



watershed

protection

ordinance

equine

BEST MANAGEMENT PRACTICES



County of San Diego

Preface

The County of San Diego has developed this Equine Best Management Practices Manual to assist horse owners and facilities with managing stormwater runoff.

Stormwater runoff that passes through the storm drain system in San Diego County does NOT go to a wastewater treatment plant. It is released into creeks, lakes, and the ocean without treatment. When water washes over the ground it picks up bacteria from horse manure carrying it through the watershed. All sources of pollution are prohibited from leaving your property and entering streets or storm drains. Only rainwater is allowed in the streets and storm drains.

We hope you find this manual to be a useful supplement to the Watershed Protection Ordinance (WPO) and Equine Ordinance.

For more detailed information about the design, and implementation of specific Best Management Practices (BMPs) tailored to horse owners and facilities, see the Equine BMP Implementation Manual.

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Key Areas and Activities

The graphic below represents key horse facility areas and activities.



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

Manure Management

CLEANING

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 on a daily basis.**

STORING

The storing practices listed below can protect animal health and prevent pollution of stormwater:

- Store 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.



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 that is covered to prevent contact with stormwater.

BEST MANAGEMENT PRACTICES

- Composting
- Hauling Away
- Spreading

Composting

Composting is the most highly recommended manure management practice since it:

- protects animal **health**,
- saves **money**, and
- prevents pollution of waterways.

Composting begins with blending manure with other organic materials. With the help of water and air, the manure decomposes 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 insect-borne diseases.

Additional information on how to compost effectively can be found within the **Equine BMP Implementation Manual**.



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

Hauling Away

An alternative to composting is to haul away the manure for recycling or pay a company to come pick it up. Manure should only be sent to the landfill if there are no recycling options available. The haul away option may be desirable for sites that do not have enough space or other means to compost. This practice also reduces pollution and protects the health of animals.

Spreading

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



Land application of manure should occur only when certain conditions are met: the manure will be used for crop production, the manure is tilled into the soil, the ground is not wet or frozen, there is adequate land area to provide a buffer between the manure and any stormwater conveyance systems.

See the Equine BMP Implementation Manual for additional information on how to spread manure to avoid adverse impacts on animal health and pollution of stormwater runoff.

MANURE MANAGEMENT PLAN

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



For more information visit:

<http://www.solanacenter.org>

Dirt Access Roads and Trails

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. Sediment can fill in streams and block sunlight that organisms need to live. This not only affects the quality of downstream waterways, but also damages the roads and trails. 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.**



BEST MANAGEMENT PRACTICES

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

Location and Design

- Locate access roads and trails at least 25 feet from waterways such as streams, lakes, and wetlands.
- Grade trails at 10 percent or less. If a trail must be built on a steep grade, have the trail switch back and forth down the slope.
- Stabilize roads or trails that must cross streams and creeks using engineered rock crossings, culverts, or bridges.

Runoff Management

- Build trails such that the water flows across rather than down 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 cracks from expanding, and maintain the designed grade and dimensions.

Arenas and Paddocks

Arenas and paddocks have the potential to release excess sediment, which can pollute runoff. Erosion within arenas and paddocks also 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**.

BEST MANAGEMENT PRACTICES

- Runoff Management
- Maintenance and Inspection

Runoff Management

Runoff management results in:

- Improved water quality,
- A drier barnyard,
- A healthier horse environment, and
- Better working conditions.

Divert. Runoff management involves diverting surface runoff around arenas and paddocks using berms, ditches, underground pipelines or other methods. When there is evidence of flow from the arena or paddock, construct berms downgradient to slow the movement of water and reduce the transport of sediment.

Separate. 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.



Improve infiltration and drainage. Use measures such as base rock and sand to improve infiltration and drainage. Paddocks with a gravel or sand bottom 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.

Maintenance and Inspection. Inspect arenas and paddocks after each rain event for signs of erosion. Repair any damaged areas.



Stockpiles

Stockpile management practices are designed to reduce pollution of water caused by 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 practices are to **divert runoff around stockpiles and cover stockpiles when not in use.**

Refer to the Manure Management section in this manual for specifics on manure stockpiles.

BEST MANAGEMENT PRACTICES

- Runoff Management
- Storage Design

Runoff Management

Protect the downstream perimeter of a stockpile with a linear sediment barrier or berm. Keep stockpile areas at least 50 feet from concentrated flows of stormwater and drainage courses. Stockpiles can be protected from run-on using 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 Drains

Horse wash water can potentially contain urine, manure, detergents, bacteria and pathogens. These pollutants can cause adverse health effects to humans and animals. To prevent pollution from wash racks **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.

