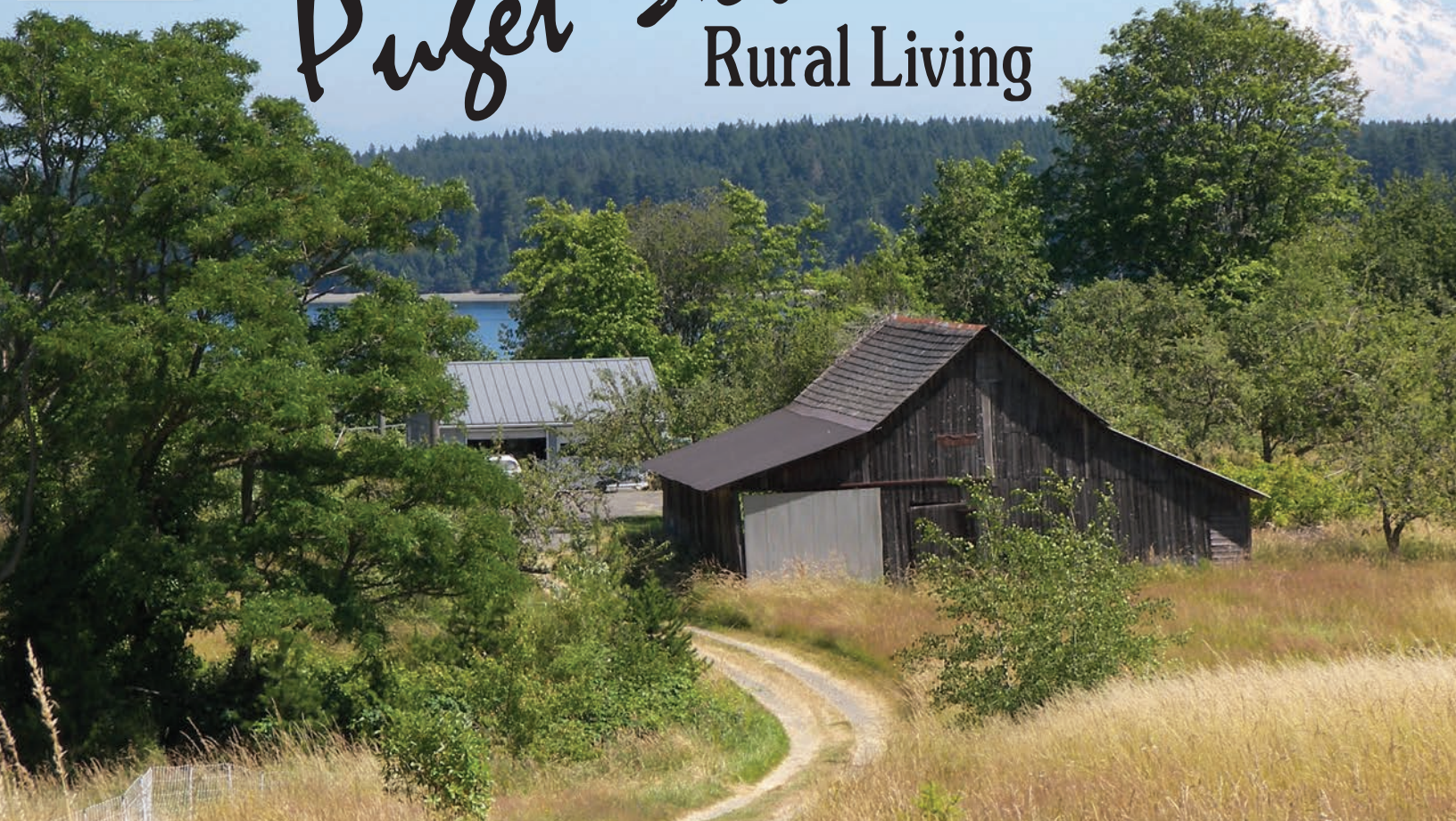




TIPS On Land & Water Management for Puget Sound Rural Living



Maintain what's best about the Puget Sound

- *Productive agricultural land*
- *Rich soils*
- *Native plants*
- *Healthy streams & forests*
- *Wildlife*

About this Publication

Adapted from: Tips on Land & Water Management for Small Acreages in Oregon by Clackamas and Tualatin Soil and Water Conservation Districts.

Revision Team:
Helen Jones, Kitsap Conservation District
Rene Skaggs, Pierce Conservation District
Sofia Gidlund, Pierce Conservation District

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Photo Credits:
Erin Ewald, Pierce Conservation District
Helen Jones, Kitsap Conservation District
Jayme Gordon, Pierce Conservation District
Tim Butler, Oregon Department of Agriculture
Julie DiLeone, East Multnomah Soil and Water Conservation District
Sam Leininger, Clackamas Soil and Water Conservation District
Tacoma-Pierce County Health Department
Marcia Rueter Leritz and Terry Lonner, Media Works
John McGinnis, WA Department of Fish and Wildlife
Missoula County Conservation District
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Montana State University Extension Service
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Terry Tuttle, Bureau of Land Management
USDA Forest Service
USDA Natural Resources Conservation Service
Mace Vaughan, Xerces Society

Designed and Illustrated by:
Lorelyn Mayr, Media Works, LLC, Bozeman, Montana
www.mediaworksmt.com

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To request copies of this brochure:
Contact your local Conservation District Office.



Better Ground
Working with you and other land stewards for 65 years
Local food ~ Healthy forests ~ Clean water
Puget Sound Conservation Districts
pugetsounded.org & betterground.org

PLAN

Why Is Land and Water Conservation Important To You & the Puget Sound?

This is a great place to live, and you can help keep it that way!

Do you raise **horses** or other **livestock** and wonder why you have to buy more feed each year as your land's productivity declines, leaving muddy ground and weeds?

Did you buy a place with a **creek** or **wetland**, and wonder how to care for and improve it for fish?

Did you just find out how expensive a new **on-site septic system** is to install, and wonder how to prevent future problems?

There's a lot to know about owning and managing land. This booklet will give you lots of information and ideas for a place that you can be proud to own. We're all part of a watershed and our actions can affect others. The things that you and your neighbors do can greatly improve the health of the resources we all appreciate about Puget Sound.

► Benefits of a Management Plan

Saves money as your land becomes more productive.

Conserves natural resources and protects water quality for you and future generations.

Increases your property value.

Enhances open space and wildlife habitat.

Improves plant and animal health.

Makes your place more attractive and promotes good neighbor relations.

Promotes the health and safety of your family.

