# Hennepin County Landowner Guide for Conserving Natural Resources

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This guide is intended to help landowners care for their land and the natural resources on their property. The guide recommends practices that can be implemented to protect and enhance natural systems. Each section also suggests resources and publications that offer additional, more specific information for each subject area.

This guide provides information regarding natural areas such as prairies, wetlands, water resources and woodlands. Information about the control of noxious weeds and invasive plants, management of pastures and livestock, maintenance of private wells and septic systems, care of wildlife habitat, and management of household wastes is also included. By promoting environmental stewardship, we hope to preserve and enhance the environment in Hennepin County for current and future generations.

This resource was produced by Hennepin County Environmental Services in partnership with the University of Minnesota Extension Service of Hennepin County.
Assess your current conditions

The first step in deciding how you are going to manage your property is to assess the current condition of your land. The following are some things you should consider when assessing your land.

Soil

Determine the kind of soil you have on your property. A soil survey and additional information on soils is available through the Natural Resources Conservation Service (NRCS) at soils.usda.gov.

Look for any areas of exposed soil where erosion might be an issue. Exposed soil can be eroded by wind or water. Wind erosion can remove the top layer of soil and decrease land productivity, and sediment carried by water erosion can negatively impact water quality.
Drainage
Assess how water drains on your land. Look for areas that are especially wet or dry. Are there areas that are prone to the formation of mud? Does water drain over areas of manure or bare soil? Identifying especially wet or dry areas can help you determine which plant species are best suited for specific areas and help you decide on the best strategies for protecting water quality.

Natural areas
Are there any natural areas, such as forests and woodlands, prairies and wetlands, or open areas on your property? Natural areas can provide habitat for wildlife, recreational opportunities for landowners and help protect water quality. Hennepin County has prepared a Natural Resources Inventory (See For more information, pg. 5) and a Wetland Inventory (See Identify wetlands on your property pg. 28) to help you identify natural areas on your property.

Consider the condition of natural areas on your property:

Forests and woodlands – What is the dominant tree species? Are the trees young or old? Are there invasive plants or noxious weeds? (See Plants that Need to be Controlled, pg. 18)

Open areas – What is the dominant vegetation – grassland, pasture, crops, brush or shrubs? Are there any invasive plants or noxious weeds?

Wetlands – What type of wetlands do you have – do the wetlands contain water year-round or are they seasonally flooded? (See Preserving Wetlands, pg. 27)

Water resources
Are there any lakes, streams or ponds on your property? What is the quality of your water resources? Are there any invasive aquatic species? What is the condition of your shorelines? Maintaining healthy shorelines, preventing the spread of invasive aquatic species, reducing runoff and using the proper amounts of pesticides, herbicides and fertilizers can help protect water quality. (See Protecting Water Resources, pg.22)

Buildings
Where are the buildings located on your property? Are there any buildings you would like to remove? Are you going to construct any additional buildings?
Decide how you would like to use your land

After you have assessed the current condition of your land, decide how you would like to use your land.

Recreation
Are you going to use your property for recreation such as boating, fishing, hiking, hunting or bird watching? Preserving natural areas and protecting water quality can enhance the recreational opportunities on your property.

Pastures
Are you going to keep any animals, such as horses, cows, sheep or goats, on your property? Proper pasture layout and management is important for protecting the health of your animals and your land. The University of Minnesota Extension offers assistance to landowners in pasture layout and management. (See Managing pastures and livestock, pg. 34)

Wildlife
Do you want to attract wildlife to your property? There are a variety of steps you can take to attract wildlife to your property, including preserving natural areas, providing nesting habitats and making food and water available. (See Providing Habitat for Wildlife, pg. 30)

Shelter
Would you like more protection from harsh winds? Establishing a windbreak can shelter your property from harsh winds and reduce energy use. (See Save energy by installing a windbreak, pg. 16)

Privacy
Would you like more privacy? Establishing plants or trees and preserving natural areas can increase privacy.

Landscaping
Are there areas on your property where you want to add landscaping features? The Quick Reference Guide to Earth-Friendly Home Landscaping, available at www.hennepin.us/sustainablelandscaping, has information on a wide variety of landscaping projects, such as planting rain gardens, maintaining shade trees and using native plants.
Develop a plan

Decide what management activities and projects you would like to accomplish on your land. Consider your time and budget limitations. Set a schedule with short-term (the next year or two) and long-term goals.

Working from the ground up—
Improving soil

Soil is an ever-changing and complex matrix of sand, silt and clay particles along with water, organic materials and living organisms. Soil acts as the foundation for your land. The type and condition of your soils will determine the type and amount of vegetation and animals that your land can sustain.

Have your soils tested

Knowing the condition of soil on your property is important for determining how to maintain the health of your soils. The University of Minnesota Soils Testing Laboratory can provide valuable information on the current condition of your soil, such as nutrient levels, soil structure and pH, and make recommendations for improvement.

Prevent erosion

The top layer of soil often has more organic material than deeper soil. The top layer of soil is also the first to erode. If the topsoil erodes, the land will become less productive. You can prevent erosion by establishing vegetation on bare soil, maintaining a buffer of vegetation on your shorelines and properly managing pastures.

Add organic matter

Organic matter is an important component of soil health. It increases the soil’s capacity to absorb and release nutrients. It improves moisture-holding capacity of sandy soils and the drainage capability of heavy clay soils. It also improves the structure of soil by providing a good environment for root growth and by encouraging the growth of microorganisms that are beneficial to plant health. You can increase organic matter by planting perennial plants, adding compost to your soil and appropriately applying manure. The amount of organic matter needed depends on the condition of your soil. (See Soil, pg. 1)
Creating a base map

Creating a map of your property can be useful in deciding how you are going to manage your land. A base map can help you determine what features you currently have on your property and help you plan what you would like to do with your land.

Information on creating a map and finding aerial photos is available from Hennepin County Environmental Services, the University of Minnesota Extension at www.myminnesota.woods.umn.edu, search: maps, or the Minnesota DNR at www.dnr.state.mn.us, search: landview.

For more information

- Hennepin County
  Environmental Services –
  www.hennepin.us/environment
  612-348-3777

- Natural Resources Conservation Service
  (NRCS) – soil survey
  www.soils.usda.gov

- Minnesota Department of Natural
  Resources – landview maps
  www.dnr.state.mn.us/maps/landview.html

- University of Minnesota Extension –
  creating maps
  www.myminnesotawoods.umn.edu/
  minnesota/minn_maps.html

- University of Minnesota
  Soils Testing Lab
  soiltest.cfans.umn.edu
  612-625-3101
Identifying and Protecting Natural Areas

Natural areas on your property

To find out if part or all of your property is located within a natural area, check the Hennepin County Natural Resources Inventory available at www.hennepin.us/naturalresources. The inventory identifies the remaining natural areas in the county as well as important corridors or greenways that link areas of ecological significance throughout the county. Corridors are important because they facilitate the growth and movement of wildlife and native vegetation between natural areas.

If your property is located within a natural area or corridor, Hennepin County encourages you to manage, protect and enhance the natural resources on your land.

Landowners play an important role in protecting the natural areas that still exist within Hennepin County. Natural areas are lands that consist primarily of native vegetation and have not been significantly altered by human activity. There are a variety of natural areas in Hennepin County, including different types of forests, prairies and wetlands.

Natural areas are important for several reasons. They provide critical habitat for wildlife and recreational opportunities for landowners, and they can protect water quality and provide flood control.
Implement Best Management Practices

Best Management Practices (BMPs) are projects or practices that landowners can implement that preserve or restore critical habitats, reduce erosion, control nutrient runoff, control invasive species, and protect or improve water quality.

Examples of BMPs include, but are not limited to:
- Native vegetation restoration or establishment
- Steam bank stabilization
- Wetland restoration
- Noxious weed and invasive species control
- Livestock, manure and pasture management
- Filter strips and buffers
- Clean water diversions

Hennepin County provides technical assistance to landowners implementing BMPs. More information on how to implement BMPs in specific types of natural areas can be found throughout this guide.

Consider establishing a conservation easement

Conservation easements are one of the most effective tools available for permanently preserving private lands as open space. The establishment of a conservation easement restricts development and certain types of use on a piece of property in perpetuity in order to protect its natural resources. Conservation easements are legally binding agreements that can be either voluntarily donated or sold by the landowner. They protect land for future generations while allowing owners to retain many private property rights and potentially providing them with tax benefits.

Hennepin County holds conservation easements that range in size from a half acre to almost 100 acres. Hennepin County provides technical assistance for tasks related to establishing conservation easements, such as surveys, title work, appraisals and practice implementation.

