



EQUINE BEST MANAGEMENT PRACTICES



County of San Diego
Watershed Protection Program



Preface

The County of San Diego Equine Best Management Practices Manual has been developed as a useful resource for horse owners and/or facilities to manage stormwater runoff. The County Watershed Protection Ordinance (WPO) and Equine Ordinance form the basis of the guidance provided in this manual. This manual focuses on common activities and areas of concern at equine properties, and is written in a non-technical format. For a more detailed discussion of design, sizing, and implementation of specific best management practices (BMPs) tailored to horse owners and facilities, see the Equine BMP Implementation Manual.

This manual contains helpful information for the following areas and activities:

- ✓ Manure Management
- ✓ Dirt Access Roads and Trails
- ✓ Arenas and Paddocks
- ✓ Stockpiles
- ✓ Horse Wash Rack Drains
- ✓ Vehicle Maintenance
- ✓ Housekeeping
- ✓ Site Design
- ✓ Exclusionary Fencing
- ✓ Pest Management
- ✓ Training and Education



Key Horse Facility Areas and Activities

Source: Adapted from Florida Department of Environmental Protection, 2013.





Manure Management¹

Horses typically generate about *50 pounds* of manure each day. Managing manure is a critical activity for all equine facilities, regardless of their size. Manure is not only a source of stormwater pollution, but it can also impact the health of the animals if not managed properly. The best practice is to **clean manure from corrals and stalls daily**.

Storing Practices

Using these recommended storing practices can improve animal health and protect stormwater from being polluted:

- ◆ Locate manure away from drainage paths.
- ◆ Cover manure to prevent stormwater contact.
- ◆ When temporary stockpiles of manure are placed directly on soil, relocate them at least once each year.
- ◆ Place permanent stockpiles of manure on concrete or asphalt and cover with a permanent structure to prevent stormwater runoff.

¹ Manure Management References:

Equestrian-Related Water Quality Best Management Practices, A Cooperative Effort among Private and Public Entities in Orange and San Diego Counties, California, June 2004.

Pennsylvania State University, College of Agricultural Sciences, Agricultural Research and Cooperative Extension, *Horse Stable Manure Management*, 2009.

Texas AgriLife Extension Service, *Lone Star Healthy Streams: Horse Manual*, July 2012.



This manure storage area is properly located on concrete. A best practice is to cover the pile.

This is an example of a well-designed manure storage area.





Management Practices

Several practices are available to manage manure.

- ✓ Composting (**highly recommended**)
- ✓ Haul Away (also recommended)
- ✓ Spreading
- ✓ A combination of these approaches

Composting

Composting is the most highly recommended management practice since it:

- ◆ is good for the health of the animals,
- ◆ can **save money**, and
- ◆ reduces stormwater pollution.

Composting involves blending manure with other organic materials, and with the help of water and air, allows the manure to decompose naturally over several weeks into a stable, fertile product called humus. As the manure decomposes, the volume is reduced by about half, harmful parasites are killed, and odors are eliminated. Composting also kills fly eggs, protecting horses from nuisance flies, painful bites and potential transmission of diseases. Additional information regarding composting can be found within the Equine BMP Implementation Manual.



This composting area is properly designed with multiple composting bins and covers.

Haul Away

An alternative to composting would be to simply haul away the manure for recycling or pay a company to come pick it up (send manure to the landfill only if there are no recycling options). This is a good option for sites that do not have enough space or desire to compost. This practice also reduces pollution and is good for the health of the animals.

Spreading

Although the practice of managing manure by spreading has been in use for a long time, it can have a significant *adverse impact on animal health as well as stormwater quality*. Fresh manure contains more pathogens than composted manure.





Spreading is best done in the spring during the growing season so crops can use the nutrients. Additional information regarding spreading can be found within the Equine BMP Implementation Manual.

Manure Management Plan

A Manure Management Plan can be developed based on the recommendations of this manual.





Dirt Access Roads and Trails²

Dirt access roads and trails can be a significant source of sediment and other pollutants as uncontrolled runoff erodes the surface of the road/trail. This does not only affect the quality of downstream waterways, but also damages the roads and trails. This damage can be costly to repair and can result in dangerous conditions for animals, people, and vehicles. The best practice to reduce erosion is to **stabilize access roads and trails and locate them at safe distances from waterways.**



Management Practices

- ✓ Location and Design
- ✓ Runoff Management
- ✓ Construction, Maintenance and Repair

² Dirt Access Roads and Trails References:

Florida Department of Agriculture and Consumer Services, *Best Management Practices for Florida Equine Operations*.

