

Heavy Use Areas

A Guide for Planning & Building Mud-Free Confinement Areas for Horses & Livestock

Heavy use areas, also called sacrifice areas, confinement areas, and winter paddocks, are your animals' winter outdoor living area. They are constructed to minimize mud and enable year-round manure collection to keep both your land and animals healthy.

BENEFITS OF HEAVY USE AREAS

- **Healthy, productive pastures** — Confining livestock in heavy use areas during the winter can dramatically improve your pastures. Pastures typically cannot survive continuous grazing and trampling, especially during the winter months when soils are wet. Livestock can also overgraze during the winter, leaving exposed bare ground that can erode into nearby waterways. Animals can also be confined in heavy use areas during the growing season. This enables you to rest pastures and allow for re-growth of the grass plants to 6-8 inches before grazing.
- **Healthier, happier livestock** — Mud is a slippery dangerous footing for livestock and living in mud can cause numerous health problems such as mud rot, rain scald, thrush, etc. Mud-free heavy use areas offer safe footing and a dry environment, minimizing these health problems.
- **Better manure management** — Manure greatly contributes to mud problems, especially since most livestock manure contains between 70-80% moisture. Cleaning muddy, manure-filled paddocks is very difficult during wet months but heavy use areas allow for easy, year round cleaning that keeps your farm healthy.

LOCATION & SIZE

It is important to carefully consider the location of your heavy use area. The best place to build is on the highest, driest ground **away from streams and wetlands**. Livestock should have access to a shelter or barn.

A slight slope will help with drainage, but avoid areas with steep slopes (over 30%) because they can be dangerous for livestock and are susceptible to erosion. Make sure the area you choose is convenient for cleaning and feeding and a manure storage area is easily accessible.

The size of the area is dependent on the number and type of livestock you own. They can range from small areas (such as 20' x 20') to long, narrow paddocks (such as 12' x 60') that will allow livestock room to exercise.

Other considerations when choosing a location:

- Can feed/delivery trucks easily access the area (gates should be about 12 feet wide)?
- Can livestock be easily fed & watered?
- Are alleys and pathways large enough for equipment such as tractors or wheelbarrows?
- Does this location allow easy access to pastures or fit well into your rotational grazing system?



BEFORE: Muddy paddock, wasted feed, dangerous footing. Manure cannot be collected.



AFTER: Mud-free gravel area. Easy manure collection and safe footing for animals.



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Updated Sept. 2017

SELECTING FOOTING

Selecting and properly installing footing is essential when constructing a heavy use area. The benefits and drawbacks of different types of footing are discussed below. Keep in mind that the footing you choose will largely depend on the type of livestock you own, the availability of products, and costs. Many livestock owners have used a variety of these footing options in their heavy use areas. **We recommend rock as a base footing for most soil types**, but other types of footings can be used for the top/surface coat.