To protect water quality and prevent erosion, don’t mow to the water’s edge and maintain a buffer of native vegetation.
For more information

- Hennepin County
  Natural Resources Inventory
  www.hennepin.us/naturalresources
  612-348-3777

- Minnesota Land Cover
  Classification System
  MN Department of Natural Resources
  www.dnr.state.mn.us/mlccs/index.html

- Ecology of Greenways: Design and function of linear conservation areas
  Smith, Daniel S. and Paul Cawood Hellmund
  University of Minnesota Press

- Field Guides to the Native Plant Communities of Minnesota
  Minnesota Department of Natural Resources, St. Paul, Minnesota. 2005.
  www.dnr.state.mn.us/npc/index.html

- Greenways: A guide to planning, design and development
  Flink, Charles A. and Robert M. Searns.

- Minnesota's Native Vegetation: A Key to Natural Communities
  Aaseng, Norman E., John C. Almendinger, Robert P. Dana, Barbara C. Delaney, Hannah L. Dunevitz, Kurt A. Rusterholz, Nancy P. Sather and Daniel S. Wovcha.
  Minnesota Department of Natural Resources, St. Paul, Minnesota. 1993.
  files.dnr.state.mn.us/eco/nhrnp/nckey.pdf

- Preserving Family Lands: Essential Tax Strategies for the Landowner
  Small, Stephen J. Landowner Planning Center, Newton, Massachusetts. 1998.
  www.preservingfamilylands.com
North American prairies are one of the rarest ecosystems in the world – only one percent are still intact. By protecting existing prairies or choosing to establish a prairie, landowners can help restore natural heritage and promote ecological diversity.

Protect existing prairies

Pre-existing, remnant or pre-settlement prairies are quite rare in Hennepin County. If a landowner has an existing native prairie, care should be taken to preserve and maintain the prairie in its natural state.

If there are areas of weeds in a prairie, spot treatments for weeds and undesirable plants can be done after consulting with a prairie expert. Avoid plowing or spraying large sections of remnant prairies as this can seriously affect existing biological diversity.
Remnant prairies may be protected under conservation programs that place management restrictions on the land. These programs are the Conservation Reserve Program (CRP), Reinvest in Minnesota (RIM) or the Natural Resources Critical Habitat program (NRICH). If there is an existing prairie on CRP land on your property, contact the Natural Resources Conservation Service (NRCS) to identify any restrictions or management schedule. Contact Hennepin County for information about planted prairies on RIM or NRICH contracted lands.

Establish a prairie

Native prairie plants can be established on sites ranging in size from a small garden to hundreds of acres. Because of their hardiness, prairie plants are a good option on sites where other plants may not have been successful.

Establishing a prairie is an exciting and ever-changing process that requires an initial commitment of time and resources. It typically takes three to five years to establish a prairie. Once established, the prairie will require periodic maintenance, and you will be able to observe how the land changes subtly throughout the growing seasons and over the years.

There are several steps to establishing a prairie.

1. Select and assess your site
   Assess the amount of moisture and light that the land receives, the soil type, the slope, drainage issues and existing, and adjacent vegetation. Prairie plants will grow best in areas that receive full sunlight most of the day. Be sure to identify any existing weeds or undesirable plants that will need to be reduced or eliminated.

2. Prepare the site
   The goal of site preparation is to reduce weed competition before planting. Identify weed problems and, based on the weed species, decide if you will use an herbicide or a mechanical method, such as plowing or disking, or a combination of control methods to remove existing, unwanted vegetation (See Plants that Need to be Controlled, pg. 18).

3. Select your plants species
   Choose plants that are suitable for the soil type and moisture and light conditions of your location. To ensure that your prairie is ecologically diverse, choose a minimum of 15 plant species. This should include five to seven different types of grass, of which two to three should be cool season varieties, and eight to ten wildflowers species. You can work with Hennepin County or a local nursery, landscaping professional or seed supplier to develop a seed mix for your site.
4. Seeding

You can seed the site once unwanted vegetation has been reduced or eliminated. Seeding can be done in the spring from mid-May to mid-June or in the fall from mid-October to when the ground freezes.

On smaller sites, seeds can be spread by hand and raked into the soil to a depth of 1/8 inch. For larger sites, seeds can be planted with a no-till drill or broadcasted with a seeder and then cultipacked.

In most cases watering should be avoided as it can be detrimental to the establishment of a drought-resistant prairie.

If the site has large existing weed populations, you may want to consider a two-step approach to planting in which wildflower species, the most expensive component of the seed mix, are added after weeds are under control. In the first few years, only seed prairie grasses and perform ongoing management of weeds with chemical and mechanical methods. Burn the prairie in the third year to further reduce weed populations. Native wildflower species can be seeded after burning once the weeds are under control.

General management steps for prairie establishment

| YEAR 0 | Site prep to remove perennial vegetation and reduce weed species. |
| YEAR 0 Fall | If good control of weeds and introduced species is attained, seed native grasses and flowers after Oct. 15. Mow during the year when required to prevent weeds from seeding. |
| YEAR 1 Spring / Summer | Seed grasses and flowers if not seeded the previous fall. Keep site mowed to a height of 6 inches throughout the year. Control weeds as needed. |
| YEAR 2 Spring | Mow to a height of 6 to 8 inches at least once when growth reaches 12 to 16 inches. Another mowing may be required in late summer to prevent weeds from producing seeds. |
| YEAR 3 April 15 to May 15 | If plant residue is evident, burn or mow the area before growth begins. If forbs (flowers) were not planted for reasons of weed control in year one, plant them following the burn and drag or cultipack them in if broadcasting. |
| FUTURE YEARS | Spot treat perennial weeds. Burn or early mow every three to five years, or burn one-third of the site every year. |

(excerpts from MN DNR brochure Establishing Prairie Grasses and Wildflowers)
5. Manage your prairie

Good weed control is especially important during the first five years of prairie to help prairie plants out-compete weeds. After the prairie is well-established, you will need to implement some ongoing management and control of noxious weeds and/or invasive plants.

Depending on the size of the site, weeds can be removed with an herbicide application, mechanical methods or with hand-pulling if the number of weeds is small.

Periodic burning or mowing can also be used to control unwanted plants. Burning or mowing is usually done in April and May. Fall burns can be beneficial to the establishment of wildflower species.

Before burning, be sure to obtain all necessary permits and follow local regulations. Check with your local fire station or city hall about necessary burn permits. Training on prescribed burns and equipment may be available through your local Minnesota DNR office.

For more information

- **A Quick Reference Guide to Earth-Friendly Home Landscaping** has information about incorporating native prairie plants and wildflowers into landscaping projects. Hennepin County Environmental Services. 
  www.hennepin.us/sustainablelandscaping 
  612-348-3777

- **A Practical Guide to Prairie Reconstruction**
  Kurtz, Carl. University of Iowa Press
  Iowa City, Iowa. 2001.

- **Establishing prairie grasses and wildflowers**
  Minnesota Department of Natural Resources, St. Paul, Minnesota.
  files.dnr.state.mn.us/assistance/backyard/privatelandsprogram/est-prairie-grasses-wildflowers.pdf

- **Going Native: A Prairie Restoration Handbook for Minnesota Landowners**
  Kilde, Rebecca.
  Minnesota Department of Natural Resources, St. Paul, Minnesota. 2000.
  files.dnr.state.mn.us/assistance/backyard/prairiестoration/goingnative.pdf

- **Landscaping with Native Plants of Minnesota**
  Steiner, Lynn M.

- **Native Plant Communities of Minnesota**
  (Field Guide Series)
  Minnesota Department of Natural Resources, St. Paul, Minnesota. 2005.
  www.dnr.state.mn.us/npc/index.html

- **Native Plants for Northern Gardens**
  Snyder, Leon C., Andersen Horticultural Library

- **The Tallgrass Restoration Handbook for Prairies, Savannas, and Woodlands**
  Packard, Stephen and Cornelia F. Mutel,
Managing Forest and Woodland Areas

Forests and woodlands can be a great asset to your property. Forests and woodlands can provide recreational opportunities for landowners and critical habitat for many wildlife and plant species. Trees are also essential in converting carbon dioxide into oxygen and can be a source of fuel, lumber, fruits, nuts and syrup.

Protecting forest remnants

The forests in Hennepin County are remnants of what used to be a large contiguous forest system commonly known as the Big Woods. Due to development, only a small percentage of fragmented forest remains today. Landowners can protect the remaining forest remnants by identifying and managing existing forest remnants on your property.
Forest and woodland types

There are five main forest or woodland types in Hennepin County.

