Management Practices for Small Acreages

Keeping Water Clean

In Clark County we receive a lot of liquid sunshine in the form of rain throughout the year and this can impact small acreage landowners and their land. How landowners manage stormwater affects not only the enjoyment of their property, but also the health of streams and waterways. Daily activities concentrated in small areas can potentially cause problems that negatively affect landowners' pocketbooks as well as the "health" of their land.

This factsheet provides a guide to some common management practices, usually referred to as BMPs (best management practices), landowners can use to reduce the impact of stormwater on their properties. This publication does not provide the detail or site specific information necessary to effectively implement some of the BMPs listed. This factsheet does provide resources and contacts that you can access to obtain further information.

Keeping Clean Water Clean

Managing water before it can cause the landowner a problem is the easiest means of controlling the effects of rainwater. Diverting rainwater to areas where it least impacts your activities comprise the least expensive and most effective BMPs. However, moving this to a neighbor's property does not solve the problem and will probably create additional problems. Additionally, helping water infiltrate into the soil benefits not only the landowner, but their community as well. Infiltration recharges groundwater and keeps our streams flowing, which benefits wildlife and community members (for recreation and sustaining wells used for drinking water).

The more impervious area landowners have on their land, the more rainwater runoff they will have to handle. Impervious areas include pavement, compacted areas (e.g., gravel driveways), and roofs. In some heavy rainfall events, there will be too much water for the soil to absorb, so some runoff is inevitable. Runoff can transport soil particles (sediment) to waterbodies with negative effects on fish habitat and stream health. Excess nutrients from fertilizers or manure attach to these soil particles and can also damage stream health and habitat.

How much water comes off impervious surfaces? As a rule of thumb, every 100 square feet (10 foot by 10 foot) of impervious surface produces 62 gallons of runoff for each inch of rainfall. Do the numbers and that is a lot of water!

Gutters and Downspouts. Installation and maintenance of gutters and downspouts on buildings constitutes the single most effective BMP for controlling the impacts of stormwater. Rainwater diverted away from buildings can reduce mud, soil compaction, and soil erosion as well as protecting the expensive investment you have in your structures. Diversion to vegetated areas or into dry wells also increase infiltra-

tion into the groundwater. If you have animals, reducing muddy conditions can also improve animal health. *(See reference 5.)*

Drywells. Downspouts can outlet into dry wells to help water infiltrate into the ground. A dry well is a pit dug and filled with gravel and lined with weed cloth or geotextile material that keeps the soil from filling in the void spaces between the gravel.

French Drains. French drains are shallow trenches with perforated corrugated plastic pipe surrounded by gravel and covered with soil. The pipe drains water from around building driplines (from the roof) and carries the water to an area where the water can infiltrate safely into the ground.

Grassy Swales and Berms. Swales are shallow, gently sloped trenches that intercept runoff and transport water away from areas of activity. Swales are kept vegetated with grass which slows down the runoff, facilitates infiltration of the runoff, and removes sediment. These are sometimes called infiltration trenches. These swales also remove excess nutrients since the grasses utilize these nutrients for growth.

Low berms (usually just a few inches in height) also direct runoff from structures or areas of activity. Berms are small mounds of vegetated soil. *(See reference 5.)*

Keeping Soil in Place

Eroding soil that enters streams can smother fish spawning beds and decrease stream health. When excess nutrients are transported with the soil particles, they can decrease oxygen levels in streams, killing fish and other stream organisms.

Buffer Strips. Buffer strips are vegetated strips of land situated downslope of potential problem areas (bare soils, intense runoff, livestock use areas, etc.). Grasses, shrubs, and trees comprise the vegetation in these strips. Buffer strips capture sediment and nutrients flowing through them. The vegetation slows runoff and causes soil particles to settle out. Nutrients are taken up by the plants. These strips are often placed along streams to reduce contaminated runoff from reaching the stream. *(See reference 1.)*

Using native plants decreases the maintenance requirements of buffer strips since they are suited to the local climate. Once established, they require little maintenance. *(See references 2 and 5.)*

Managing Nutrients

Major nutrients common to fertilizers and manure include nitrogen (N), potassium (K), and phosphorous (P). Other common nutrients include calcium, magnesium, and sodium among others. When they enter streams, nutrients can encourage algae growth which depletes oxygen other organisms and fish require.