Footing Type	Benefits	Drawbacks	Notes
<p>Hogfuel - This coarse wood product is made from chipped stumps, branches or logs. Hogfuel is available locally and prices range significantly depending on the supply.</p>	<ul style="list-style-type: none"> Inexpensive when compared to gravel, although you should apply 1-2' of material when constructing the heavy use area. Natural composting process of the wood product contributes to the breakdown of the nitrogen in livestock urine and manure, thus reducing urine or ammonia smell. 	<ul style="list-style-type: none"> Decomposes overtime. Decomposed material must be removed every year and new material added. Not a suitable footing for areas that are poorly drained because it becomes super-saturated and is difficult to clean. 	<p>When shopping for hogfuel, always look at the product prior to purchasing it. Avoid hogfuel made from lumber, building materials or mill ends as this may contain metal or nails. Take note of the size of the material, fine material will decompose before the end of winter and very coarse material will make picking up manure difficult. Make sure the wood pieces are soft and won't impale hooves.</p>
<p>Gravel - A minimum of 6 inches of compacted gravel should be applied and the size of gravel will depend on the type of material you want your livestock standing on; 3/8", 5/8", and 7/8" crushed rock are commonly used.</p>	<ul style="list-style-type: none"> Long term material life Compacts to form a hard, durable surface Easy to clean Water typically flows along the top of the fabric Allows for some drainage through the footing 	<ul style="list-style-type: none"> Expensive An ammonia or urine smell is sometimes evident Requires thorough manure removal for functionality Some gravel will turn up in your manure pile Surface may be too hard or sharp for some livestock (e.g. – horses don't like to roll on gravel) 	 <p>5/8" gravel on geotextile</p>
<p>Sand - Coarse sand can be a useful footing in some heavy use areas. Sand should not be used as the only footing in areas where there is poor drainage. A minimum of 8-12" of sand should be applied.</p>	<ul style="list-style-type: none"> Soft surface that most livestock will lay/roll on Easy to pick up manure Allows for some drainage Long term material life 	<ul style="list-style-type: none"> Expensive Requires thorough manure removal for functionality Cannot feed horses on sand surface (ingestion of sand particles will cause colic in horses and other livestock) Plugs up with manure/organic material over time, leading to mud. 	<p>Sand can become dusty during the summer months, which can be unpleasant for both livestock and people. Sand, like gravel, varies greatly from pile to pile so be sure to inspect the pile before you buy.</p>



GEOTEXTILE FABRIC

Made of woven plastic, geotextile fabric is a heavy duty material that is commonly used for road building. Geotextile fabric is very useful in constructing heavy use areas as well. The fabric allows water to pass through, but does not allow sand or silt to migrate up. By using geotextile fabric, you will keep the gravel from "sinking" into the native soil over time, prolonging the life of your heavy use area. There are several types of geotextile fabric available at most local building supply stores. We recommend selecting a durable woven fabric designed for road building rather than the less expensive felt fabric which tends to breakdown faster.

CONSTRUCTION

Now that you have decided where to build your heavy use area and what type of material to use, it's time to start construction! Keep in mind that the best time of year to build a heavy use area is when the soil is dry. Do not try to build an area when the site is already muddy, you'll be wasting time and money!

1. Eliminate water flowing into heavy use area.

Make sure that barns and shelters are equipped with gutters and downspouts that divert clean roof runoff water away from the heavy use area. Install curtain drains around the heavy use area to divert seasonal water (if needed). All diverted water should outlet to a dry well or clean grassy area away from manure piles.



Downspout carries roof water via pipe to drywell.

2. Grade the area.

Remove any organic material such as manure and

shape the bare ground to create a slight slope (1-2% is ideal). Avoid scraping too much soil off the surface, the goal is to build up heavy use areas.



Geotextile fabric installed on bare ground and tucked into trench.

3. Cover prepared bare ground with geotextile fabric.

Lay the fabric down in the same direction as the slope for enhanced water flow. Be sure to overlap the fabric pieces at least 2 feet to allow for shift when the footing is applied on top. You can temporarily hold the fabric down until you get the footing on or use garden staples or stakes to permanently pin the fabric to the ground. The edge of the fabric should be pulled outside of the fence to keep livestock from pulling up the edges. Alternatively, dig a trench around the heavy use area and tuck the fabric into the trench.

4. Build a perimeter around your heavy use area to retain the footing.

Use railroad ties, fence posts, or other long lasting materials to build a perimeter around the heavy use area. The retaining perimeter around the heavy use area keeps the footing from being pushed out, especially along sloped areas or where livestock pace frequently along a fence line. Be sure that the retaining perimeter is outside of the fence line. Leave a small gap (1-2") between the retaining boards to allow for water passage.

5. Spread base footing.

We recommend a 6-inch layer of rock. Size of rock can range from 3/4" to 1 1/4" minus or larger. Compact every four-

inch layer of gravel using a compactor (commonly found at equipment rental stores). Use a hose to water the area and continue to compact it until the surface is firm.



Dump truck spreading gravel.

6. Apply top footing, if desired.

Pea gravel, sand, and hogfuel are commonly used as top footings. Sand can migrate into the base footing over time, leading to plugging, so it is not recommended as a top footing over rock.