Maple-Basswood Forest – These Big Woods remnants are the most common forest type found in Hennepin County. These forests grow in moist, well-drained soils.

Oak Forest – These forests are found most often in the transition zone between Maple-Basswood forests and prairies.

Flood Plain Forest – These forests are found along major rivers and streams in soils that flood seasonally.

Lowland Hardwood Forest – These forests are found in low-lying areas, such as in wetlands or adjacent to lakes.

Oak Savanna – This woodland is an upland fire-dependent plant community formed of prairie herbs with scattered trees or groves of trees.

For more detailed information on the forest and woodland types, including species found in each type, see the Field Guide to the Native Plant Communities of Minnesota (See For more information, pg. 17).

Forest and woodland management

Management of forested or woodland areas primarily consists of controlling invasive species, monitoring for and controlling tree diseases and pests, and replanting forest species where major disturbances, such as wind damage, logging or plant removal, has occurred.

Control invasive species

Invasive species can spread rapidly in a forest and out-compete native species. European buckthorn and garlic mustard are invasive species commonly found in forests in Hennepin County.

A variety of biological, chemical, cultural and mechanical methods can be implemented to reduce or control populations of invasive forest species.

(See Plants that Need to be Controlled, pg 18)

Monitor for and control tree diseases and pests

Tree diseases and some insect species can negatively impact forest health. The severity of tree diseases and pests vary – some are treatable while others can kill trees. Once introduced, some diseases and pests can spread to other trees of that species in the forested area.

Diseases and pests can impact the foliage, bark or roots of a tree. Early identification and management of tree diseases and pests can help protect the health of your forest. Landowners should become familiar with the types of diseases and pests that could affect forest or woodland areas and then monitor forested areas for any problems.
The University of Minnesota Extension has a searchable guide to diagnosing and managing plant diseases available at www.extension.umn.edu, search: plant disease diagnostics. The Minnesota Department of Agriculture also has information on tree and plant diseases available at www.mda.state.mn.us/plants.

Managing removal of dead or fallen trees
If trees in your forest or woodland die or blow down, removal of most of the dead or fallen trees is recommended within the affected area. Leaving some downed or dead trees is desirable as they will provide important wildlife habitat. A wide variety of animals, including insects, birds, squirrels and raccoons use snags (dead trees with cavities) for habitat. It is desirable to have a minimum of six snags per acre. If the tree is diseased, it should be removed to prevent the spread of the disease.

When a tree is removed, replant the area with trees, shrubs and other herbaceous understory plants native to the forest or woodland community to prevent establishment of invasive species.

Selective harvesting
Selective harvesting of mature trees can improve the overall health of your forest or woodland. This should only be done after consultation with a qualified forester and careful consideration of potential impacts to the forest’s integrity.

Reestablishing native species
To promote forest diversity, a variety of native plant species should be established where needed. Native species that may need to be replanted in a forest include trees, shrubs and herbaceous understory plants. Contact Hennepin County or the University of Minnesota Extension for more information on reestablishing native species and for site-specific plant lists.

The dieback in this Green Ash is caused by the Emerald Ash Borer. Loss of foliage is one sign that a tree may be impacted by a disease or pest.
Planting trees in your forest or woodland

Bare root seedlings are typically used when replacing trees in your forest or woodland. The following technique is the most commonly used method for planting the seedlings.

Bare root hand planting technique

1. Drive a shovel into soil. Pull the handle toward you to open the bottom of the hole.
2. Set the seedling vertically, one to three inches deeper than the nursery depth.
3. Push the top soil back into the hole with the back of the blade.
4. Pack the soil firmly with your heel.

Protect trees from livestock

Livestock can damage tree roots by compacting the soil. Livestock can also damage or even kill trees by eating or stripping the bark. To prevent damage, livestock should be fenced out of forested areas.

Planting a woodland

Planting a woodland requires proper planning and site preparation. To learn more, read the Minnesota Tree Planting Handbook, visit www.myminnesotawoods.umn.edu, search: tree planting, or contact a forestry professional.

Save energy by installing a windbreak

Windbreaks or shelterbelts are used to modify wind flow to reduce energy use in homes, control snow drifting on roads and protect fields from wind erosion. By blocking homes from harsh winter winds, windbreaks can reduce annual fuel bills by 10 to 20 percent.

Windbreaks can be made up of one row or a few rows of trees and shrubs. Depending on the species selected, trees used in windbreaks can provide wildlife habitat and effective erosion control for crop fields.

Windbreaks should be placed on the prevailing wind side of a house, field or road. In Hennepin County, the prevailing winds are from the northwest. Hennepin County or the University of Minnesota Extension can provide assistance designing a windbreak and selecting tree and shrub species.

Windbreaks modify wind flow and can reduce energy use in homes.
For more information

- University of Minnesota Extension
  Database of tree professionals
  www.myminnesotawoods.info/assistance/assi_loc_home.aspx

- Forest resources
  www.myminnesotawoods.org
  www.extension.umn.edu/foreststewardship

- Minnesota Department of Natural Resources
  Forest information
  www.dnr.state.mn.us/forests/index.html
  www.mntrees.org
  Forest health information
  www.dnr.state.mn.us, search: forest health

- Seedling tree sales
  1-800-657-3767
  www.dnr.state.mn.us/forestry/nurseries/ordering.html

- Minnesota Tree Care Advisors
  612-625-3765
  www.mntca.org

- Natural Resources Conservation Service – windbreak information
  www.nrcs.usda.gov, search: windbreaks

- Field Guide to the Native Plant Communities of Minnesota: Eastern Broadleaf Forest Province
  Minnesota Department of Natural Resources, St. Paul, Minnesota. 2005.

- Minnesota Trees

- Trees of Minnesota Field Guide

- Windbreaks for Rural Living
  Wight, Bruce, Teresa K. Boes and James R. Brandle, University of Nebraska and the Soil Conservation Service.

- Minnesota Tree Planting Handbook
  Minnesota Department of Natural Resources, St. Paul, Minnesota. cfc.cfans.umn.edu/links/handbook.pdf

- How to Prune Trees

- Save Energy with Trees
  Minnesota Department of Commerce Energy Information Center, St. Paul, Minnesota. www.energy.mn.gov
You may have plants on your property that need to be controlled for regulatory or ecological reasons. Some plant species are considered noxious weeds, and controlling them is required under state law. Other plant species are considered invasive and need to be controlled for the ecological health of your property.

**Noxious weeds**

Minnesota statute identifies certain plants as noxious weeds because they are injurious to public health, the environment, public roads, crops, livestock or other property. The Minnesota Noxious Weed Law (MN Statutes Chapter 18 Section 18.75 to 18.88) requires the control of plants considered to be noxious weeds.

The most current list of noxious weeds, as well as photos and information on identifying them, is available from the Minnesota Department of Agriculture at [www.mda.state.mn.us](http://www.mda.state.mn.us), search: noxious weeds. Counties may add plants to the prohibited list depending on local conditions and needs.
Landowners are responsible for the control of noxious weeds on their property. If a landowner does not take the proper steps to control noxious weeds, they may receive a legal form that outlines a time period they have to control the weeds. If an effort is not taken to control the weeds, the municipal or county government that issued the notice can complete the work, and the landowner will be billed for the costs.

Report infestations of noxious weeds
Landowners can help in the control of noxious weeds by reporting infestations to the local weed inspector, who can be contacted through your city hall.

Invasive plants
Plants considered invasive are non-native species that cause economic or ecological damage. Without natural predators, invasive plants can spread rapidly in an ecosystem and out-compete native species. Invasive plants in Minnesota disrupt ecosystems and negatively impact recreational activities.

For a list, photos, description and suggested control methods for invasive species in Minnesota, visit the Minnesota Department of Natural Resources at www.dnr.state.mn.us/invasives/index.html.

Leafy spurge (Euphorbia esula) is a prohibited noxious weed that primarily infests disturbed environments including roadsides, fields, and prairies. It spreads aggressively and rapidly displaces native vegetation.

Photo courtesy of Minnesota DNR

Common buckthorn (Rhamnus cathartica) is an invasive species found in dry areas such as woodlands, savannas, abandoned fields and roadsides. It can form dense thickets that crowd out native shrubs and understory plants.

Photo courtesy of Minnesota DNR
Control and manage noxious weeds and invasive plants

Noxious weeds and invasive plants can spread quickly in an ecosystem and are often difficult to eradicate. Once they are established, it can take several years to get them under control.

Controlling noxious weeds and invasive species is easiest and most effective when plant infestations are small. By regularly monitoring your land, you can identify and control new infestations before they spread.