Any rural property needs a management plan. A management plan is a set of strategies and actions to help you maintain and improve the natural resources on your property.

► What are your Goals?

How do you want your place to look like in 5 years? 20 years?

Do you want to raise livestock? If so, what kind & how many?

Do you have, or plan to have, pasture?

Do you want to produce food for your family and/or to sell?

Are you interested in landscaping with native plants?

Do you want to attract and protect wildlife such as hummingbirds, salmon or bald eagles?

How will you be a good neighbor? Will you make sure polluted run-off is not leaving your property?

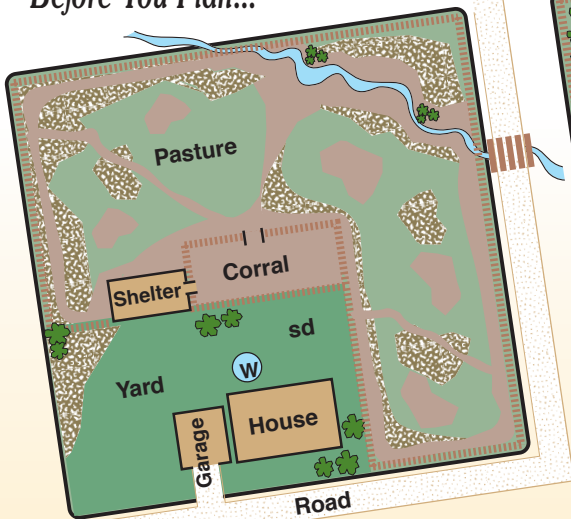
You may find that you have to modify some of your goals because they are not realistic for the land or would violate state or local regulations. Work with your land and not against your land!

► Look At What You Have

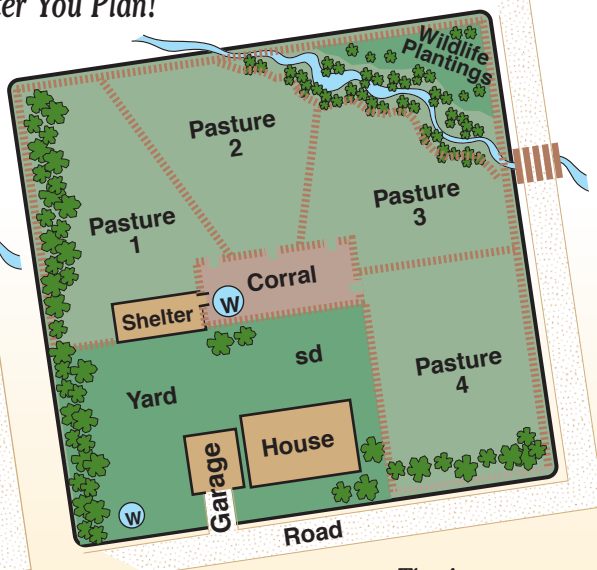
Before developing your plan—look around, make a sketch, and take a few notes about your property. In your sketch, show or note:

- Soil type (Look up your soil type at <http://websoilsurvey.nrcs.usda.gov>).
- Neighboring land uses.
- Topography and water flow.

Before You Plan...



After You Plan!



Tips For Planning A Homesite

- Plan for erosion control before building.
- Site homes and roads on stable soils away from streams. Avoid steep slopes and floodplains.
- Provide adequate distance between your well and septic system.
- Avoid disturbing wildlife corridors, wetlands, and riparian areas.
- Maintain or plant native vegetation.

- Property boundaries
- ▤ Fences and corrals
- ▤ Buildings
- Ⓜ Wells (human or stock)
- sd Septic drainfield and/or reserve

- ~ Streams, wetlands, ponds
- ☹ Bare or muddy ground
- ☹ Weeds
- ▤ Lawn, pasture, or cropland
- ☘ Trees or shrubs

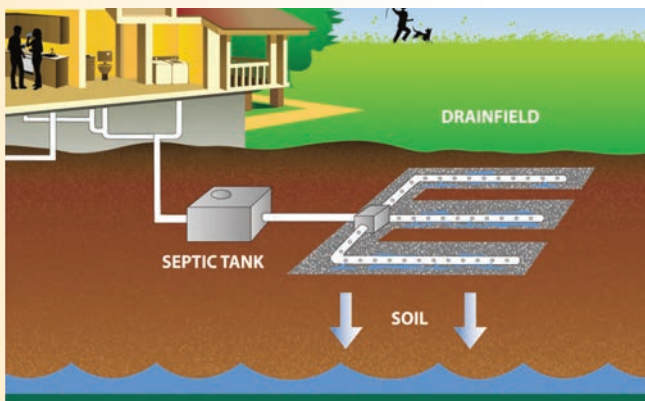
The four pastures in this "After" drawing allow better management of livestock grazing and increased forage production. A water trough and shelter area located in the corral is accessible from all pastures and reduces streambank trampling. Shrub and tree plantings along the streambank prevent erosion, absorb water, replace weeds and bare areas, and improve wildlife habitat.

QUIZ

How Safe Is Your Well and Septic System?

- | | No | Yes |
|--|--------------------------|--------------------------|
| Is your well at least 50 feet away from the septic tank and 100 feet from the drain field? | <input type="checkbox"/> | <input type="checkbox"/> |
| Has a well test within the last year shown acceptable results for bacteria and nitrate? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you keep fertilizers, pesticides, gas/chemical tanks, and animals away from your well? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are you sure there are no old, unused wells on your property? | <input type="checkbox"/> | <input type="checkbox"/> |
| Have you hired a professional to inspect your septic system within the last three years? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do you know how to maintain your well and septic system to protect your drinking water and avoid costly repairs? | <input type="checkbox"/> | <input type="checkbox"/> |
| Are you sure there are no openings in your well cap/casing? | <input type="checkbox"/> | <input type="checkbox"/> |

If you answered "no" to any of these questions, schedule an inspection with a certified professional, or contact your local Health Department for assistance.



An on-site septic system contains an underground septic tank that receives and settles out domestic sewage. Solids accumulate in the bottom as sludge; oils and grease accumulate on the top as scum. The liquid between the sludge and scum flows (or is pumped) into a network of pipes (drain field). Once in the drain field, soil filters the liquid waste before it gets into the groundwater.