BEST MANAGEMENT PRACTICES

- Permanent Wash Area Connected to Sanitary Sewer
- Permanent Wash Area Discharge to French Drain or Mulch Basin
- Temporary Wash Area Discharge to a Vegetated Area

Permanent Wash Area

A permanent wash area should:

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

Connect to Sanitary Sewer.

Whenever possible, connect permanent wash areas to the sanitary sewer. Connecting to the sanitary sewer:

- results in containment and treatment of the wash water preventing wash water and associated pollutants from entering the storm drain or waterways;
- Prevents wash water from flowing over other parts of the site, causing damage and muddy conditions;
- Prevents standing water which can become breeding grounds for disease-carrying insects.

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.



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

Temporary Wash Area Discharge to Vegetated Area

Keep temporary wash areas at least 50 feet away from water bodies, wells, and domestic septic tank drain fields. Rotate temporary wash areas between established turf areas to prevent mud and sedimentation problems. Wash areas are not permitted to discharge wash water to storm drains, creeks, ponds, or seasonal drainages. Instead, direct runoff to a pervious, well-vegetated area.

Vehicle Maintenance

Vehicle maintenance areas have the potential to expose nutrients, organics, and oil and grease to stormwater. The best practice is **to perform maintenance activities onsite**; 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.

BEST MANAGEMENT PRACTICES

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

Runoff Management

If maintenance must happen onsite, 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.

Leak and Spill Control

Best practices for leak and spill control are:

- 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 absorbent materials on small spills and promptly dispose of the used absorbent materials in accordance with applicable laws and regulations.
- Segregate and recycle waste, 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.
- Never place used oil in dumpster or pour it into a storm drain or waterway. Dispose of it in accordance with applicable laws and regulations. Take waste to an appropriate recycling center.
- Dispose of used tires in accordance with applicable laws and regulations. Visit www.wastefreesd.org for more information.

- Inspect vehicles daily at startup for leaks, and repair leaks 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.

Inactive Vehicle Storage

Best practices for inactive vehicle storage are:

- Place drip pans under inactive vehicles or drain inactive vehicles of fluids.
- Store inactive vehicles under permanent cover or cover with a sturdy tarp.



Other Helpful Hints

HOUSEKEEPING

By cleaning active horse areas daily, you can protect 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 planning agency for setback requirements from property lines and other restrictions.

EXCLUSIONARY FENCING

Exclusionary fencing is used to prevent horses from accessing specific areas. Use exclusionary fencing when areas become clear of stabilizing vegetation 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 longterm prevention and control of pests and pest damage. IPM involves:

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

Visit www.sdcounty.ca.gov/awm/ipm_public.html, www.ipm.ucdavis.edu/PMG/menu.house.html, or www.solanacenter.org 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 provided in the next section.

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.wastefreesd.org

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)

http://www.sandiegocounty.gov/content/sdc/deh/lwqd/lu_water_wells.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

References

MANURE MANAGEMENT:

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.

DIRT ACCESS ROADS AND TRAILS:

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.

ARENAS AND PADDOCKS:

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.

STOCKPILES:

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

HORSE WASH RACK DRAINS:

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.

VEHICLE MAINTENANCE:

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

Training Log

Date	Topic	Presented by	Attendees

Self-Inspection Checklist

Stormwater BMP Training Documentation WPO 67.808(a)	
Annual Employee Training	
Annual Review of Facilities and Activities	
SWPPP (if required)	
Implement Pollution Prevention Methods WPO 67.808(a)	
Pollutants Eliminated or Reduced, Recycled, Re-Used	
Housekeeping, Owner/Operator Responsibility WPO 67.808(a)(5)	
Work areas inspected and cleaned daily	
Liquid Waste Management WPO 67.808(a)(6)	
Proper disposal and management of wastewater	
Wet clean up methods - discharge to MS4 must be prevented	
Materials and Waste Management WPO 67.808(a)(7)(AB)	
Proper spill prevention and response	
Hazardous materials and hazardous wastes	
Solid, non-hazardous materials & waste WPO 67.808(a)(7)(C-E)	
Trash Storage and Disposal, Dumpsters (Container Condition)	
Loading and unloading areas properly maintained	
(R) Grease Bin, Trap, Interceptor condition	
(R) Mop Sink - type, design, accessibility	
(R) Floor Mats	
(R) Patio cleaning method	
(E) Animal Waste storage/composting area	
(E) Wash Racks - perimeter, drainage, infiltration	

Vehicles and Equipment WPO 67.808(a)(8)		
Properly maintained and inspected		
Outdoor Areas WPO 67.808(a)(9)		
Storage - stockpiles, condition of containers		
Storm drain inlets protected		
Landscaping and grounds maintained		
Parking lots and vehicle storage areas		
Rooftops	Roof material: _____	