Identifying noxious weeds or invasive plants and understanding the plant life cycle will determine the best control method. Cultural, mechanical, biological or chemical methods can be used to control undesirable plants. Developing an integrated management program that combines several methods is the most effective way to control noxious weeds or invasive plants.

Cultural methods encourage the growth of desirable species, which in turn suppresses the growth of undesirable ones.

- Monitor areas for noxious weeds and invasive species, and deal with small infestations before they expand.
- Encourage the healthy growth of desirable vegetation, which will minimize the ability of undesirable plants to become established.
- Plant desirable species that are suited to the soils and climate of the area.

Mechanical methods include methods such as mowing, disking, tilling or pulling to control invasive plants and noxious weeds.

- Mowing can prevent some noxious weeds and invasive plants from spreading and allow desirable species to compete with the undesirable plants for food, water and light.
- Mow noxious weeds or invasive plants before they reproduce to prevent seeds from spreading.
- Mow annual and bi-annual plants before flowering to prevent seed production.
- Mow perennial plants frequently to reduce energy reserves, which will reduce plant populations over time.
- Depending on the life cycle of the weed, tilling the soil may disrupt the roots of undesirable plants. However, this method can expose the area to seeds of new weed species, so consider the area of control carefully. This method, where feasible, can be followed with reseeding or replanting of desirable vegetation.

Biological methods use live organisms, such as insects or livestock, to help control invasive species and noxious weeds. The goal of biological controls is to reduce the numbers of undesirable plants to an acceptable level instead of eradication.

- Insects are currently available for the biological control of Leafy Spurge, Spotted Knapweed and Purple Loosestrife.
- Letting your livestock graze undesirable plants can be an effective way to control the plant populations.
**Chemical methods** can be used to kill or control undesirable plants.

- Herbicides are chemicals that kill or control plants. When using herbicides, choose products that are specific to the plant species that needs to be controlled.
- To ensure that herbicide application is safe and effective, always read and follow label instructions. Use herbicides at the lowest effective label rates.

**For more information**

- Hennepin County Environmental Services  
  [www.hennepin.us/naturalresources](http://www.hennepin.us/naturalresources)  
  612-348-3777  
  You can contact Hennepin County with questions concerning the identification and control of invasive plants and noxious weeds.

- Minnesota Department of Agriculture –  
  Information on noxious weeds  
  [www.mda.state.mn.us](http://www.mda.state.mn.us)  
  651-201-6000

- Minnesota Department of Natural Resources –  
  Information on invasive plants  
  [www.dnr.state.mn.us/invasives/index.html](http://www.dnr.state.mn.us/invasives/index.html)  
  651-296-6157

- U.S. EPA – Integrated Pest Management  
  [www.epa.gov/agriculture/tipm.html](http://www.epa.gov/agriculture/tipm.html)

- *Invasive Plants of the Upper Midwest*  
  Czarapata, Elizabeth J.  
  University of Wisconsin Press  

- *Minnesota Invasive Non-Native Terrestrial Plants*  
  Minnesota Department of Natural Resources  

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**Wild parsley** (*Pastinaca sativa*) is an invasive species that spreads into disturbed habitats or along edges of prairies. Contact with the sap of this plant can cause a skin rash or blistering when exposed to sunlight.  
*Photo courtesy of Minnesota DNR*

**Garlic mustard** (*Alliaria petiolata*) is a prohibited noxious weed that spreads into high-quality woodland areas and floodplain forests where it outcompetes native species and alters the habitat for insects and wildlife.  
*Photo courtesy of Minnesota DNR*
Minnesota is known for its abundance of water resources. Hennepin County has about 200 lakes, three major rivers – the Mississippi, Minnesota and Crow – and multiple streams and ponds. Protecting the health of streams, rivers and lakes is important for recreation, water quality, wildlife habitat and tourism.

The quality of water resources in Minnesota is threatened by increasing development and pollution. A variety of human activities can be harmful to water resources. Sources of water pollution include:

- Improper agricultural practices and mismanagement of pastures and manure.
- Leaking septic systems.
- Destruction of wetlands and other natural areas.
- Runoff from lawns, roads, croplands and construction sites.
- Litter and improper disposal of waste.
- Aquatic invasive species.
- Direct discharge from industry.

Landowners can take a variety of actions to protect water quality.

### Determine your watershed

A watershed is an area of land that drains to a common lake, river, stream or wetland. Water resources are managed based on their watershed, which allows communities to work together to prevent and solve water-related problems.

Watersheds are managed by either a watershed district or watershed management organization, which are special units of local government that work to solve and prevent water-related problems. Watershed organizations regulate land-disturbing activities, perform capital improvement projects and provide environmental education related to water issues.

It is important to know which watershed your property is in as you may need to obtain a permit or submit for review certain projects on your land that affect water resources. Contact Hennepin County for assistance in determining the watershed for your property.
The major watersheds in Hennepin County.

1. Bassett Creek
   Watershed Management Commission
   www.bassettcreekwmo.org

2. Elm Creek
   Watershed Management Commission
   www.elmcreekwatershed.org

3. Lower Minnesota River
   Watershed District
   www.watersheddistrict.org

4. Middle Mississippi River
   Watershed Management Organization
   www.mwmo.org

5. Minnehaha Creek Watershed District
   www.minnehahacreek.org

6. Nine Mile Creek Watershed District
   www.ninemilecreek.org

7. Pioneer-Sarah Creek
   Watershed Management Commission
   www.pioneersarahcreek.org

8. Richfield-Bloomington
   Watershed Management Organization
   Contact the City of Richfield or the City of Bloomington for more information.

9. Riley Purgatory Bluff Creek
   Watershed Commission
   rileypurgatorybluffcreek.managedsp.com

10. Shingle Creek
    Watershed Management Commission
    www.shinglecreek.org

11. West Mississippi River
    Watershed Management Commission
    www.shinglecreek.org
Take care of your shoreline

Shoreline areas play a critical role in protecting water quality and providing habitat for fish and wildlife. Stabilizing your shoreline with native plants has many benefits.

Preventing erosion – Runoff from precipitation, waves and foot traffic all contribute to shoreline erosion. Sediment that erodes into bodies of water can reduce water clarity, carry phosphorous and other pollutants into the water, and destroy or bury habitats. The deeper root structure of tall grasses and certain native plants will help reduce erosion and provide stabilization to the soil on your shore.

Reducing runoff – The plants along your shoreline will absorb runoff and pollutants, such as chemicals, paint, oil, leaves and grass clippings. This helps to protect water quality.

Providing habitat for wildlife – Fish and wildlife are highly dependent on vegetated shorelines as they provide critical habitat for feeding, resting and mating.

Serving as a barrier to geese – Geese prefer shorelines that are mown to the water’s edge because they can keep an eye out for predators. Taller vegetation, including certain native grasses, will discourage geese from coming onto your shore.

To take care of your shoreline:

- Don’t mow down to the lake or stream edge. Instead, maintain a buffer of native plants between your lawn and the water’s edge.
- Plant a variety of native species along your shoreline. They will provide wildlife habitat and their deep root structures will help to stabilize your shore.

The Minnesota Department of Natural Resources has an interactive website that will help you design a native planting for your lakeshore. Visit www.dnr.state.mn.us/shorelandmgmt/index.html.

Avoid or control invasive aquatic species

Invasive aquatic plants and animals threaten Minnesota’s water resources because they can clog waterways, out-compete native species, infiltrate water treatment plants and negatively impact water-based recreation.

Common invasive aquatic species in Minnesota include:

- Zebra mussel
- Purple loosestrife
- Eurasian watermilfoil
- Spiny water flea
- Round goby
- Curly leaf pondweed

Landowners can help prevent the spread of invasive species by taking the following actions.
Keep septic systems working properly
Maintaining a healthy septic system will help protect the quality of nearby water resources. Establish and follow an appropriate maintenance schedule, and have your system inspected regularly. (See Maintaining Septic Systems, pg. 42, for more information.)

Modify your landscaping practices
How you take care of your lawn can impact water resources. Phosphorous from leaves, grass clippings, pet waste and fertilizers can cause rapid growth of algae in lakes, which turns lakes green and can be unsafe for pets. Stormwater running over driveways and lawns can carry pollutants like oil, paint and chemicals into nearby streams and rivers. There are a few simple steps you can take to minimize the impact that your lawn care practices have on water quality.

- Keep storm drains clear of debris and pollutants.
- Reduce runoff by utilizing rainwater – plant a rain garden, install a rain barrel, and direct downspouts so that they pour into gardens or onto your lawn.
- Don’t rake leaves into a body of water and avoid piling leaves along shorelines or in wetlands.