TIPS

To Prevent Water Pollution

- Establish and maintain shrubs and grasses along streams and around animal confinement areas to trap and absorb pollution-laden runoff before it reaches streams or groundwater.
- Locate manure piles, corrals and other livestock confinement areas away from wells and streams. Use water troughs or nose pumps to minimize damage to streambanks.
- Scoop, bag and dispose of pet waste in the trash.
- Cover manure piles to retain nutrients and avoid run-off. Only apply aged manure to pastures when plants are actively growing and can use this natural fertilizer. Do not spread aged manure during the wet season or on wet soils.
- Inspect your septic system regularly and according to local regulations (typically every 1-3 years). Pump your tank according to your inspector's recommendation.
- Use practices that reduce soil erosion, increase water infiltration, and reduce mud and run-off, such as pasture management, plantings, and composting.

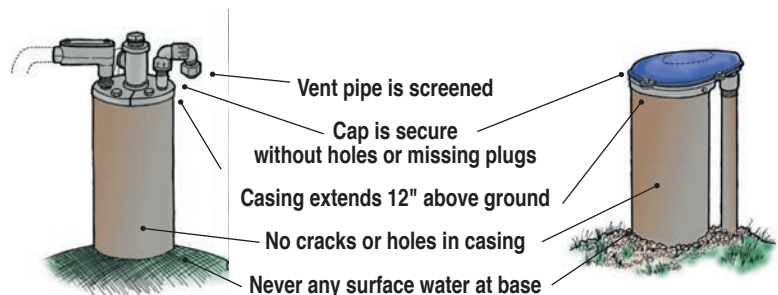
TIPS

Proper Operation & Maintenance of Your Septic System

Proper operation and maintenance of your septic system helps save you thousands of dollars by extending the life of your system. It also protects our ground, surface and drinking water from contamination, and prevents bacterial pollution from entering creeks, streams and Puget Sound.

- Keep records of your system's location and any repairs and pumpings.
- Spread heavier water use throughout the week.
- Fix water leaks and use water saving fixtures for shower and faucet heads, toilets and washing machines. Slow-draining fixtures can be a sign of a failing system.
- Check the drain field and downslope areas routinely for odors, wet spots, or surfacing sewage. Route roof run-off and other drains away from the drain field.
- Avoid allowing grease, hair, solid waste, and chemicals to go down the drain. Also avoid using a garbage disposal. The disposal adds solids and grease to your system and may plug the drain field.
- Landscape your drain field with grass. This helps absorb water, prevents soil erosion, and receives oxygen to help break down bacteria.
- Keep cars, heavy equipment and livestock off of the drain field. The pipes cannot support heavy loads and may burst under pressure.
- Do not construct patios, driveways, sport courts, fire pits, structures or use landscaping plastic over the drain field.

► Inspect Your Well Every Year



► Dog & Yard Waste

Unpicked pet waste washes into nearby water bodies and causes significant water pollution. Studies show that in urban environments, 20-30 % of the bacteria in water samples come from dog waste. Decaying pet waste in waterways consumes oxygen and releases ammonia. Pet waste also carries a lot of bacteria, viruses, and parasites, such as salmonella, E. coli and giardia, which can threaten the health of humans and wildlife. A single gram of dog waste contains an estimated 23 million bacteria. A day's worth of waste from one large dog can contain 7.8 billion fecal coliform bacteria, enough to close 15 acres of shellfish beds! The nutrients in pet waste also promote weed and algae growth in waters we use for swimming and fishing. Always pick up pet waste, bag it, and dispose of it in the trash!

When yard waste, including grass clippings and pruning debris, is dumped into surface waters, nutrients such as nitrogen and phosphorus are released into the water and can result in an excess of nutrients, causing noxious odors and aiding the growth of toxic algae. Dumping yard waste into water is a violation of State law. Instead, leave grass clippings on the lawn to recycle nutrients, compost your yard waste, haul it to yard waste facilities, or dispose of it through a curb-side pick-up service.

SOIL

Know Your Soil

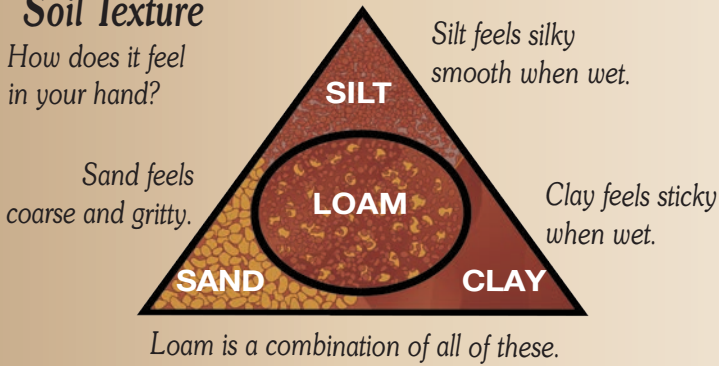
Soils vary widely, even across your property.

The type of soil you have will influence:

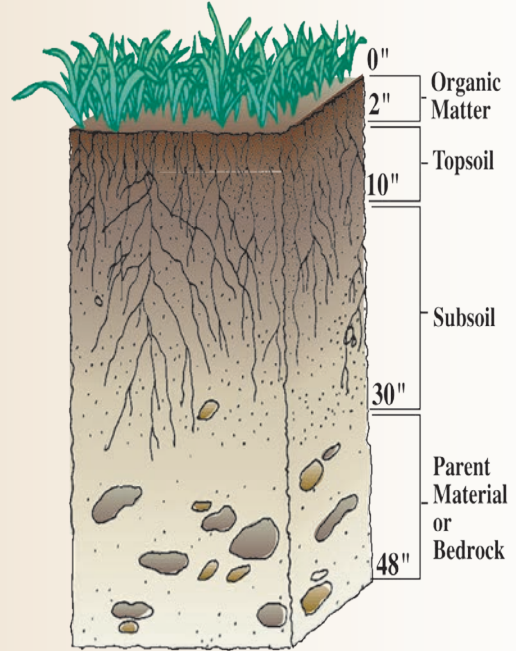
- Amount and type of compost and/or fertilizer to apply.
- Type and quantity of grass/crops/trees your land can produce.
- How easily soil may erode.
- If the soil will filter human and animal wastes before they reach groundwater.
- When to graze livestock.
- Possible problems with building foundations.
- Depth of tree and plant roots.

Soil Texture

How does it feel in your hand?



A Soil Profile:



- Living in the soil are plant roots, bacteria, fungi, protozoa, algae, mites, nematodes, worms, ants, maggots, insects, grubs and larger animals.
- Soil is made of about 45% minerals, 25% water, 5% organic matter and 25% air.
- Soil organisms recycle organic matter back into nutrients that support plant growth.
- Healthy soil has amazing water-retention capacity. Every 1% increase in organic matter results in as much as 25,000 gallons of available soil water per acre.
- Earthworm populations consume 2 tons of dry matter per acre per year, digesting and mixing it with soil.

