



Council of Bay Area Resource Conservation Districts

Equine Facilities Assistance Program

*“Working with horse owners to protect San Francisco Bay Area water resources.”*

# Stormwater Runoff Management at High Use Areas

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**Stormwater Runoff Management at Horse Facilities** — Rain water flowing across the land, or in channels or pipes is called stormwater runoff. If stormwater runoff is allowed to erode soil from bare areas or run through manured areas, it becomes polluted and must not be allowed to enter a stream. High-use areas, such as buildings, corrals, arenas, paddocks, turn-out areas, manure storage areas, etc., are areas that must be managed to keep clean water from becoming polluted. Diverting fresh water around high-use areas will keep the “clean water clean” and minimize the runoff from high-use areas. By keeping the size of high-use areas small, managing polluted water can be reduced. It is much easier to manage the clean water than treat that water once it becomes polluted.

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## Two goals for managing stormwater runoff:

### #1 - Keep “clean” water “clean”

“Clean” stormwater runoff from roofs and hillsides will become “contaminated” if it flows across bare soil and/or manured areas and carries away sediment and/or manure.

Capture “clean” roof runoff water in gutters and route it to downspouts. Divert “clean water” away from manured areas and areas prone to erosion. Management of clean water is especially important if paddocks are adjacent to buildings or near streams or drainageways. Size gutters to handle the volume of rainfall calculated for the roof size. Seek professional help for gutter and downspout sizing. Protect downspouts from damage by animals. Pipe or channel the roof runoff away from buildings, horse keeping areas, and manure storage areas. Erosion-resistant methods of diverting water include the use of underground pipe, grassed waterways, and lined (rock or concrete) waterways, along with energy dissipaters at outfalls into creeks, ditches, or ponds.

Divert “clean” hillside runoff around buildings, corrals, bare soil areas, manure storage areas, and other high-use areas. Use berms, ditches, or channels lined with grass, rock, or concrete. Convey the runoff to ponds, wetlands, or vegetated areas such as pastures, grass filter strips or other vegetated areas where concentrated flow can be dispersed into sheet flow and infiltrate into the ground. If the runoff must be diverted directly into a creek, be sure to protect the streambank from soil erosion with appropriate bank protection and an “energy dissipater,” such as a rock apron.

Manage stormwater runoff around buildings and high-use areas to:

- Keep clean water from becoming polluted
- Reduce wet and muddy areas
- Keep clean water from becoming polluted

This fact sheet is part of a series prepared and published by the Council of Bay Area Resource Conservation Districts in cooperation with the USDA Natural Resources Conservation Service and the University of California Cooperative Extension. The Equine Facilities Assistance Program’s goal is to protect San Francisco Bay Area water resources by assisting in effective management of possible non-point source pollutants associated with horses. Resource Conservation Districts (RCD) are non-regulatory, special districts governed by a volunteer board of directors. In addition to educational programs, RCDs provide landowners and the general public with technical assistance in natural resource management.

## **#2 - Manage “contaminated” runoff**

Stormwater that flows through manured areas becomes “contaminated” because it can carry manure off site. In addition, high-use areas with bare soil, as well as active gullies and bare streambanks are subject to soil erosion. Erosion leads to sedimentation in creeks that may smother fish spawning areas. Sediment fills stream channels, reducing capacity, which may increase flooding. Divert “contaminated” runoff from high-use areas away from streams and into a buffer strip or holding pod where sediment and nutrients can settle.

Manure can also add excessive nitrogen and phosphorus to creeks. These nutrients feed algae blooms. The algae’s subsequent death and decay can consume much of the water’s oxygen, which is necessary for fish to breathe. Ammonia from urine and manure can be toxic to fish and other aquatic life. Salts from horse waste can change the variety of insects that a stream can support. Unless manure is cleaned-up regularly during the rainy season contaminants can leach into groundwater.

Managing stormwater runoff also promotes horse health. Manure that accumulates can turn to mud. Manure and mud provides a breeding ground for unwanted insects. Mud supports bacteria and fungi which increases the likelihood of disease and hoof problems in horses. Mud and manure can be an unsafe footing for horses. Horses that stand in mud require more energy to keep warm. Worms in manure can reinfest horses very shortly after deworming. Additionally, mud and manure can be unsightly for neighborhoods and communities.

A good way to tell if pollutants are entering a creek is to monitor the water upstream and downstream of high-use areas. Water monitoring can be done on-site with the use of inexpensive kits. See the fact sheet series “Simply the Facts on Water Quality Monitoring” for details (available from the Council of Bay Area Resource Conservation Districts.)

### **Horse Facility Management**

- Remove manure regularly and store properly. Daily manure removal is optimal.
- Deep bedding used in paddocks can reduce mud and absorb potential contaminants.
- During the summer, sprinkle water on high-use areas to keep down dust and help breakdown organic matter.

### **Manure Storage**

- Cover stored manure with a roof or tarp and direct runoff away from the manure storage area.
- Build berms around the manure storage area so clean surface runoff does not run through manure and become polluted.
- “Contaminated” runoff should not be allowed to enter directly into creeks.

### **Filter Strips**

- Maintain a grass filter strip around high-use areas to trap sediment and manure that washes off of these areas. Thick, sod-forming grass works well. The filter strip can be mowed to encourage dense upright growth.
- Divert polluted runoff into a pipe or impervious lined channel for filtration in a grass filter strip.
- An alternative to a filter strip is a sediment pond for later irrigation onto pasture or cropland.

### **Horse Facility Layout**

- Do not locate confinement areas in drainages which can transport sediment and waste off-site during storms.
- Kick boards, railroad ties, or telephone poles around arenas help to hold footing material on-site.

## **Construction for stormwater runoff management**

Plan to limit impacts of grading, runoff from roofs and other impermeable surfaces, and runoff from bare soil areas. Locate buildings and horse holding areas away from creeks and steep slopes. Avoid building in floodplains. Minimize disturbance to wetlands and riparian areas. County regulations may require permits and setbacks from creeks.