Remove any aquatic plants and animals from the propeller and underside of your boat and trailer every time you move your boat from one body of water to another. This will prevent invasive species from being transported to other bodies of water.

Drain bilge water when removing your boat from a body of water to avoid transporting infested water to another location.

Dispose of any unwanted bait in the garbage instead of in bodies of water.

Use desirable plants in your pond and along your shoreline to suppress the growth of invasive species that can alter and dominate ecosystems.

Never release aquatic pets or plants into the wild. It is illegal in Minnesota to release aquarium pets including fish, amphibians and turtles into the wild because they can expose native fish to diseases and parasites.

Know which lakes and rivers are infested. The Minnesota Department of Natural Resources maintains a list of infested waters, available at www.dnr.state.mn.us/eco/invasives.html.

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For more information

- Minnesota Department of Natural Resources Lakefinder
  www.dnr.state.mn.us/lakefind

- Metro WaterShed Partners
  www.cleanwatermn.org

- Habitattitude
  Information about keeping aquatic pets and plants out of waterways.
  www.habitattitude.net

- A Quick Reference Guide to Earth-Friendly Home Landscaping
  Hennepin County Environmental Services.
  More information on lawn care practices that help protect water quality.
  www.hennepin.us/sustainablelandscaping.

- A Citizens’ Guide to Lake Protection

- Lakescaping for Wildlife and Water Quality

- Shoreline Alterations: Natural Buffers and Lakescaping.
  Minnesota Department of Natural Resources, St. Paul, Minnesota.
  files.dnr.state.mn.us/publications/waters/shorelineAlterationsLakescaping.pdf
Preserving Wetlands

Wetlands act as a transition between water and land. In wetlands, the flow of water, the cycling of nutrients and the energy of the sun meet to produce one of the most unique and diverse ecosystems in the world.

The unique physical, chemical and biological functions of wetlands provide numerous benefits to people and wildlife including the following.

**Improved water quality** – Wetlands help protect water quality by absorbing sediment and other pollutants from runoff.

**Reduced flooding** – Wetlands help reduce flooding by retaining runoff after rainfall.

**Protection of shorelines** – Wetland vegetation stabilizes shorelines and minimizes erosion from waves.

**Recharge and discharge of groundwater** – Wetlands help replenish groundwater levels by retaining and infiltrating runoff and precipitation.

**Fish and wildlife habitat** – Wetlands provide diverse habitats for amphibians, birds and other wildlife and spawning areas for fish.

**Opportunities for recreation and aesthetic enjoyment** – Wetlands provide many opportunities for people who enjoy hiking, biking, bird watching and viewing natural areas.
Types of wetlands in Hennepin County

Hennepin County has a wide variety of wetland types. Although wetlands are often filled with water, they do not necessarily contain water year-round. Some of the most important wetlands are only wet a small portion of the year. Wetlands in Hennepin County vary from small seasonally flooded areas to large shallow water basins to wooded bogs.

The Wetland Conservation Act

The Minnesota Wetland Conservation Act (MN Rule Ch. 8420) was enacted to maintain and protect wetlands and the benefits they provide. Under the Wetland Conservation Act, filling or draining a wetland without a permit is against the law.

You can avoid the expense and inconvenience associated with violating the Wetland Conservation Act by checking with local authorities before starting any activity on a wetland area. Your city and watershed organization can offer advice regarding whether a permit is needed for the proposed activity, how and where to apply for permits, and how to minimize the environmental impact of your project.

If you suspect that a wetland has been illegally filled, please contact the city, watershed organization or DNR Conservation Officer where the suspected violation is occurring.

Identify wetlands on your property

There are three ways to identify wetlands on your property.

- **Look for wetland characteristics.** The wetland characteristics are:
  - Hydric (saturated) soils
  - Hydrophitic (water-loving) vegetation
  - Hydrology (presence of water)
- **Check wetland inventories.** Wetland inventories can help you identify the location and type(s) of wetlands on your property.
  - The Hennepin County Wetland Inventory is available from Hennepin County Environmental Services.
  - A National Wetland Inventory is available from the United States Fish and Wildlife Service at [www.fws.gov/wetlands](http://www.fws.gov/wetlands).
- **Hire a wetland consultant to delineate wetlands on your property.** A wetland delineation will determine the exact size and type of wetlands on your property. A list of certified wetland consultants is available from the Board of Water and Soil Resources at [www.bwsr.state.mn.us](http://www.bwsr.state.mn.us).

There are a wide variety of wetland types in Hennepin County Wetlands can vary from:

1. seasonally flooded areas to
2. shallow water basins to
3. wooded bogs
Protect and enhance the wetlands on your property

If you have wetlands on your property, you can take several actions to protect and enhance them.

- If you are considering digging a pond, cleaning a ditch or filling a wet area on your property, check first with your local city government and/or watershed organization (See Watersheds, pg. 23) to make sure the work will not impact a wetland.
- Maintain a buffer – a natural, undisturbed area of native vegetation – around the perimeter of the wetland.
- Plant a variety of native vegetation within and around your wetland. Plantings should be suitable for the type of wetland on your property.
- Keep grass clippings, tree branches, soil, leaves, gravel, other yard materials and fill out of the wetland.
- Restore water levels of wetlands that have been ditched or drained in the past. Removing sediment that has built up in a wetland will help restore water levels. Check with Hennepin County or your watershed organization to determine the best method for restoring water levels.

For more information

- Board of Soil and Water Resources
  www.bwsr.state.mn.us
  651-296-3767

- Minnesota Department of Natural Resources
  www.dnr.state.mn.us
  651-296-6157

- United States Fish and Wildlife Service
  www.fws.gov/nwi

- US Army Corp of Engineers, St. Paul District Regulatory (wetlands permits)
  www.mvp.usace.army.mil
  651-290-5375

- Classification of Wetlands and Deepwater Habitats of the United States
  Cowardin, Lewis M., Virginia Carter, Francis C. Golet and Edward T. LaRoe.

- Floristic Quality Assessment for Minnesota Wetlands
  Milburn, S.A., M. Bourdaghs and J.J. Husveth

- Minnesota Routine Assessment Methodology (MnRAM)
  www.bwsr.state.mn.us/wetlands/mnram

- U.S. Army Corps of Engineers
  Wetlands Delineation Manual
  Environmental Laboratory.
  U.S. Army Engineer Waterways Experiment Station,
  Vicksburg, Mississippi. 1987.
  el.erdc.usace.army.mil/wetlands/pdfs/wlman87.pdf

- Wetland Conservation Act Rules
  Chapter 8420
  The Office of Revisor of Statutes
  St. Paul, Minnesota.

- Wetland Plants and Plant Communities of Minnesota & Wisconsin
  Eggers, Steve D. and Donald M. Reed.
Providing Habitat for Wildlife

By preserving natural areas and establishing certain plant species, landowners can provide habitats that will attract a variety of wildlife species ranging from songbirds and butterflies to squirrels and white-tailed deer. Providing wildlife habitat will allow you to enjoy viewing animals in their natural setting right in your backyard. Some wildlife species can also control pests. Birds and bats can reduce populations of mosquitoes and other pesky insects and raptors such as hawks, eagles and owls can control rodents.

Wildlife habitat is a combination of food, water, shelter and space. Any size area of land can be managed to attract wildlife. Small yards can be landscaped to attract birds, butterflies, beneficial insects and small animals, and larger tracts of land can be managed to attract larger mammals and birds.
Provide food

Providing the food necessary for desired species can attract them to an area. Think about what species you would like to attract, and research what food they need. Some animals will eat a wide variety of food, while others have very specific food requirements.

Provide food for wildlife year round by planting trees and shrubs that provide berries, nuts and acorns. The Quick Reference Guide for Earth-Friendly Home Landscaping has a list of trees, shrubs and wildflowers that will attract wildlife.

Provide a water source

A water source is an essential component of wildlife habitat. Abundant water in an accessible form can mean the difference in survival for some animals.

Preserving natural bodies of waters, such as lakes, ponds, wetlands and streams, and protecting water quality will ensure that wildlife have access to clean water. You can improve water quality by maintaining healthy shorelines, preventing the spread of invasive aquatic species, and reducing runoff and pollution. (See Protecting Water Resources, pg. 22 and Preserving Wetlands, pg. 27)

If you do not have a natural body of water on your property, you can provide water for wildlife by including a water feature, such as a bird bath or landscaping pool, in your landscaping plan.

Provide shelter

As with people, animals, birds and insects need a place to sleep, escape the elements, and raise their young or lay eggs. Some wildlife species require a very specific environment, while others are more flexible in their living arrangements. For example, bird species tend to only use birdhouses of specific shapes and sizes that are placed in the correct location. The following are steps you can take to provide shelter for wildlife.