► For More Information

For information about your soil type, refer to your county's soil survey available at <http://websoilsurvey.nrcs.usda.gov/>.

QUIZ

Do you have erosion?

- Cloudy or muddy water flows down the field, road, or driveway.
- Small rills or gullies begin to show.
- Dust clouds appear.
- Soil collects along fences or splashes on windows, walls, and plants.
- Sediment builds up on pavement or at low spots in the field.
- Streams and ditches run cloudy after a rain.
- Stream or shoreline banks crumble and fall down.

No	Yes
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

If you answered "yes" to any of these, you have erosion and are losing soil. Utilize our tips to protect your soil.

TIPS

To protect your soil

- Create a protective cover. A planted cover keeps soil in place. The leaves cushion the impact of wind and rain while the roots anchor the soil. Other covers, such as mulches, also protect soils.

- Establish barriers to wind and water. Barriers slow wind and water and trap eroded soils. Barriers can be as simple as grass strips, silt fences, or tree or shrub windbreaks.
- In general, mulches protect slopes less than 33 percent, plants can protect slopes that are less than 50 percent, and erosion control structures like terraces may be needed for steeper slopes.
- Contour farming is when rows run "on the level" around the hill rather than up and down the slope. Crop rows form hundreds of small barriers that slow water and reduce soil loss up to 50 percent compared to farming up and down a slope.
- Cover crops temporarily protect the soil until the main crop is planted. Cover crops also add organic matter, hold nitrogen, and reduce weed growth. Cereal grains and legumes are good winter cover crops. Buckwheat is a good summer cover crop. Cover crops can also be planted between rows.
- Crop rotation switches crops each year in a certain order. A rotation that includes grasses, legumes, or small grains will break pest cycles and reduce erosion compared to continuous row crops.
- Utilize no-till farming to avoid disturbing the soil.
- Irrigate only when necessary: Do the "squeeze" test to determine if irrigation is necessary. Squeeze several handfuls of soil taken at 6", 12" and 18" depths. If the soil stains your fingers, wait a few days and test again. If the soil feels only slightly moist or forms a slightly crumbly ball from squeezing, then it is time to irrigate.



► Protect Your Soil

It can take 1,000 years to form just an inch of soil! Loss of soil happens through erosion. A raindrop is like a miniature water bomb: it hits the ground at 20 miles per hour. When raindrops hit bare soil, water can splash up to six feet away, carrying soil particles off the fields and into drainage ways. Wind also dislodges, moves, and transports soil particles away from fields.

QUIZ

Is Your Stream Healthy?

Y N

- Is streamside vegetation diverse, vigorous, and native to the area?
- Does the water flow out onto the floodplain every couple of years?
- Does more than 50% of the streambank length have trees and shrubs?
- Is the stream stable with little (less than 10%) or no bank erosion?

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

If all your answers are "yes," then you probably have a healthy stream—read on to find out how to maintain your stream. Even one "no" answer can indicate an unhealthy stream—read on to find out what you can do to improve your stream.

RIPARIAN AREAS

are the green borders found along streams, lakes, and wetlands. They are made up of water-loving plants such as alder, willow, cottonwood, and sedges.

Poor



Good



TIPS

To Enhance Riparian and Wetland Areas

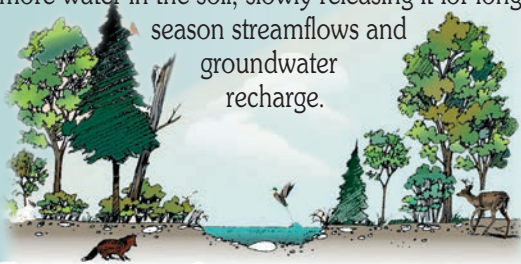
- Avoid applying fertilizers, herbicides, and pesticides in buffer areas to keep pollutants from running into water.
- Fence livestock away from water areas to protect streambanks, reduce erosion, and protect water quality.
- Provide offstream water sources using a nose pump or trough in the pasture. Cattle gain weight faster on clear, unpolluted water.
- Try removing noxious weeds and invasive plants by mechanical rather than chemical means. Replace with native plants.
- Consider "passive restoration" by giving riparian areas around wetlands and streams a break from land use activities.
- Leave large pieces of wood in the stream channel to provide fish habitat.
- Preserve floodplains for slowing and filtering flood water.
- Install buffers or increase the buffer width around water. Ask your Conservation District for guidance and assistance. In general, some studies suggest that widths of 35 feet along ditches and 50 feet along streams trap eroded soils, 100 feet filter pollutants, and 200-300 feet provide wildlife corridors.



Grazing removes important near-stream vegetation, and may cause streambank erosion and water quality degradation. Riparian areas make up less than 5 percent of the landscape, yet contain much of the plant and animal diversity by providing food, water, and shelter. In western Washington, 94% of the wildlife use riparian zones. Leaving these areas in a healthy condition will protect benefits we all enjoy.

A Healthy Riparian Area

- The key to a healthy stream system. Lush and diverse riparian and wetland vegetation along the water's edge will:
- Slow flood flows and reduce erosion and property loss.
- Secure food and cover for fish, birds, and other wildlife.
- Keep water cooler in the summer.
- Reduce water pollution by filtering out sediment, chemicals, and nutrients from runoff.
- Provide important breeding habitat for birds.
- Hold more water in the soil, slowly releasing it for longer season streamflows and groundwater recharge.



Does Your Property Have A Wetland?
Wetlands provide wildlife habitat, absorb pollutants, and reduce flood damage. Wetlands have wet soils, and water that may be on top of the ground or just below the surface. To protect wetlands and their benefits, laws limit activities within them. Check with agencies for technical assistance to enhance your wetland.

Fish Need Healthy Streams

What do fish need to thrive?

- Riparian buffers to filter nutrients and sediment.
- Rocks and riffles to churn and add oxygen to the water.
- Clean cold water.
- Overhanging vegetation and large pieces of wood to hide under.
- Deep pools that provide coldest water in the summer and are least likely to freeze in the winter.
- Riparian vegetation to shade and cool water.

QUIZ

Is Your Property Attractive to Wildlife?

Are there a variety of native vegetation types, such as wildflowers, tall grasses, shrubs, and trees for food? For cover?

Is water accessible to wildlife all year?

Can wildlife avoid predation from domestic animals, such as cats and dogs?

The more "yes" responses you had, the more likely you will enjoy the company of birds, fish and small mammals.