Florida Department of Agriculture and Consumer Services, *Water Quality/Quantity Best Management Practices for Florida Equine Operations*, 2011.

Natural Resources Conservation Service, *Conservation Practice Standard: Animal Trails and Walkways (Code 575)*, June 2011.

New Hampshire Department of Agriculture, Markets, and Food, *Manual of Best Management Practices (BMPs) for Agriculture in New Hampshire*, June 2011.



Provided below are the recommended best practices for dirt access roads and trails.

Location and Design

- ◆ Locate access roads and trails at least 25 feet from watercourses, lakes and wetlands.
- ◆ Do not let trails exceed 10 percent grade. If a trail must be built on a steep grade, have the trail switch back and forth down the slope.
- ◆ Design roads or trails that must cross streams and creeks to be stabilized using engineered rock crossings, culverts or bridges.

Runoff Management

- ◆ Build trails such that water sheet flows across the trail.
- ◆ Construct berms to direct stormwater away from the trail.

Construction, Maintenance and Repair

- ◆ Minimize the amount of vegetation that is cleared when constructing roads and trails.
- ◆ Maintain vegetative cover along the sides of roads and trails.
- ◆ Inspect and maintain road and trail surfaces.
- ◆ Re-grade roads to smooth the surface, prevent rills from expanding, and maintain the designed grade and dimensions.



Arenas and Paddocks³

Arenas and paddocks are continuously compacted, under constant physical stress from horses' hooves. Arenas and paddocks have the potential to release excess sediment, which can damage receiving waters. Erosion within arenas and paddocks increases maintenance costs by requiring the surface material to be replaced more often. The best practice is to **divert runoff around arenas and paddocks and separate the arenas and paddocks from waterways using vegetated buffer strips.**

Management Practices

- ✓ Runoff Management
- ✓ Maintenance and Inspection

Runoff Management

Runoff management results in:

- ◆ Improved water quality,
- ◆ A drier barnyard,

³ Arenas and Paddocks References:

County of San Diego Watershed Protection Program, *Equine Facilities Stormwater Best Management Practices*, June 2013.

Equestrian-Related Water Quality Best Management Practices, A Cooperative Effort among Private and Public Entities in Orange and San Diego Counties, California, June 2004.

Florida Department of Agriculture and Consumer Services, *Water Quality/Quantity Best Management Practices for Florida Equine Operations*, 2011.

Massachusetts Department of Natural Resources, *A Horse Owner's Guide to Protecting Natural Resources*, 2014.



- ◆ A healthier horse environment, and
- ◆ Better working conditions.

Runoff management involves diverting surface runoff around arenas and paddocks using berms, ditches, underground pipelines or other methods. It is advisable to locate arenas and paddocks at least 200 feet away from creeks, steep slopes and floodplains. The limits of local floodplains can be researched through FEMA and the County Flood Control Program. Separating arenas and paddocks from waterways with vegetated buffer strips will filter sediment and absorb nutrients in runoff. Drainage can be managed to keep it from becoming concentrated as it flows through the buffer.

Infiltration and drainage in and around arenas and paddocks can be improved by using base rock and sand or other appropriate measures. Paddocks with a gravel or sand bottom will allow



for percolation of water and pollutants, when built in areas with less than a 10% slope. Sand can be kept within the paddocks and arenas by using boards around the perimeter.

When there is evidence of sheet flow from the arena or paddock, berms can be constructed downgradient to slow the movement of water and reduce the transport of sediment.



Maintenance and Inspection

It is recommended to inspect arenas and paddocks after each rain event for signs of erosion. Any damaged areas can be repaired.





Stockpiles⁴

Stockpile management practices are designed to reduce air and stormwater pollution from stockpiles of feed, hay, soil, manure, sand, green waste and other materials. Improper management can spoil supplies and release pollutants into the waterways. Piles of old, unused equipment should also be managed as stockpiles.

The best practice is to **divert runoff around stockpiles** and **cover stockpiles when not in use**.

For specifics on manure stockpiles, refer to the Manure Management section previously presented in this manual.

Management Practices

- ✓ Runoff Management
- ✓ Storage Design

Runoff Management

It is desirable to protect the downstream perimeter of a stockpile with a linear sediment barrier or berm and to locate stockpile areas at least 50 feet from concentrated flows of stormwater and drainage courses. Stockpiles can be protected from run-on using

⁴ Stockpiles References:

California Stormwater Quality Association (CASQA), *Stormwater Best Management Practice Handbook: Construction*, July 2012.



perimeter sediment barriers (dikes/berms, ditches, or gravel bags).