Maintain a buffer of vegetation along shorelines to provide nesting cover for birds. (See Take Care of your Shoreline, pg. 24)

Manage grassy areas to provide habitat for ground nesting birds such as meadowlarks, killdeer and bobolinks. Correctly timing when you mow is critical for allowing nesting birds to hatch their broods. Only mow or burn established prairies from April 15 to May 15 or after Aug. 1 to avoid disturbing the nesting habitat.

Place bird and bat houses on your property. Songbirds and bats will help control flying insect populations.

Provide nesting boxes for waterfowl where appropriate. It is important to investigate the shelter requirements of each type of bird desired to ensure that nesting boxes are the correct shape and in the correct location at the right time of year.

Provide shelter, continued on next page
Leave standing snags (dead trees with cavities) in your woodland areas. Snags provide food and shelter to a wide variety of wildlife species. Leave about six snags per acre.

**Preserve open space**

Wildlife of all types require space to move from area to area and to forage for food. Different species will require different amounts of space, and some are less willing to live in close proximity to people than others. Take the following steps to preserve space for wildlife on your property.

**Preserve any existing natural areas on your property,** including forests, prairies and wetlands.

**Preserve corridors and travel lanes that facilitate the movement of wildlife** between natural areas. Shelterbelts (groups of trees and shrubs that provide food and shelter) and fence rows (unmowed areas of tall grass along a fence line) provide cover, travel lanes and food for wildlife.

**Conflicts with wildlife**

Wildlife can occasionally damage crops or property. If wildlife is causing a problem on your property, there are several resources you can turn to for help.

- Minnesota Department of Natural Resources  
  www.dnr.state.mn.us/livingwith_wildlife  
  651-296-2316

- University of Minnesota  
  Bell Museum of Natural History  
  Wildlife Information Services  
  www.bellmuseum.org/wildlife_infoservices.html  
  612-624-1374

- Internet Center for Wildlife Damage Management  
  www.icwdm.org/handbook/index.asp

Preserving natural areas and corridors will provide shelter, food and travel lanes for wildlife.
For more information

- Minnesota Department of Natural Resources
  Wildlife publications and reports
  www.dnr.state.mn.us/publications/wildlife/index.html

- Private lands program
  www.mndnr.gov/privatelandsprogram

- National Wildlife Foundation
  www.nwf.org/backyard

- NRCS Wildlife Habitat Incentive Program (WHIP)
  www.nrcs.usda.gov/programs/whip

- Lakescaping for Wildlife and Water Quality
  Henderson, Carrol L., Carolyn J. Dindorf, Fred J. Rozumalski.
  Minnesota Department of Natural Resources, St. Paul, Minnesota.
  1998.

- Landscaping for Wildlife
  Henderson, Carrol L.
  Minnesota Department of Natural Resources, St. Paul, Minnesota.
  2002.

- Wildlife Habitat
  Natural Resources Conservation Service, Washington, D.C.
  1998.

- Woodworking for Wildlife
  Henderson, Carrol L.
  Minnesota Department of Natural Resources, St. Paul, Minnesota.
  2009.
Managing Pastures and Livestock

By establishing proper pasture layout, implementing certain grazing techniques and properly managing manure, landowners can ensure the health of their land and prevent the pollution of nearby water resources.

Protect water resources

Bodies of water can become polluted by runoff from rainwater or snow carrying nutrients, animal waste, bacteria and agricultural chemicals. Landowners that have livestock, including horses, cattle, sheep and goats, can implement several techniques to prevent runoff carrying pollutants from reaching water resources. If water becomes polluted on a person’s property, action can be taken to clean it up before the water leaves the property.
Prevent water pollution

Landowners can take action to prevent water pollution, decrease erosion and reduce the formation of mud. Reducing mud is safer for animals and more convenient for owners. Preventative measures are important because it is much less expensive to prevent water from getting dirty than it is to clean it up.

- Locate buildings, livestock holding areas, manure and high traffic areas out of swales and natural water flows. Placing these areas on top of a hill is better than in a valley because less water flows through the area.
- Use clean water diversions such as berms, rain gutters, waterways and drain tile to move clean water around livestock and manure storage areas and bare soil.
- Store and dispose of manure to reduce its contact with stormwater.

Clean up dirty water

Even after diverting as much clean water from high traffic areas as possible, some water will inevitably run through areas of bare soil and manure. Several techniques can be used to clean up dirty water.

Livestock exclusion – Fence animals out of creeks, streams, wetlands, ditches and wooded areas. If your animals need access to drinking water, create a stabilized access point to a body of water or run water pipes to your pastures.

Vegetative filter strip – Filter strips act as a buffer along the edge of bodies of water. Filter strips can clean up dirty water by slowing it and allowing sediment to drop out or the water to soak into the ground before reaching a body of water. Filter strips are commonly 30 to 50 feet wide, although the appropriate width for a given area depends on the slope steepness and soil type. Plants in filter strips should be 8 to 10 inches in height. To ensure that the filter strip will continue to absorb nutrients, plants should be mown, grazed or harvested down to 4 to 6 inches a few times a year.
Settling basin – In a settling basin or collection pond, nutrients and sediment settle to the bottom so water leaving the pond is cleaner. Engineering assistance is required to ensure proper basin design, size and location. Contact Hennepin County or the Natural Resources Conservation Service (NRCS) for assistance.

Maintain healthy soils

Maintaining healthy soils will help you produce more forage for your animals and help protect water quality.

Avoid compacting soils – Growth of plant roots is limited in compacted soil. To prevent soil from becoming compacted, keep animals and vehicles off the soil when it is wet.

Limit the number of animals on sandy soils – Sandy soils can support the least amount of plant growth because they hold the least amount of water. Sandy soils are also more prone to erosion. The number of animals on sandy soils should be limited to prevent overgrazing and erosion.

Increase organic matter in the soil and encourage plant growth – Increasing organic matter improves the water retention of sandy soils, increases water movement through clay soils, and provides nutrients for plants. You can increase organic matter by preventing overgrazing of pastures, amending the soil with compost and appropriately applying manure.

Control or reduce erosion – The top layer of soil often has more organic material than deeper soil. The top layer of soil is also the first to erode. If the topsoil erodes, the land will become less productive. You can prevent erosion by establishing vegetation on bare soil and properly managing pastures.

Maintain healthy pastures

Proper pasture management helps protect water quality as well as produce more forage for animals. Managing pastures has more to do with promoting the growth of desired forage plants than managing animals. To maintain the health of plants and encourage growth, plants need time to recover after being grazed. Resting plants helps them to create and store energy. Take the following steps to maintain the health of your pastures.

Establish proper pasture layout – The University of Minnesota Extension offers technical assistance to landowners for pasture layout and design.

Determine the appropriate stocking rate – The stocking rate is the number of animals that a given area of land can support without overgrazing. As a rule of thumb, you need at least two acres of good upland area for one animal unit of livestock. One animal unit is 1,000 pounds. For example, 10 sheep that weigh 100 pounds each would equal one animal unit. Stocking rates will vary depending on soil type, precipitation and pasture management practices.
Use rotational grazing – In a rotational grazing system, pastures are divided into smaller paddocks and animals are rotated through the paddocks. Graze one paddock until the vegetation is four inches tall, and then move the animals to another paddock. This helps prevent overgrazing and allows pastures to rest.

Give pastures a break – A three to four week rest period helps pastures recover after grazing.

Build a dry lot or sacrifice area – Dry lots are used to maintain the health of your other pastures. They should be located out of waterways, and the amount of water flowing through the dry lot should be minimized. Put animals in the dry lot when:

- The ground is wet. This occurs during the spring thaw, heavy rains and extended periods of wet weather. By putting animals in the dry lot, other pastures will be protected from the compaction of soil and removal of vegetation by hooves.
- The pastures are too short. The minimum grazing height for most pasture grasses is four inches.

Control weeds – Encouraging the growth of desirable plants can help control weeds. When healthy forage plants flourish, they become more competitive and help keep weed populations down. Herbicides are available to address large infestations of most weed species.

Manage manure

Manure can be spread on fields, composted or hauled off-site. Manure is an excellent soil amendment, but too much of it can result in runoff that causes serious problems in bodies of water. One goal of proper manure management is to keep nutrients from the manure in the soil and out of the water. Proper manure management will also help control flies and maintain good relations with neighbors. For assistance with manure management, contact the University of Minnesota Extension or the NRCS. Take the following steps to manage manure.

Write a manure management plan – The plan should include:

- Estimates of annual animal manure production and annual nutrient production.
- Plans for collecting, handling and storing manure.
- Emergency action plan that quickly deals with accidental manure spills or other environmental emergencies.