Y	N
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

TIPS

For Creating Wildlife Habitat

- Plant a diversity of native vegetation types and heights.
- Plant shelterbelts and fence rows with evergreens and fruit-bearing shrubs.
- Leave snags and down, woody material for perching, hiding, and nesting.
- Plant small grains or large-seeded grasses for wildlife food.
- Develop ponds or other watering facilities.
- Build or modify wildlife-friendly fences.

► Pollinators

Native bees are valuable pollinators that can boost crop yields and provide insurance when honey bees are scarce.

To increase the number of native bees on your land, here are some things you can do:

Provide Food – Bees eat nectar and pollen. They rely on flowers throughout the growing season. Consider planting native plants that are early and late-season bloomers to provide food when flowers are few. Native flowering plants will also support local honey bee populations.

Protect Nest Sites – Different native bees build different nests. Wood-nesting bees often nest in hollow twigs or beetle tunnels in dead trees. Ground-nesting bees favor undisturbed ground. Bumblebees make use of small spaces such as rodent burrows. Consider preserving snags or dead trees, leaving ground untilled and making bee blocks.

Be Prudent with Pesticides – Insecticides directly kill bees. Consider minimizing the use of pesticides or select less toxic insecticides and formulations (granules or solutions.) Try to spray on dry evenings and soon after dark, when bees are not active.

Doing More – Plant hedgerows and stream buffers with a variety of flowering plants, leave untilled and unsprayed areas next to fields and roadsides and work with neighbors to protect natural areas around your farm.

For more information on pollinators, visit the Xerces Society website, www.xerces.org.



► Upland Birds and Raptors

Provide food and water. Areas of tall grass, thickets of shrubs, and plots of wheat, barley, and other small grains provide food and habitat diversity for quail and other field birds. When harvesting crops, begin cutting from the center of the field outward to flush the birds away.

Trees and shrubs provide seeds, fruits, and berries for birds. Streams or ponds provide water. Add a water source if none is currently on site.

Provide nesting areas and cover. Since some birds nest on the ground in the spring, avoid mowing or using weed control chemicals on your tall grass until birds are out of the nest in mid-July.

Perches of different heights, such as old snags, fences, and telephone poles, are used by many birds (from bluebirds to hawks) for resting and searching for food.



► Amphibians and Reptiles

Provide food and cover. Water-holding structures like well-vegetated ponds, rain puddles, logs, and rocks can provide drinking water and a source of food.

Provide habitat. Reptiles and amphibians are cold-blooded animals. They need sunny areas to warm up in the morning and cool areas in the heat of the day. Rock piles in the sun provide basking areas. Stumps, logs, shaded rocks, and groundcover provide cool areas.



► Shellfish



Shellfish refer to aquatic invertebrates, including various species of molluscs (such as clams and oysters), crustaceans (such as crab and shrimp), and echinoderms (sea urchin). Shellfish feed by filtering water, primarily for phytoplankton and zooplankton, and can thereby accumulate contaminants, such as bacteria, viruses, chemicals and biotoxins in their bodies. Washing or cooking shellfish does NOT remove chemicals or biotoxins. Eating contaminated shellfish can have dire human health consequences. Shellfish can be seen as the guardians of water quality and a single clam can clean and filter 50 gallons of water in a day! Shellfish also provide food and habitat for a healthy marine ecosystem. In a healthy Puget Sound, shellfish will be abundant and safe for consumption. The best way to keep shellfish safe for consumption is to protect water quality. When harvesting shellfish; make sure you have a license, follow all guidelines, and only harvest at approved and "open" locations.

► Salmon



Salmon are integral to Puget Sound's environmental health, economy, food system and culture. Salmon runs deliver vast amounts of marine nutrients to our upper watersheds. During spawning season, salmon carcasses are the primary food for aquatic invertebrates, fish and marine mammals. They also provide food and nutrients to birds, land mammals and trees. Generally, the more pristine, diverse and productive the freshwater ecosystem is, the healthier the salmon stocks. In streams, salmon benefit from downed trees for shelter, and slower water flow and deep, cooler pools for hiding and feeding. In estuaries, juvenile salmon need vegetation, such as eelgrass, for protection and nutrients.

Puget Sound is a spawning ground for five species of Pacific Salmon: Chum, Coho, Chinook, Sockeye, and Pink, as well as Steelhead. Salmon hatch in streams and spend transitional time in estuaries and near-shore waters before they head to sea. After spending a few years in the ocean, salmon return to their birth streams to spawn and die. While spawning, the female builds a nest (called a redd) for fertilized salmon eggs. Redds look like gravel mounds. To avoid disturbing them, keep dogs and livestock out of streams.

TIPS

For A Healthy Forest

- Maintain diverse tree ages and species that are native and well-suited to the site.
- Prevent insect and disease buildup through timely salvage. Keep in mind that these natural disturbances create valuable snags and down logs for wildlife. Contact a forester for assistance.
- Thin trees to improve growth, health, and vigor. Leave the largest and healthiest trees for timber, as well as some trees with defects (i.e. broken tops, cavities), for wildlife.
- Locate access roads away from streams. Design, construct, and maintain roads to provide drainage, prevent erosion, and reduce costs.
- When planting trees: prepare the site, select native species suited to the site, handle planting stock carefully, and plant to the proper depth without "J-rooting." Control competing vegetation and protect seedlings from grazing by livestock and wildlife until trees become the dominant vegetation.
- When using chemicals to control competing vegetation, avoid damage to your trees or to other resources such as water bodies. Make sure you use the right chemical for the job, follow all label directions, and obtain the necessary permits.
- Dispose of large amounts of slash (logging debris) to reduce fire hazard. Pruning trees can also reduce fire hazard and improve the looks and timber quality of your stand.

► Protect Your Home From Wildfire

- Keep leaves and needles off your roof and deck.
- Maintain 30' of green lawn or fire-resistant plants around your home.
- Prune the lower branches of trees below 12' to remove "ladder fuels" that can cause a ground fire to become a more destructive and harder-to-control crown fire.
- Have water and fire-fighting tools available.
- Develop, discuss, and practice an emergency plan with everyone in your home.
- Avoid using wood shakes for roofing, or storing firewood next to your home.
- Contact the USDA Forest Service or Firewise for publications on making your home and property more defensible against wildfire:



www.fs.fed.us/managing-land/fire

www.firewise.org

NATIVE PLANTS

► Benefits of Using Native Plants:

- Disease resistant.
- Once established, native plants in the right locations require little maintenance and are drought tolerant.
- Provide food & habitat for birds, fish and other wildlife.
- Control erosion and reduce flooding.
- Clean water by filtering out sediment and pollutants before they reach lakes and streams.
- Improve infiltration and reduce runoff, thus contributing to an overall healthy ecosystem.