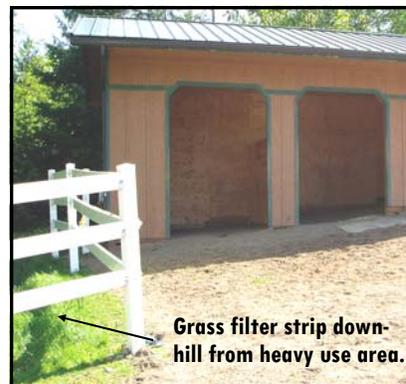


Compacting gravel with hand compactor.

7. Leave a grass filter strip around heavy use area.

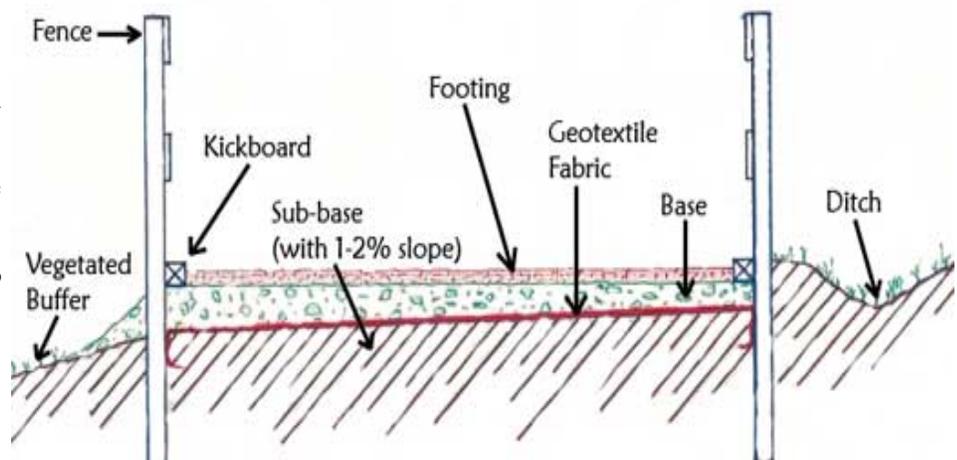
This grassy area around the outside of the heavy use area will catch excess nutrients (from livestock manure) and sediments and also soak up excess water running off the area. Clip grass regularly to promote growth and utilization of the nutrients. The width of the grass filter strip will vary depending on your soil type,

vegetation density (thickness of the grass), and slope. A 25-foot grass buffer should be adequate for an area with little or no slope. Generally, the steeper the slope, the wider the filter strip needed to slow down faster moving water.



Grass filter strip downhill from heavy use area.

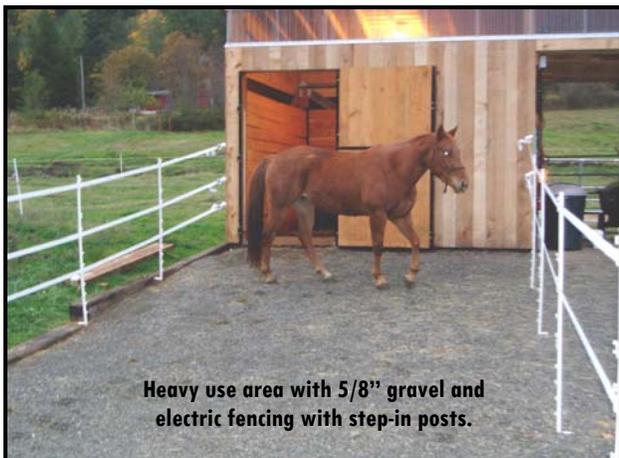
Diagram of a Sacrifice Area : Longitudinal Section



FENCING

There are several things to consider when selecting and constructing fencing in your heavy use area:

- Safety should be the first consideration. Fences need to be safe and durable, especially since livestock will be living in the area for extended periods of time. The type of fence you choose will depend on your livestock. It is recommended that you offset the fence with a hot wire if your livestock tend to test/lean on the fence. Remember, the grass is always greener on the other side! Also, keep in mind that once built, your heavy use area will require periodic maintenance. Removable fencing (such as livestock panels) allow for easy access for maintenance. At a minimum, be sure that equipment can easily access the area through gates (minimum width of 12 feet).
- Different livestock have different needs. For horses, we recommend that you avoid barbed wire and hog or chicken wire, which they can become entangled in. Board or rails, smooth wire, and no climb woven wire are commonly used as fencing in heavy use areas. We recommend that you offset any fence with an electric wire to minimize damage by horses. Cattle tend to be less likely to interfere with fencing and will respect barbed wire. Again, your fence will last longer if it is offset by a hot wire.
- Be sure that gates are durable and swing conveniently (open to allow for easy cleaning, access, animal movement, etc.). We recommend that you install at least 12-foot gates to allow for equipment access.
- If you are installing new fencing, we recommend setting the posts before constructing your heavy use area. The footing should extend well outside of the fence line, preventing the livestock from pushing out the footing.



Heavy use area with 5/8" gravel and electric fencing with step-in posts.

Mud-Reducing Tips:
Protect mud-prone areas such as gates, water troughs, walkways and feeding areas with the same heavy use area protection techniques.

MAINTENANCE

1. **Clean on a regular basis.** The most important maintenance activity to keep heavy use areas functional is regularly cleaning. Fine organic material, like manure and hay, will plug the footing layers over time, causing the area to drain poorly and become muddy. Manure should be removed at least every 3 days, though many livestock owners have found that daily manure removal yields the best results. Try to avoid feeding on top of the footing since hay and grain can also plug the footing (not to mention that livestock may ingest some of the footing). Avoid allowing livestock to routinely move from muddy areas into the heavy use areas since they will track mud (from hooves) into the area.
2. **Fill in holes or low areas right away.** Be sure that the geotextile fabric is always covered, direct access to the fabric by livestock may cause damage to both the fabric and the livestock (the fabric is very slippery).
3. **Replace/add footing every year.** Some new footing



Maintenance Tips:

- **Do not feed on the surface of heavy use areas. Hay and other feed can plug the footing material. Also, livestock can ingest footing particles if they eat off the surface.**
- **For best results, clean the area daily to prevent manure from grinding into the footing.**

will be needed every year to replace the material removed during cleaning. For best results, remove the top few inches of footing and replace it with new footing. This will enhance drainage, reduce odor, and provide for easier cleaning. Footing products that decompose, such as hogfuel, may be composted.

4. **Ensure that water is not draining into heavy use area.** Check that gutters, downspouts, and drainage ways are functioning and in good repair. One broken downspout can contribute a lot of water to your heavy use area!
5. **Maintain a grassy filter strip.** Keep the grass filter strip around the heavy use area healthy and productive. Grass height should be 3 to 6 inches, graze or mow to keep grass from going to seed.

OTHER APPLICATIONS

Areas around gates, water troughs, feeding areas, and livestock trails are also prone to mud because of heavy use by livestock. The construction techniques discussed in this handout can be used to protect these areas and make them functional and accessible year round.

LOCAL EXAMPLES OF MUD CONTROL ON FARMS IN CLALLAM COUNTY

Location: Beef Cattle Farm in Sequim

Problem: The cattle traveled along a muddy lane from their winter pasture to the feeding area which was leading to pollution of a drainage ditch and nearby ponds. The winter feeding area was plagued with heavy mud and the farmer scraped the area to remove mud and manure, resulting in significant soil loss.

Solution: A concrete slab was poured in the feeding area. The slab was lined with concrete ecology blocks. The farmer can now scrape manure on a regular basis without removing native soil. The lane was protected by installing geotextile fabric and crushed rock, reducing muddy runoff.



This lane, used to move cattle from their feeding area to their winter sacrifice pasture, was protected from mud by installing geotextile fabric and crushed gravel.



The concrete feeding slab allows the farmer to collect manure on a regular basis.