Storage Design

Whenever possible, it is best to cover stockpiles using either a permanent covered storage area or temporary covers such as tarps. Select cover materials based on anticipated duration of use. Tarp material that is resistant to degradation from sunlight may need to be replaced less often than others. If stockpiled materials are bagged, place them on pallets and under cover.





Horse Wash Rack Drains⁵

Horse wash water can potentially contain urine, manure, detergents, bacteria and pathogens. These pollutants can cause adverse health effects to humans and animals. The best practice to prevent pollution from wash racks is to **contain the wash water** and **connect the drain to the sanitary sewer**. If this is not practical, the wash water can discharge to a French drain or mulch basin.

Management Practices

Several options are available to manage horse wash rack areas.

- ✓ Permanent Wash Area Connected to Sanitary Sewer (**highly recommended**)
- ✓ Permanent Wash Area Discharge to French Drain or Mulch Basin (also recommended)
- ✓ Temporary Wash Area Discharge to a Vegetated Area

⁵ Horse Wash Rack Drains References:

County of San Diego Department of Environmental Health, Land and Water Quality Division, *Graywater Frequently Asked Questions*, 2010.

County of San Diego Watershed Protection Program, *Equine Facilities Stormwater Best Management Practices*, June 2013.

Equestrian-Related Water Quality Best Management Practices, A Cooperative Effort among Private and Public Entities in Orange and San Diego Counties, California, June 2004.

Florida Department of Agriculture and Consumer Services, *Water Quality/Quantity Best Management Practices for Florida Equine Operations*, 2011.



Elevating wash areas is best, but ground level slabs may be allowed as long as pollutants do not go to the storm drain system.

Permanent Wash Area

A valuable permanent wash area:

- ◆ consists of a concrete slab with a rough finish or permeable gravel or pavers,
- ◆ is elevated from the surrounding ground, and
- ◆ is located at least 50 feet from water bodies, wells and domestic septic tank drain fields.

Connected to Sanitary Sewer

If possible, connecting permanent wash areas to the sanitary sewer is preferred because it results in containment and treatment of the wash water. This prevents the opportunity for wash water and associated pollutants to enter the storm drain or receiving waters and prevents wash water from flowing over other parts of the site, causing damage and



muddy conditions. Connecting to the sanitary sewer also prevents standing water which can become breeding grounds for insects that carry diseases.

Discharge to French Drain or Mulch Basin

If not connected to the sanitary sewer, the best approach is for the wash area to contain a slab drain that discharges to a French drain or a mulch basin. If there is no slab drain, the next approach is to pitch the slab such that water gently runs off and is collected by a French drain or mulch basin at the lowest point of the slab.

A French drain is a trench filled with gravel or rock that also contains a perforated pipe to redirect water away from an area. Pre-manufactured French drain systems are also available for easy installation.

Temporary Wash Area Discharge to Vegetated Area

It is best to locate temporary wash areas at least 50 feet from water bodies, wells and domestic septic tank drain fields. Temporary wash areas can be rotated using established turf areas to prevent mud and sedimentation problems. It is preferable for temporary wash areas to direct runoff to a pervious, well-vegetated area, instead of discharging wash water to storm drains, creeks, ponds, or seasonal drainages.



Vehicle Maintenance⁶

Vehicle maintenance practices are designed to prevent or reduce the pollution of stormwater by running a clean and dry site. Vehicle maintenance areas have the potential to expose nutrients, organics, and oil and grease to stormwater. The best practice is to perform maintenance activities offsite; however, when this is not practical, maintenance can be performed in a designated area that provides cover for any materials stored outside and allows for containment of leaks and spills.

Management Practices

- ✓ Runoff Management
- ✓ Leak and Spill Control
- ✓ Inactive Vehicle Storage

Runoff Management

If maintenance must happen onsite, it is best to use a designated area that is located at least 50 feet from waterways and drainage courses. The designated maintenance area can be protected from run-on using perimeter controls such as dikes or berms.

⁶ Vehicle Maintenance References:

California Stormwater Quality Association (CASQA), *Stormwater Best Management Practice Handbook: Construction*, July 2012.



Leak and Spill Control

Provided below are the recommended best practices for leak and spill control.