Use native plants for:

Pollinator habitat — attract native bees, hummingbirds and butterflies to your yard.

Hedgerows — increase privacy, reduce noise and dust, provide habitat, control livestock.

Rain gardens — recharge groundwater, reduce flooding, beautify yard.

Restoration projects — woodlots, slopes, riparian areas, construction sites.

Landscaping — beautify your yard with native trees, shrubs and groundcovers.

For more information:

Washington Native Plant Society, Central Puget Sound Chapter:
<http://www.wnps.org/cps/>

King County Native Plant Guide:

<https://green2.kingcounty.gov/gonative/index.aspx>

USDA PLANT Database: <http://plants.usda.gov/java/>

QUIZ

Give Your Land A Weed Exam

How much of these do you have on your property?

	1	2	3
Healthy ground cover (forest, shrubs, grass, or cropland)	A lot	Some	A little
Patches of weeds and undesirable plants	A little	Some	A lot
Bare or muddy ground	A little	Some	A lot

If all of your answers are in the first column, your land earns an "A" for health. If most of your answers are in the second column, it is in average condition. If you have any responses in the third column, your land needs immediate help! Read on to learn about conservation practices that will improve your land's health.

WEEDS

► Weed Control

Weeds spread fast, so regularly look for new weed patches on your property. Act immediately to treat them by using one or more of the weed control practices listed below. Team up with neighbors to improve effectiveness. Weed control by itself is not enough. It is also necessary to modify the practices that caused weeds to become established in the first place!

Prevention. Good land management will help keep desirable vegetation healthy and weeds under control. Avoid over-grazing which leaves bare spots for weeds to proliferate, buy weed-free hay, plant certified seed, wash your vehicle after being in a weed-infested area, and respond quickly to any new weed infestations.

Biological. Biological control attempts to find something in nature that can weaken or eventually kill a weed plant. Successful bio-agents include certain fungi and insects that weaken weeds by attacking seed heads and other plant parts.

Mechanical. Mow weeds annually before they go to seed. Pull small weed patches and weeds near streams by hand.

Livestock Grazing. If safe, graze weeds before they go to seed. Because livestock can easily carry weed seed on their coats or in their feces, avoid moving livestock from a weedy area to a weed-free area. Use care and know your weeds, as some weed species, if eaten, will make livestock sick.

Chemical Herbicides. Read label instructions carefully and follow directions. Use chemicals away from water to avoid harming you, your animals or wildlife, and to prevent pollution of streams and groundwater. Only certified pesticide applicators can use restricted herbicides. Call a local farm supply store to find out about hiring custom chemical applicators to spray your weeds. Be sure herbicide will not kill desirable trees and shrubs. Do not use herbicides that are toxic to pollinators. Dispose of leftover chemicals at hazardous waste facilities.

Puget Sound Weeds of Significance

Control your weeds before they:

- Reduce the productivity of your pasture and land.
- Cause water pollution and soil erosion because they're less effective at holding the soil.
- Spread RAPIDLY!



Tansy Ragwort



Purple Loosestrife



Milkthistle



Giant Hogweed



Knapweeds
(spotted, diffuse, bighead)



Gorse



Knotweeds
(giant, Japanese, Bohemian)

The noxious weeds pictured above are aggressive and competitive. They should be removed immediately!

TOXIC ALGAE

What are toxic algae? Toxic algae are naturally occurring organisms that can create powerful poisons—also called toxins. Weather conditions, fertilizers and waste, and other causes can lead to rapid algae growth and toxic algae blooms.

What are the health concerns? Some toxins harm the nervous system and others harm the liver. In general, the more toxic algae present, the greater the potential health concern. Children and pets are at greatest risk—you should seek medical attention immediately if they have swallowed water with algae.

What should I do if I see a bloom? Keep children and pets away from areas with visible algae. Do not swim, wade, fish, or water ski in areas with visible algae. Contact your local Health Department if the area has not been posted.

How can I help prevent toxic algae blooms?

- Eliminate or reduce use of fertilizers.
- Properly use and maintain septic system.
- Keep animal waste out of streams and lakes. Pick up after your pets, don't feed waterfowl, and keep livestock away from water.
- Plant a buffer of native plants between your yard and the stream or lake to reduce runoff and prevent erosion.

QUIZ

Are Your Grazing Animals Properly Managed?

- Do you have so little grass in your pastures that animals consume dirt while trying to graze? Y N
- Are animals chewing on trees, shrubs, fences, or barns?
- Are animals trampling the streambank?
- Do animals have scruffy coats?
- Do you have a weed problem?

If you answered "yes" to any of these questions, you need a new grazing program that will provide more grass and healthier animals. This will save you money in lower feed costs and lower veterinarian expenses!

Grazing Management Produces More Grass



Continuous grazing allows weeds to grow where grass roots have been weakened. A less dense leaf canopy allows sunlight to reach invading weeds.

Pasture rotation and good grazing management produces more grass, fewer weeds, and a minimum of bare ground.

▶ How Much Feed and Forage Do Your Livestock Need?

Forage is what your animals consume by grazing. Feed is the hay that you provide an animal when forage is not available. Generally, livestock will need to consume 2.6 to 3.0 % of their body weight per day in forage and feed. For example, a 1000-lb. cow will need to eat between 26 and 30 pounds of forage or feed per day (approximately 900 pounds per month). Calculating how much forage your pastures produce and how much forage your animals require will help you determine if you need to:

- Buy additional feed or rent pasture.
- Increase your forage pasture production.
- Improve your grazing management.
- Reduce your number of animals.

▶ Water Rights

You must have a water use permit before diverting, impounding, or withdrawing any surface water. Certain groundwater uses are exempt from permit requirement, such as:

- Providing water for livestock (no gallon per day limit).
- Watering a non-commercial lawn or garden one-half acre in size or less (no gallon per day limit, however limited to reasonable use).
- Providing water for a single home or groups of homes (limited to 5,000 gallons per day).
- Providing water for industrial purposes, including irrigation (limited to 5,000 gallons per day, but no acre limit).