Proper Application of Nutrients. In this practice, landowners apply only the amount of nutrients (from manure or synthetic fertilizer) the soil needs to grow the desired product: grass, crops, etc. This requires taking a soil sample and having a lab test it for nutrient levels. A soils lab will provide a recommendation for your desired use. A soil test is a requisite for good nutrient management. Applying only the nutrients the plants need will not only reduce potential runoff contamination, but also save the landowner money. Why pay for fertilizer you do not need? *(See references 10 – 13.)*

Manure Storage. Stored manure should be covered to prevent rainwater from leaching nutrients into runoff and groundwater. A cover also prevents erosion of the manure solids. Manure storage should be located at least 100 feet from wells and streams to reduce potential contamination. Covering manure also conserves nutrients in the compost you want to put onto your pasture or garden and thus saves you money on fertilizer. *(See references 5 and 6.)*

Animal	Volume cu ft/day	Weight lbs/day	Moisture percent
Beef	1.02	63	88
Ducks	0.73	46	75
Goats	0.63	40	75
Horse	0.81	50	78
Sheep	0.63	40	75

Composting. Properly composting manure reduces a potential contaminant into a useful product. When applied to the soil, compost increases the ability of the soil to hold water while also improving soil structure (soil tilth) by replenishing organic matter in the soil. Compost also releases its nutrients slowly and decreases chances of contaminating water (wells, streams, etc.). Pastures, gardens, landscaping, and orchards all benefit from compost application.

The composting process relies on a balance between air (oxygen), moisture, and heat. A proper balance encourages the proliferation of microorganisms that break down the manure. In our wet climate, controlling the moisture content helps regulate heat and air. It is essential to cover compost piles to maintain the optimum moisture content of 50% - 60% and achieve an internal temperature of 130°F – 140°F. Another important factor in maximizing the compost process is the carbon to nitrogen ration (C:N) which should between 30:1 and 40:1. *(See references 3 and 4)*

For a thorough explanation of farm-scale composting, purchasing the *On-Farm Composting Handbook* is a good investment (see http://www.nraes.org/publications/nraes54.html).

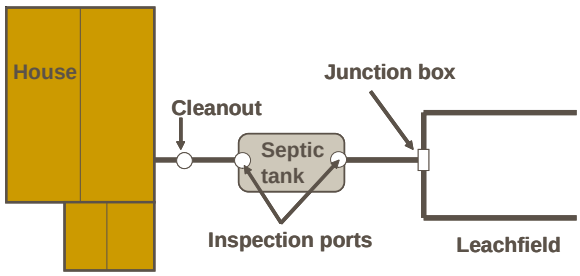
Human Health

On many acreages, landowners rely on wells for drinking water and on septic systems to process human waste. Wells are susceptible to contamination while poorly maintained or damaged septic systems can cause contamination of both groundwater and runoff into streams and rivers.

Protecting Wellheads. As a rule of thumb, keep potential contaminants at least 100 feet away from wellheads. This includes storage of manure, chemicals (fertilizers, pesticides, etc.) and motor oil among others. Animals should not be confined in close proximity to your well.

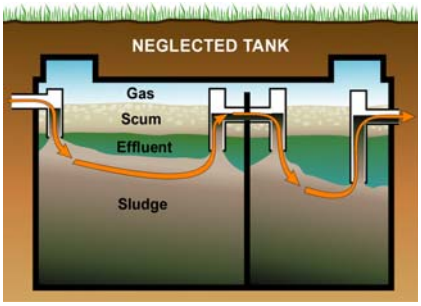
Wellheads should be properly sealed and soil slightly mounded to slope away from the wellhead to keep rainwater flowing away from the well.