- ◆ Use drip pans or absorbent pads during vehicle maintenance work that involves fluids.
- ◆ Keep a spill cleanup kit handy in the designated maintenance area.
- ◆ Use adsorbent materials on small spills. Remove the adsorbent materials promptly and dispose of properly.
- ◆ Segregate and recycle wastes, such as greases, used oil or oil filters, cleaning solutions, batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials when stored onsite.
- ◆ Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- ◆ Do not bury used tires.
- ◆ Inspect vehicles daily at startup for leaks, and repair immediately.
- ◆ Keep vehicles clean – do not allow excessive build-up of oil and grease.
- ◆ Consider products that are less toxic or hazardous than regular products. These products are often sold under an “environmentally friendly” label.
- ◆ Take waste to an appropriate recycling center.



Inactive Vehicle Storage

Provided below are the recommended best practices for inactive vehicle storage.

- ◆ Place drip pans under inactive vehicles or drain inactive vehicles of fluids.
- ◆ When possible, store inactive vehicles under permanent cover or cover with a sturdy tarp.





Other Helpful Hints

Housekeeping

By cleaning active horse areas daily, you can enrich animal health, improve chore efficiency, enhance aesthetics, improve safety and reduce flies.

It is best to collect and properly dispose of trash and debris; do not allow trash or debris to enter creeks, watercourses, or ponds.

Site Design

Maintenance costs can be reduced and water quality can be protected by placing roads and structures away from waterways. As much as is practical, it is recommended to not disturb the natural topography, drainage patterns, and vegetation onsite. Prior to building and site design, contact your local agency for setback requirements from property lines and other restrictions.

Exclusionary Fencing

Exclusionary fencing is used to prevent horses from accessing specific areas. When areas become clear of stabilizing vegetation, exclusionary fencing can be used to allow the areas to be re-vegetated. It can also be used to keep horses from accessing unstable slopes or stream banks. Benefits of exclusionary fencing include decreased health risks associated with horses standing in muddy areas, decreased injuries associated



with horses climbing steep and unstable stream banks, and reduced erosion of stream banks caused by trampling or overgrazing.

Pest Management

Use Integrated Pest Management (IPM) techniques to reduce the amount of chemicals, pesticides, fertilizers and herbicides used onsite. IPM is an ecologically based pest control strategy that focuses on long-term prevention and control of pests and pest damage. IPM involves:

- ◆ identifying the pest,
- ◆ removing or reducing the pest habitat when possible,
- ◆ using natural enemies or resistant plant varieties, and
- ◆ using mechanical means for weed removal.

Visit www.sdcounty.ca.gov/awm/ipm_public.html or www.ipm.ucdavis.edu/PMG/menu.house.html for more information.

Training and Education

Training and education are key components of any successful management practice. For practices to be properly put in place, the people who are active on the site daily need to be properly trained. Helpful educational resources are identified at the end of this manual.



For More Information

Pesticide Applications

County of San Diego
Department of Agriculture, Weights and Measures
858-694-8980

www.sdcounty.ca.gov/awm/pesticides.html

West Nile Virus, Flies, and Vector Control

County of San Diego
Department of Environmental Health
858-694-2888

www.sdcounty.ca.gov/deh/pests/vector_disease.html

Recycling Events and Household Hazardous Waste

County of San Diego
Department of Environmental Health
1-877-R-1-EARTH

www.sdcounty.ca.gov/deh/hazmat/hhw.html

Water Wells and Gray Water

County of San Diego
Department of Environmental Health
858-565-5173 (San Diego office)
760-471-0730 (San Marcos office)

www.sdcounty.ca.gov/deh/water/lu_water_wells.html

www.sdcounty.ca.gov/deh/water/lu_graywater_systems.html



Equine Ordinance

County of San Diego
Department of Planning and Development Services
858-565-5981

www.sdcounty.ca.gov/pds/advance/Equine.html

Grading, clearing, setbacks, and other zoning issues

County of San Diego
Department of Planning and Development Services
858-694-2705 (San Diego)
760-940-2893 (North County)

www.sdcounty.ca.gov/pds/ce5/

Dust and air pollution

County of San Diego
Air Pollution Control District
858-586-2600

www.sdapcd.org/

California Stormwater Quality Association (CASQA)

www.casqa.org

Project Clean Water

www.projectcleanwater.org



Training Log

Date	Topic	Presented by	Attendees



Site Assessment Log

Date	Area Reviewed	Issues Noted	Plan to Correct



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