TIPS

For a Successful Grazing Program

- Eliminate continuous season-long grazing.
- Subdivide large pastures into smaller pastures (see sample grazing designs on page 9) and develop a pasture-rotation grazing system.
- Move livestock into a pasture when grass is 6" - 8". Move them out when grass is 3" - 4". Even in late summer, when grass is no longer growing, grazing below 3" - 4" will damage root health and reduce leaf growth.
- During winter months, hold animals in a corral to avoid compacting saturated soils. If soils are well-drained and pasture is actively growing, continue your rotation to distribute manure and feed wastes evenly across your pastures.
- Allow long rest periods or use a high-intensity, short-duration grazing system to rejuvenate poor-condition pasture.
- Provide a water source that is accessible from each pasture.
- Irrigate each pasture (if you have irrigation) immediately after grazing to get plants growing again. Do not graze on wet soils.
- Horses' nutrition needs can be met with as little as 4 hours of grazing on good pasture each day. Corral horses for the remainder of the day to prevent overgrazing.
- On limited acreage, you may have only enough pasture to exercise your animals and will need to feed year-round.

▶ Pastures Used For Recreation

Some horse owners prefer to use their pastures as turn-out areas and are not so concerned with growing forage. Here are some things you can do to reduce negative effects:

- Seed bare or thin spots with annual ryegrass or sod-forming grasses such as bentgrass or bluegrass which can withstand shorter grazing.
- Limit grazing time, especially when soils are wet.
- Control weeds.
- Mow tall grasses to prevent them from going to seed and to encourage grazing in those areas.
- Drag manure to distribute nutrients and to reduce avoidance of areas where livestock defecate.

Poor Pastures Cause

- Colic and respiratory problems from eating dirt.
- Weight loss.
- Parasites.
- Poor coat.
- Polluted runoff.
- Lost wildlife habitat.

PASTURE

Grazing Schedule

For A One-Herd Multiple-Pasture System

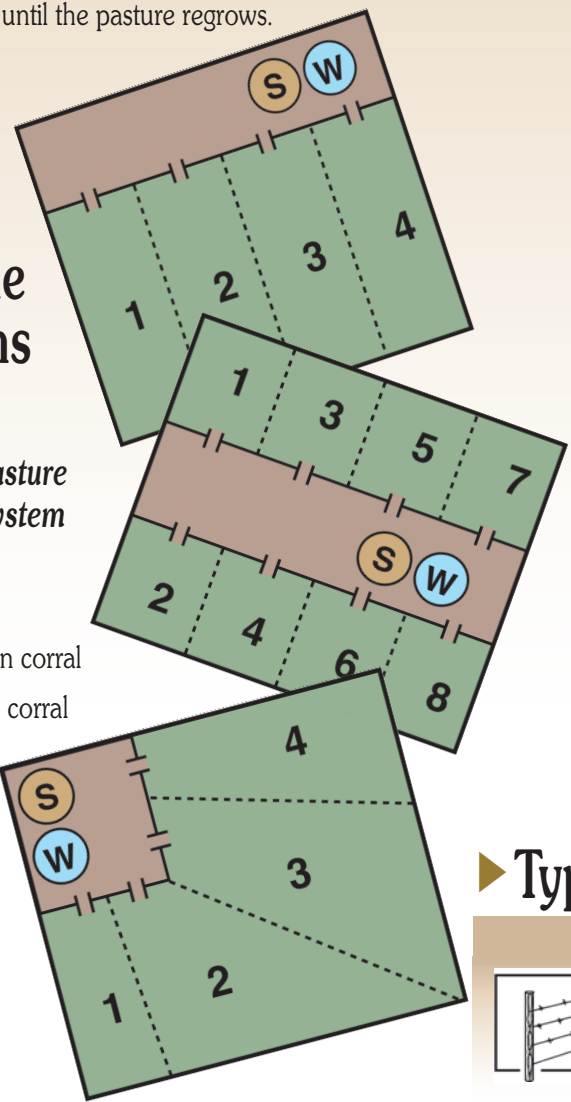
In Puget Sound, livestock usually graze April through October during the plants' growing season. Begin grazing when plants are 6" to 8" in height. Move livestock after 50 percent has been eaten (3" to 4" remains). A re-growth period of 18-40 days is needed, depending on the grass species, the time of year, and water availability. You may need to corral livestock and feed them hay until the pasture regrows.

		M O N T H S											
Pasture		A	M	J	J	A	S	O	N	D	J	F	M
1	G			G		G							
2		G			G		G						
3			G			G			G				
4				G			G			G			

G Graze Rest Provide feed/hay

Sample Designs

For A Multiple-Pasture Grazing System



- (S) Shelter in corral
- (W) Water in corral
- || Gate
- Corral
- Pasture
- Pasture fence

FENCING

A Grazing Management Tool

When selecting a fence, consider:

- Purpose (type of animal you're keeping in or out).
- Type of soil material (rocky or deep loam).
- Terrain.
- Material and labor costs for construction.
- Availability of power.
- Maintenance requirements.
- Weather.
- Visual impact.
- Wildlife. Smooth wire is safer for wildlife than barbed or woven wire. Space wires at 16", 22", 28", and 40" from the ground to allow deer, and elk to get through with reduced fence damage. The 12" gap between the top two wires keeps animals from getting tangled in the wires.

Livestock Water

An Essential Part of Your Grazing and Animal Health Programs

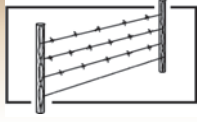
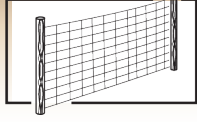
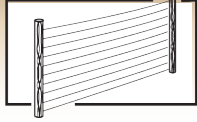
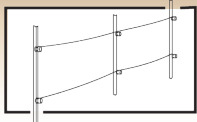
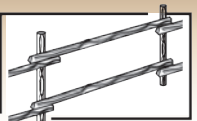
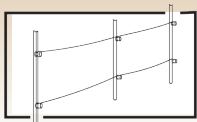
As you divide your acreage into several pastures, establish separate water sources for each pasture or a single water source that is accessible from several pastures. Clean, fresh water is essential for good animal health. Options for livestock water include stock tanks and nose pumps. It is highly recommended that you fence your grazing livestock away from streams to keep manure out of the stream, protect and maintain streamside grasses and shrubs, and control erosion.

For More Information

Obtain publications from county extension offices on livestock production, farming, gardening, 4-H, and FFA programs. Assistance is available from the local conservation district, USDA-NRCS, and private consultants to:

- Design a grazing system, livestock watering systems, and a livestock waste usage or disposal program.
- Increase hay and pasture production.
- Help you meet water quality standards.