Location: Sheep farm in Agnew

Problem: High traffic areas near the barn and feeding area became muddy during the winter. The barn was equipped with gutters but the downspout drained into the barnyard.

Solution: Downspouts were installed on the barn and the roof runoff water was piped to a drywell out side of heavy traffic area. Gravel was installed in the barnyard to cover the bare soil and minimize mud.



Location: Horse farm in Sequim

Problem: Horses were confined to a large pasture (about 1 acre) during the winter months. The pasture was poorly drained and very muddy during the winter. Hogfuel was piled in areas to keep the horses out of the mud.

Solution: The winter pasture was reduced in size to a 60 x 100 foot area. The area was graded to remove excess organic material (manure and old hay/hogfuel) and covered with geotextile fabric and compacted 3/4" gravel. The area remained mud free over the first winter but the landowners noticed that the horses were not growing much hoof and that they would not roll on top of the footing. On a recommendation from their veterinarian, they top coated the heavy use area with pea gravel (which promotes hoof growth). They also constructed "sand boxes" which the horses roll in.



The remaining winter paddock area was planted to pasture. Roof runoff water is directed into a sealed rain barrel, where it is then used to fill a small stock tank. Excess roof runoff water is piped into the newly planted pasture.

Location: Horse Farm in Agnew

Problem: Horses were drinking water from an irrigation ditch and muddy runoff was flowing from the horse paddocks into the irrigation ditch.

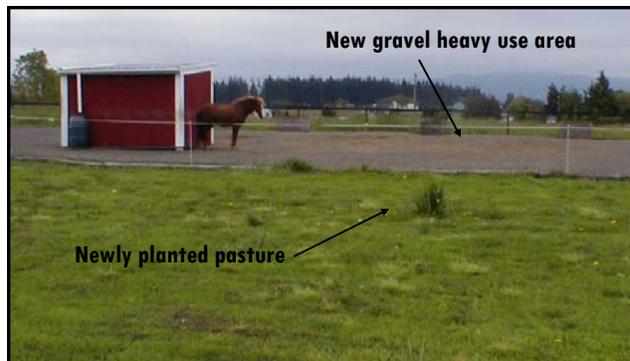
Roof runoff water from the horse barn flowed into the paddock area, creating considerable mud in high traffic areas and adding to the runoff problem.

Solution: The horses were fenced out of the irrigation ditch and gutters and downspouts were installed on the barn. The roof water was directed into a stock tank and the overflow/excess roof water was piped to a drywell.

This horse owner used heavy use area construction techniques to eliminate mud around a water trough. Permeable pavers along with compacted gravel protect this heavily used area from mud.



Permeable pavers for mud control



New gravel heavy use area

Newly planted pasture

Design A Heavy Use Area For Your Livestock

1. Location & Size

Describe the location of your planned heavy use area:

Is there at least a 25' filter strip between your heavy use area and any surface water?: YES NO

Is the area convenient for cleaning, feeding, watering, and ongoing maintenance: YES NO

Is all surface water, including roof water, directed away from your heavy use area? YES NO

What is the estimated slope of the area? ____%

What is the size of your planned heavy use area? ____ft. long x ____ft. wide; Total sq. ft.= ____
(For horses, we recommend a minimum of 1,000 square feet per animal)

What is the existing **soil type** where you will be constructing the heavy use area? (check one)

(A) Drains poorly, water at surface most of the rainy season; soil shallow (hardpan) with clay

(B) Drains moderately well, water puddles after a storm event, drains after a few hours

(C) Drains well, water does not puddle at surface, deep gravelly or sandy soils

If you checked **A or B**, use rock footing as a base in your heavy use area.

If you checked **C**, you may not need rock as a base footing and you can apply a top footing to cover the bare soil. We encourage the use of hogfuel footing in well-drained soils to help protect ground water quality.

2. **Geotextile Fabric** – Install geotextile fabric on the bare ground to retain your footing and keep mud from migrating up through the footing layers. Geotextile fabric typically comes in rolls that vary in length. Most fabrics are 12.5 feet wide (road width). You can buy entire rolls or you can buy cut lengths (12.5 feet wide). Install the fabric in the same direction as your slope and overlap the fabric about 2 feet to allow for shift.