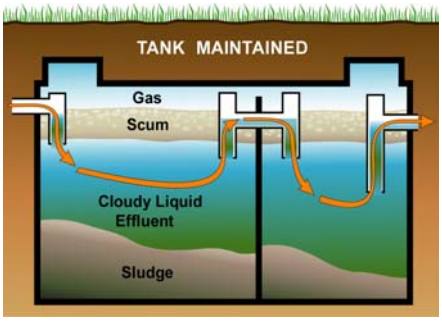
Maintaining Septic Systems. If you are unsure whether you are on septic, find out! Consisting of a relatively airtight tank and a leachfield (for infiltrating liquids into the soil), septic systems process human waste and other household water that goes down the drain.



Similar to manure composting, septic systems essentially break down fecal material and fluids into a state that can then be discharged into the soil which further filters out contaminants. Microorganisms also play a critical role in this process. Maintaining a good growth environment for these organisms requires that landowners not drain large amounts of certain items into their septic systems: detergents, sink and tub cleaners, cleaning compounds, bleach, disinfectants, caustic drain openers, polishes, acids, and toilet cleaners.

Septic systems need to be pumped by a licensed pumper on a regular basis. If solids build up in the septic tank, they can migrate into the leachfield and plug the pores between soil particles and significantly damage the ability of the soil to infiltrate liquids. Result: a soggy surface and time for a new leachfield!





To properly maintaqin your septic system:

- Pump the tank on a regular schedule;
- Do not drive over the tank and leachfield;
- Keep livestock off your leachfield;
- Do not plant food gardens or trees on the leachfield.

Improperly maintained, septic systems will fail and you will spend between $5,000 and $20,000 to repair or replace that system. This certainly puts the $300 - $500 pumping expense every 3-5 years in perspective! *(See references 7 and 8.)*

Tank Size (gallons)	1	2	3	4	5	6
1000	12	6	4	3	2	2
1250	16	8	5	3	3	2
1500	19	9	6	4	3	3

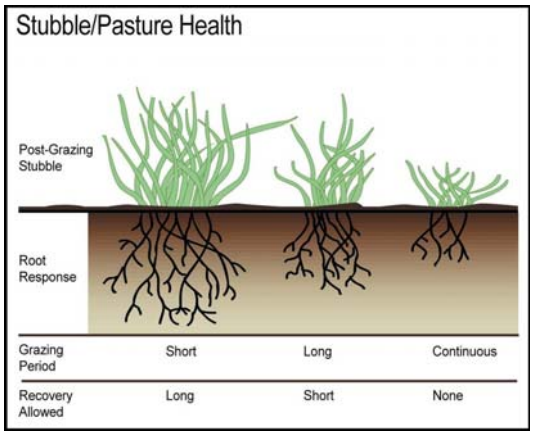
	People in House	1	2	3	4	5	6
Tank Size (gal)	1000	12	6	4	3	2	2
	1250	16	8	5	3	3	2
	1500	19	9	6	4	3	3
Pumping Schedule: Four person household with a 1250 gallon should pump their tank every three years							

Managing Animals

Animals pose significant challenges for landowners in terms of keeping their land productive and their animals healthy. Clark County's high rainfall necessitates special care to avoid muddy messes and resulting erosion. Healthy pastures prevent soil erosion and reduce the transport of nutrients to streams or other waterbodies.

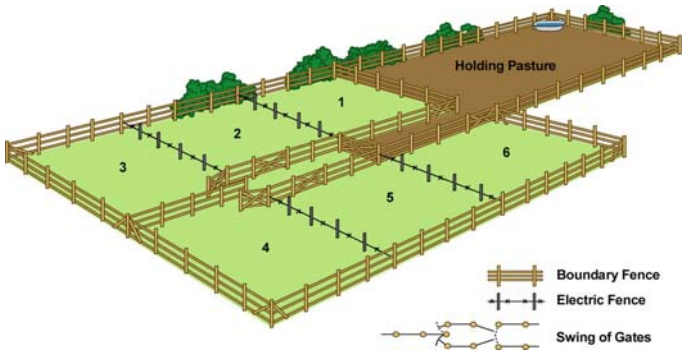
Sacrifice Areas (Holding Areas). In order to control potential pollution and where mud occurs, landowners can set aside a specified area where animals are confined during rainy months. Since this area will always be muddy or at least devoid of vegetation, it is called a sacrifice area (sacrificed for the good of the rest of the property). You can limit the mud in these areas by laying down hog fuel or other material (e.g., gravel or sand).