Types of Fencing

	Advantages	Disadvantages
	4-Strand Barbed Wire Good control of cattle and sheep.	Barbed wire can injure horses, llamas and wildlife. Place wire to allow wildlife to safely pass. High labor and material costs. Periodic maintenance required.
	Woven wire Good control of sheep. Add an electric wire or 2 upper strands of barbed wire for cattle. May not keep some predators out.	Extremely unsafe for wildlife. Limit use to small areas near buildings. High labor and material costs. Easily damaged by falling trees.
	4 to 10-strand smooth wire 4- to 5-strand good for horses and less harmful to wildlife. 8- to 10- strand will contain large, exotic animals. Durable.	High labor and material costs. Periodic maintenance required.
	Portable Electric Good for establishing pasture rotation program on small acreages. Lightweight, portable, easy to set up or dismantle before and after irrigation. Less expensive.	Not very durable. Needs power source. Not recommended for perimeters.
	Post and Pole (rail fence) Durable. Withstands heavy snowfall. Low maintenance, less harmful to wildlife.	High labor and material costs. Less durable in high rainfall areas.
	High Tensile Electric (New Zealand Style) Good control for all animals. Inexpensive and easily installed and requires little maintenance.	Can be unsafe for horses if installed incorrectly. Loss of physical barrier during power outage.

MUD

► Causes Problems for You, Your Livestock and Your Neighbors

- Mud harbors bacteria, fungal organisms and other pathogens which cause disorders such as abscesses, scratches, rain scald or thrush.
- Mud is a breeding ground for insects such as Culicoides, filth flies and mosquitos.
- If fed on the ground, horses can ingest mud or sand, which can cause sand colic.
- Standing in mud can lower an animal's body temperature, which in turn causes unthriftiness and even hypothermia.
- Mud is a slick and unsafe footing.
- Mud makes chore time difficult and unpleasant.
- Muddy farms are unsightly and cause an increase in odors and flies.
- Mud can be harmful to the environment. Sediment runoff contaminates surface water and is detrimental to fish and aquatic wildlife.

From this...



To this...



TIPS

How to Reduce Mud

- Fence animals out of creeks, wetlands and lakes.
- Provide watering systems away from streams.
- Practice good pasture management techniques so you have a healthy pasture—avoid overgrazing and creating bare spots.
- Create a sacrifice area (paddock) and use it to confine livestock in the winter. Also, use the sacrifice area when pastures are grazed down to 3" during the summer months.
- Pick up manure every 1-3 days in stalls, sacrifice areas and outdoor arenas.
- Use footing material, such as hogfuel or gravel over geotextile fabric, in high traffic areas such as sacrifice areas and around gates. Avoid using hogfuel in very wet areas where it will turn into muck.
- Maintain a grassy area at least 25 feet in width around the sacrifice area. Increase this dimension if near a stream. The grass will serve as a filter for any runoff that does occur.
- Install gutters and downspouts on all buildings and divert water away from sacrifice areas.
- Plan your gutter system to handle the amount of rainfall for your area.
- Maintain or plant trees and moisture-loving shrubs outside of sacrifice areas. Trees can drink a lot of water, 100-250 gallons per day for a mature tree. This can aid in keeping an area drier and reducing surface runoff.
- Protect downspouts from livestock damage. Use heavy PVC pipe, or construct other barriers.



Gravel and geotex fabric example

MANURE

► More Than a Few Reasons to Manage Livestock Manure on Your Property

- Manure problems create an unhealthy environment for horses and livestock. Poor health may mean more vet bills and increased feed bills.
- Leaving manure on the ground creates more mud.
- Manure, like mud, creates a breeding ground for insects, especially filth flies. Insects are annoying at best and, at worst, carry disease or can cause serious allergies.
- Internal parasites hatch from manure as often as every 3 days and can reinfest animals as soon as 24 hours after worming.
- Nutrient runoff from manure has a negative impact on the environment. It contaminates surface water and groundwater, is detrimental to fish and other aquatic wildlife, and fertilizes aquatic weeds.
- Applying manure back to pastures creates a natural nutrient cycle; one horse's manure represents about \$150 in fertilizer value/year.

TIPS

Managing, Using & Disposing of Manure

- Collect raw manure and stall waste from stalls, paddocks and barnyard areas. Picking manure every 1 to 3 days prevents animals from re-ingesting parasites, and can break the parasite cycle.
- Store manure in a covered area. A roof or tarp over your manure pile will prevent rain from leaching away valuable nutrients and control moisture for ideal composting conditions.
- Store manure in a location that makes it easy for equipment to turn, haul and load compost or non-composted manure.
- Use a good deworming program. If manure is properly composted, the heat generated (ca. 140°) can kill parasites, worm eggs and weed seeds.
- Have soil and manure tested so that you can apply manure at the right rates for plant needs. Overapplying manure nutrients can be harmful for animal health, plant growth and the environment.
- Only apply manure and compost to flower beds, cropland and pastures during the growing season when plants can take up valuable manure nutrients (April to October).
- Sell or give away composted manure and stall waste to neighbors, community gardens, local garden clubs, organic farms, nurseries, or tree farms.
- Utilize a manure exchange program to market your aged manure. Contact your local conservation district, cooperative extension office or county livestock programs to see if they operate one. Or consider starting a program in your neighborhood where you organize a yearly spring event that offers aged manure to all who want it. Maybe you and your neighbors can collect old feed sacks to give it away in bags!
- Haul your excess compost to topsoil or compost businesses. You will need an appropriately sized, located and covered storage bin or area and a truck or a tractor with a bucket. Plan to have manure removed from your site at least twice a year (spring and fall). Don't let manure accumulate on your property. Consider renting a container from a compost facility for monthly manure pickup.

TIPS

For Successful Composting

- Begin by building a bin or pile of manure and stall waste on top of pallets that is at least 3'x3'x3', and place the bin or pile where surface water flow cannot reach it.
- Cover the pile or bin with a roof, tarp or sheet of plastic (a cover keeps it from getting too wet in the winter or too dry in the summer).
- Keep the pile as damp as a wrung out sponge – no wetter or drier!
- Add air to the pile by turning it by hand, or with a tractor; alternatively, lay a few perforated pipes down and build the pile on top of them.
- When the pile gets as big as you want it for manageability, start a second pile and allow the first to continue composting.
- It is ok to add garden and lawn clippings to your compost, but do not let grass clippings clump together.
- Kitchen scraps are best managed in a worm bin so that you do not end up attracting vermin.
- Add only herbivore manure to your compost. Carnivores, such as dogs and cats, may share similar pathogens with humans. Pet waste should always be picked up and disposed of in the trash.

► Is your farm “manure tight?” Some state and federal laws are aimed at keeping manure on the land as a fertilizer and out of surface and groundwater. Check with your local Conservation District to find out about regulations pertaining to manure management in your area.