The NRCS has a manure management planner available at wmc.ar.nrcs.usda.gov/technical/WQ/mmp.html.
Add composted manure to your soil – Spreading composted manure will supply soil with valuable nutrients and organic material. The composted manure should be spread at rates that the plants can absorb within a year or so. The University of Minnesota Extension can help you learn how to compost manure and determine how much composted manure your soil can absorb.

Avoid spreading manure that contains a large amount of bedding – Spreading fresh manure that contains large amounts of bedding is not recommended for fields where hay or crops are grown. Bedding contains large amounts of carbon that can bind to nutrients in soil, making the nutrients unavailable for vegetation. Manure containing a lot of bedding can be composted and then spread.

Find someone to use your extra manure – If you do not have enough land to spread all of the manure produced, manure can be hauled away and used off-site. Neighbors that are gardeners or farmers may be able to use your extra manure as a soil additive or fertilizer. You can also pay a hauler to take the manure. Find out where the hauler is taking the manure, and make sure that it is being used appropriately.

Have a good storage facility – Make your manure storage facility large enough to handle the maximum number of animals that you may have on your property. Locate facilities out of drainage areas.

Follow local regulations and Minnesota Pollution Control Agency (MPCA) guidelines for storing manure. The MPCA guidelines can be seen at www.pca.state.mn.us/publications/wq-f8-06.pdf.

For more information

- Applying Manure in Sensitive Areas

- Grazing Systems Planning Guide
  Blanchet, Kevin, Howard Moeching and Jodi DeJong-Hughes.

- On-Farm Composting Handbook
Maintaining Wells

How do I know if I have a well?

When you purchase land, the seller is required to disclose information about the location and status of any well on the property at the time of sale. This is a legal requirement of the Ground Water Protection Act (Minnesota statutes, section 103I.235).

Maintain your well

Properly constructed wells have an average lifespan of approximately 40 years, depending on use. Although properly constructed wells require little maintenance, there are a few things that you can do to ensure the health and safety of your well.

• Have the water tested by a certified laboratory regularly and keep records. The Minnesota Department of Health has a listing of certified laboratories at www.health.state.mn.us/divs/eh/wells.

Maintain your well, continued on next page

Many landowners get their water from a well instead of from a municipal water supply. Proper care and maintenance of your well is important to ensure that you and your family have a healthy source of drinking water.
• Make sure that the cap of the well is securely fastened. If the well cover becomes unfastened, have the water tested for coliform bacteria and nitrates.
• Make sure that the cap of the well is clearly marked to prevent cars or snowplows from hitting it.
• Make sure that surface water runs away from the cap of the well to prevent pooling.
• Keep hazardous products, such as paint, pesticides and motor oil, away from your well.
• If you suspect that you have an old or faulty well, have a well contractor analyze the well to decide what remedies are needed. The Minnesota Department of Health maintains a listing of certified well contractors on their website.

Test your well

Test well water periodically for potential contaminants.
• Wells should be tested at least once a year for bacterial contamination. The presence of coliform bacteria indicates that surface water contaminated by fecal material has seeped into the well.
• Wells should be tested for nitrate every two to three years. High nitrate levels can cause adverse health effects. Sources of nitrate include fertilizer, animal waste or human sewage.

Always make sure the lab you select to test your water has been certified by the state to perform that particular test. Prices for tests will vary. The Hennepin County Environmental Health Division or the Minnesota Department of Health can help you find a qualified laboratory.
Treat contaminated water

The action you need to take to clean up contaminated water depends on the type of contamination.

- If your well is contaminated, contact the Minnesota Department of Health and ask to talk to a drinking water protection specialist.
- If lab tests determine that the number of coliform bacteria exceeds the drinking water standard, contact a well contractor to disinfect the well. The well contractor can also help identify the source of the contamination. Follow the recommendations of the Minnesota Department of Health until the well is disinfected.
- If an excess amount of nitrate is found in your well water, follow the recommendations of the Minnesota Department of Health. Boiling water will not remove the nitrate. Identify potential sources of nitrates near your well. If the sources cannot be moved, consider sealing your well.

Manage unused wells

You have three options if a well is not in use – you can put the well back into service, seal the well or obtain a maintenance permit for the inactive well.

Sealing the well is recommended if you do not want to put the well back into use. An unused and unsealed well can act as a channel between the surface and the aquifer below, potentially leading to groundwater contamination. Minnesota state law requires that well sealing be done by a licensed well contractor.

If you have questions on how to implement these options, contact the Minnesota Department of Health and ask to talk to a well specialist.

For more information

- Minnesota Department of Health, Well Unit
  www.health.state.mn.us/divs/eh/wells
  651-201-4600

- Well Owners Handbook
  Minnesota Department of Health
  www.health.state.mn.us/divs/eh/wells/construction/handbook.pdf
Many landowners have a septic system on their property instead of being connected to city sewer service. Septic systems act as personal sewage treatment systems by carrying waste away from the home and safely storing and processing it in a septic tank. All pipes in the house from sinks, toilets, showers and bathtubs drain directly into the septic tank. The waste is held in the tank long enough for the solids and liquids to separate.

Three layers are eventually formed in a septic tank. Solids that are lighter than water form the top layer called scum. The second layer is partially purified water. The bottom layer is made up of the solids heavier than water called sludge.

Naturally occurring bacteria work on the layers of sludge and scum to further break them down. Waste that cannot be broken down remains in the tank until it is pumped out.

The liquid layer is carried to the drain field, which is a series of trenches or drain tile lined with gravel or coarse sand. The wastewater is further treated by bacteria in the gravel and the soil as the wastewater slowly drains out of the drain field pipes. The gravel and sand act as biological filters that purify the groundwater.
Have your septic system pumped regularly

Septic tanks should be pumped periodically to remove the scum and sludge that accumulates. If either is allowed to enter the soil treatment system or drain field, it will cause expensive and often irreparable damage to the drain field.

Businesses that work on septic systems must obtain a state license. The Minnesota Pollution Control Agency (MPCA) has a searchable list of licensed septic system contractors, available at www.pca.state.mn.us/programs/ists/search_business.cfm.

Pumping frequency

Septic tanks should be pumped every one to three years to remove all solids. No tank should go more than three years between being pumped or evaluated.

The size of the system, how it is used and the number of people using it will determine how often a septic tank needs to be pumped. The University of Minnesota Extension has a worksheet available at septic.umn.edu/factsheets, search: pumping frequency guidelines, to help you determine how often your septic tank needs to be pumped.

Maintain your septic system

Proper maintenance of your septic system is critical for personal and environmental health. Poorly functioning or failing systems can be a source of contamination in your home and in the groundwater. Take the following steps to maintain your septic system.

- Conserve water. The most common cause of septic system failure is excessive water entering the system. Conserving water will help ensure the performance of your system. Some ways to conserve water include installing low-flow fixtures or water efficient appliances and looking for ways to reduce the amount of water used in the bathroom, kitchen and laundry room.
- Check for leaks in water fixtures and toilets. Repair any leaks immediately.
- Do not put any additives or cleaners into your septic tank. These products may be harmful to your system and have not been proven effective.
Keep garbage out of your septic system

Many common household products can damage your septic system. The following is a list of products that should not be put down drains or pipes. Instead of putting these items down the drain, throw garbage in the trash and dispose of hazardous waste properly. (See Managing Your Waste, pg. 46)

Do not put the following items down the drain:

**Garbage**
- Dental floss
- Feminine hygiene products
- Condoms
- Diapers
- Cotton swabs
- Cigarette butts
- Cat litter
- Paper towels
- Medication
- Grease or fat
- Food scraps

**Hazardous products**
- Bleach
- Anti-bacterial soap
- Gasoline
- Oil
- Pesticides
- Antifreeze

Follow septic system safety guidelines

- Do not smoke near your septic tank. Potentially combustible gases such as methane may be present.
- Do not drive over the drainage field as this could compact the area and damage the drain tile or pipes.
- Make sure that your septic tank is covered with vegetation such as shallow rooted grasses. Vegetation will help to insulate your septic system and prevent freezing. Do not plant trees over the septic tanks because their roots will interfere with the tank.
- Never enter the septic tank or put your head over the opening because toxic gases can quickly overcome you.
- Be sure that the tank and its access ports have sound and secure covers that are not at risk of collapsing and cannot be removed by children.
For more information

- Hennepin County
  Environmental Health Division
  Septic inspection and enforcement program
  www.hennepin.us/septic
  612-348-5200

- Minnesota Pollution Control Agency,
  Subsurface Sewage Treatment Program
  www.pca.state.mn.us/programs/ists/homeowners.html
  651-296-6300

- National Onsite Wastewater Recycling Association –
  Septic Locator
  www.septiclocator.com

- *Septic System Owner’s Guide*
  Brown, Laurie, Sara Christopherson, David M. Gustafson, Barbara Liukkonen, Nicholas Haig, Doug Malchow, Kenneth M. Olson, Valerie Prax, Dan Wheeler, Jessica Wittwer.
  University of Minnesota Extension
Properly disposing of your trash is important for the health of land, water and wildlife. Today’s garbage contains a lot of plastics and paper treated with chemicals, coatings and inks that can pollute the environment if not properly disposed.