Confining animals to the sacrifice area allows the remaining pasture land to regrow and keeps animals from overgrazing and undermining the pasture's ability to regenerate for the next grazing season. Wet soils compact easier and restricting animal access during the winter keeps the soil from being compacted. Compacted soils also reduce the grass' ability to grow (compaction reduces infiltration into the soil and makes it more difficult for adequate root growth). *(See references 5)*



Pasture Management. In order to maximize the forage available for animals, landowners need to manage pastures for grass health. Allowing continual grazing weakens grasses and results in decreasing plant growth (and thus decreasing forage) as well as opening bare areas to weeds and erosion.

As a general guide, grasses should not be grazed below three inches in height. At three inches, animals should be removed from that part of the pasture. Once the grasses grow back to six to eight inches in height, animals can graze that area again.



Rotational Grazing (The Magic of Fencing). Rotating animals around parts of your pasture maximizes the time period animals can graze by allowing parts of a pasture to regenerate while other parts are being grazed. Landowners divide pastures into sections with fencing. While the perimeter (boundary) fence is usually a permanent installation, interior electric fences allow changes with minimal labor. Animals are moved from section to section as the grass height reaches three inches. Animals return to a section once the grass grows back to six inches or more. *(See references 5 and 9.)*

Controlled Stream Access. Animals allowed uncontrolled stream access can damage streamside vegetation, destabilize stream banks, facilitate erosion, and directly deposit nutrients into the water. These all cause degraded habitat for fish and wildlife, may kill some aquatic species, and generally pollute. Completely excluding animals from waterbodies using either permanent or portable electric fencing provides the best protection. However, when animals rely on waterbodies for watering, restricting access also reduces potential water quality pollution. In this case, a crossing alleyway can be formed that allows access to water, but limits that access to one area. These alleys can also be structured to limit the times when animals can get to water. Another option would be to install a non-electric, mechanical pump (called a "nose pump") that animals operate to bring water from a fenced waterbody. More information can be obtained through the Clark Conservation District.

Nose pump allows off-stream watering

Contacts:

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Brush Prairie WA 98606
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USDA Natural Resource Conservation Service
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Brush Prairie WA 98606
360-883-1987 extension 3
http://www.wa.nrcs.usda.gov/

Information Sources on the web:

Horses for Clean Water http://www.horsesforcleanwater.com/

NRCS Technical Information and Resources http://www.nrcs.usda.gov/technical/

Oregon State University Extension & Experiment Station Communications Publications http://eesc.orst.edu/agcomwebfile/EdMat/default.html

Oregon State University Extension Service, Oregon Small Farms http://smallfarms.orst.edu

Oregon State University, The Oregon Well Water Program http://wellwater.orst.edu/

Shady Springs Farm, Equine Winter Turn-Out Project http://www.shadyspringsfarm.com/

Washington State Department of Ecology Well Logs http://apps.ecy.wa.gov/welllog/

WSU Extension Publications http://pubs.wsu.edu/cgi-bin/pubs/index.html

WSU King County Extension Agriculture Publications http://www.metrokc.gov/dchs/csd/wsu-ce/agriculture/Publications.htm

WSU Natural Resource Extension http://homefarmasyst.wsu.edu/

WSU Natural Resource Extension – Publications http://ext.nrs.wsu.edu/publications/index.htm

WSU Small Farms Team http://smallfarms.wsu.edu/publications/index.html

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