Example: Your heavy use area will be 20 wide and 50 long. You will need approximately 2, 50+ foot lengths of geotextile fabric to cover this area (comes in 12.5' width). So, you will need about 1,350 square feet of fabric (or 108 lineal feet of 12.5' width fabric).

Enter the square feet of fabric you need here: _____

3. **Selecting Footing** – We recommend that horse heavy use areas have a compacted rock base when built on poorly drained soils. Our general rule of thumb is 6 inches of compacted gravel as a base footing. You may choose to apply 2-4 inches of top footing (like sand or hogfuel). Volume calculation for base footing: volume = length x width x height; divide by 27 to get cubic yards.

Enter the cubic yards of gravel needed: _____

Enter the cubic yards of top footing (if desired): _____

(Selecting Footing *continued*)

Example: Your heavy use area will be 50' x 50' size with footing 6 inches deep:

50' x 50' x 0.5' = 1,250 cubic feet of rock

Most gravel companies sell their rock by the yard. **1 yard = 27 feet; 1,250/27 = 46.3 cubic yards**
 1,250 cu ft = approximately 46 cubic yards. Most gravel trucks deliver 10 yards at a time. Round up to factor in the compaction of the rock. For a 50' x 50' square foot heavy use area, you would need approximately 5 trucks (or 50 yards) of gravel.

4. Build the perimeter to retain footing – The “Sandbox” Technique

Install edging around the perimeter of the heavy use area to keep livestock from pushing out the footing material. This is especially important on the downhill side of the heavy use area. Use rebar to drive the timbers securely into the ground. Be sure to leave small gaps to allow for water passage, especially on the downhill sides. To determine the amount of retaining timbers you need, add up the perimeter of the heavy use area. Figure that you will need 2, 3 foot rebar stakes per timber (stakes should be pounded in the ground 2-3').

Example: For a 50' x 50' heavy use area, you will need 200 lineal feet of retaining timbers (or 25, 8' posts) You will also need 50 rebar stakes to secure the posts (2 stakes per post).

Enter number/feet of retaining timbers you need here: _____

Enter number of rebar stakes you need here: _____

5. Compile materials list and calculate cost estimates.

Now that you know how much materials you need, you can easily calculate your material costs. Fill in the table below to determine your heavy use area protection costs:

Item Description	Units Needed	* Estimate Cost Per Unit	Total Cost Estimate
Geotextile Fabric	Square feet	\$2.29 per lineal foot (comes in 12.5' widths)	
Footing Material (base)	Cubic yards	\$12—\$20 per yard, depends on material	
Footing Material (top coat)	Cubic yards	\$20—\$22 per yard, depends on material	
Retaining Perimeters	Each	\$8.00 —\$16.00 for new timbers or railroad ties, can use old fence posts, etc.	
Rebar Stakes	Each	\$5.49 for 20' stake	
Fabric Staples	Each	\$0.10 per staple	
Misc. Supplies			
* TOTAL			

PRICES AS OF 2013

NOTE: While it is possible to build heavy use areas without a tractor, we recommend that you budget for the rental of a tractor with a front-end loader and/or contractor. A tractor will be needed to grade the bare ground (**Important: Do not excavate out soil when preparing the base, the goal is to build up the area, not dig down.**) A tractor can quickly and easily spread the footing. We also recommend renting a compactor to firmly compact the gravel base. You can usually find tractors and compactors by contacting your local equipment rental stores and contractors. Also, don't forget to talk to that neighbor with a tractor, maybe you can work out a deal!

Developing a Site Plan for your Heavy Use Area

Below is a **sample plan** for a heavy use area. Please use the back of this sheet (or graph paper) to design your heavy use area. We recommend including a plan view (top view) of the area and a cross-section (side view). Include all the information and details that you (or a contractor) will need to build the heavy use area. Be sure to include the slope, materials list, and size dimensions.