Don’t make your property a dumping ground

Unmanaged garbage disposal of any kind causes pollution, attracts nuisance animals, and can be dangerous for children, wildlife and livestock. Old equipment and vehicles can leak fluids into streams and the groundwater. Mercury and other hazardous components in electronics can pollute water and land, and tires can be a breeding ground for mosquitoes.
Hire a waste hauler

Check with your local municipality for haulers licensed in your city, and choose garbage and recycling services tailored to your needs.

Ask potential haulers:
- What is included in the cost of service?
- What recyclables do they collect? Can you get additional containers if needed?
- When do they pick up your garbage?
- Do they offer yard waste pick-up service? What are the guidelines and cost of this service?

Eliminate burn barrels

Burning trash in large drums or piles is dangerous and illegal. When trash is burned, it produces low-temperature fires and a lot of smoke that often contains toxic substances. The smoke may contain dioxins, acidic gases and heavy metals such as mercury. The pollutants released into the air and close to ground level are easily inhaled, which could lead to serious health problems.

Because of the danger to human health, burning of household trash became illegal in Minnesota in 1969.

A burn permit is required to burn vegetative material such as leaves, brush and yard waste. Contact your city hall for information regarding the availability of this permit.

Composting is the environmentally preferred method for managing yard waste. Yard waste should be brought to a compost site. Your garbage hauler may offer yard waste pick-up. For a list of yard waste facilities, go to www.hennepin.us, search: yard waste.

Dispose of treated lumber safely

Never burn treated wood in stoves, fireplaces or recreational or cooking fires. Low-temperature burning of treated wood releases toxic chemicals into the air and concentrates them in the ash. Open burning of treated wood is prohibited by state law. Homeowners may dispose of treated wood waste in approved landfills.
Reduce waste by reusing

Depending on the situation, you can repair, rent, buy/sell or donate used goods. Reusing items can save money, reduce waste and support local businesses.

Some items may be unsafe to reuse (for example, a toy that has been recalled, a damaged bike helmet or wood painted with lead-based paint). Electrical items, sports, medical and exercise equipment and children’s goods should all be examined carefully before donating.

Recycle

Recycling saves energy and resources. All communities in Hennepin County provide curbside recycling service to residents. It is important to know what you can and cannot recycle.

Items you can recycle curbside

- **Paper** – newspaper and inserts, cardboard boxes, magazines and catalogs, mail, office and school papers, boxboard (e.g., cereal boxes) and shredded paper (in closed paper bags)
- **Plastic** – plastic bottles and jugs
- **Glass** – Food and beverage containers and jars
- **Metal** – food and beverage cans

Items you cannot recycle curbside*

- **Paper** – food-soiled paper or boxes, boxes from refrigerated or frozen foods, paper towels, napkins, cups and plates, gift wrap
- **Plastic** – plastic tubs (e.g., margarine or cottage cheese tubs), yogurt, fruit and pudding cups, microwaveable food trays, produce, deli and takeout containers, containers that held hazardous products, toys
- **Glass** – drinking glasses, dishware, cookware, pottery, vases, window and mirror glass, containers that held hazardous products
- **Metal** – paint cans, aerosol cans, containers that held hazardous products

* Some items that can be recycled (like plastic bags or mattresses) are not collected curbside but have drop-off locations. Check with Hennepin County for drop-off recycling options of additional items.

Collect your organic waste

Approximately 25 percent of an average household’s garbage is organic waste. Organic waste, which includes food scraps and food-soiled paper products, can be recycled into compost.

Backyard composting

Backyard composting is an easy way to turn much of the waste from your yard and kitchen into a rich organic material that you can use to improve your soil. Using finished compost on your lawn and garden will add nutrients, suppress weeds and hold moisture in the soil.

*The Quick Reference Guide for Earth Friendly Home Landscaping* has more information on backyard composting.
Organics recycling services
In organics recycling programs, food scraps and food-soiled paper products are collected and sent to a composting facility. Instead of taking up space in a landfill or being burned, they are recycled into compost – a valuable resource used in landscaping and road construction projects.

Check with your garbage hauler to see if they have an organics recycling option, or check with Hennepin County for current organics recycling options.

Properly dispose of household hazardous waste
Some common household products may contain hazardous materials that should not be thrown in the trash. They may be flammable, corrosive, toxic or reactive. Household hazardous waste include appliances, automotive products, electronics, gas cylinders, tires, and household, lawn and garden products.

Drop-off facilities and collection events
Household hazardous wastes can harm human health and the environment if they are not properly treated, stored, transported and disposed. The county has two permanent, year-round drop-off facilities in Brooklyn Park and Bloomington that accept household hazardous wastes and problem materials as well as recycling.

For more information on the drop-off facilities and a full list of what is accepted, visit www.hennepin.us/dropoffs.
The county also holds community collection events at various locations throughout the year. Visit www.hennepin.us/collectionevents for more information.

Empty pesticide containers
Proper disposal of pesticide containers is required by law. Pesticide containers must be triple rinsed before they are thrown away. It is best to clean pesticide containers immediately after emptying them because timely rinsing will be more effective in removing all pesticide residues from the container. Empty pesticide containers should not be used for any other purpose.

To properly dispose of pesticide containers, follow these steps.

• Remove the cover from the container, and empty any residue into the spray tank or original container, allowing the container to drain for 30 seconds.

1. Fill the container 20 to 25 percent full of water.
2. Replace the cap and shake for 30 seconds.
3. Pour the rinse water into the tank or spray rinse water out of original container.

• Repeat steps 1 through 3 two more times using fresh water each time. Pour rinse water into spray tank.

• Throw the empty container in the garbage.

• Spray contents of sprayer on target plants at rate specified on pesticide label.
For more information

- Hennepin County Environmental Services
  www.hennepin.us/environment
  612-348-3777

- RethinkRecycling
  RethinkRecycling.com

- Recycling Association of Minnesota
  www.recycleminnesota.org
  651-641-4560

- Recycle More Minnesota
  www.recyclemoreminnesota.org
  651-641-4589

- American Environmental Health Studies Project
  www.burnbarrel.org

- Minnesota Pollution Control Agency – burn barrels
  www.pca.state.mn.us/oea/reduce/burnbarrel.cfm

- United States Environmental Protection Agency’s (U.S. EPA) Office of Solid Waste
  www.epa.gov/osw

- Pesticide Containers: Management and Disposal
  Minnesota Department of Agriculture, St. Paul, Minnesota. 2006.
Resources

- Hennepin County Environmental Services
  www.hennepin.us/naturalresources
  612-348-3777
  Hennepin County provides a variety of information and technical assistance for managing your land.

- University of Minnesota Extension – Hennepin County
  www.extension.umn.edu/county/hennepin
  612-596-2110
  The University of Minnesota Extension provides outreach for the University of Minnesota and delivers educational programs and technical assistance on a variety of land management topics.

- Minnesota Department of Agriculture
  www.mda.state.mn.us
  651-201-6000

- Minnesota Department of Natural Resources (DNR)
  www.dnr.state.mn.us
  651-296-6157

- USDA – Natural Resources Conservation Service (NRCS)
  www.mn.nrcs.usda.gov
  763-241-1150, ext. 3

- Minnesota’s bookstore
  www.minnesotasbookstore.com
  Minnesota’s bookstore sells a variety of publications from Minnesota state agencies including many of the publications listed in this guide.

- Midwest Plan Services
  www.mwps.org
  Midwest Plan Services, based out of Iowa State University, sells a variety of low-cost agricultural publications.

Books & publications

- A Quick Reference Guide for Earth Friendly Home Landscaping
  Hennepin County Environmental Services.
  www.hennepin.us/sustainablelandscaping

- Beyond the suburbs – A landowner’s guide to conservation management

- Guide to Rural Living
  www.extension.umn.edu/ruralliving

- Living on Acreages

- Small Scale/Small Field Conservation
  NRCS, Washington, D.C.
  landcare.sc.egov.usda.gov