

**NATURAL RESOURCES CONSERVATION SERVICE**  
**VIRGINIA ENGINEERING DESIGN NOTE 561 (DN-561)**  
**HEAVY USE AREA PROTECTION**

Heavy Use Area Protection used to stabilize a ground surface that is frequently and intensively used by people, animals or vehicles..

**Field Investigation.** Investigate the topography, soil conditions, erosion, water quality and quantity, air quality, and degree and type of usage before a site-specific plan is prepared. Additional information about the farming operations and animal density is required for areas utilized by livestock. Complete Virginia Technical Note – Water Quality #1, Risk Assessment of Water Impairment from Animal Concentration Areas, as part of the site investigation. For sites that are used by people, aesthetic considerations must be part of the investigation.

**Foundation Preparation.** To the extent possible, excavate areas to be treated with vertical edges around the perimeter.

**Surface Treatment.** Select materials that are appropriate for the loading, uses, and exposure of the area. The following information is to be used in addition to the criteria in the CPS:

Concrete – Use a minimum slab thickness of 5 inches. Virginia Construction Specification VA-731, Concrete Construction, provides material and installation guidance.

Bituminous Pavement – The use of bituminous pavement is allowed but it is not a recommended material because it does not hold up well with continuous animal traffic. It also gets soft during hot weather.

Other Cementitious Materials - Use of soil cement, agricultural lime, roller-compacted concrete, and coal combustion by-products will require the assistance of the Area Engineer.

**Geotextile.** Use Class 1 Nonwoven geotextile unless the site conditions are suitable for other material. Install geotextile in accordance with Virginia Construction Specification VA-795 Geotextile.

**Drainage and Erosion Control.** Unless special provisions are made for drainage and erosion control, heavy use areas should not be placed on slopes less than 1 percent or greater than 8 percent.

### **AREAS UTILIZED BY LIVESTOCK**

If the HUAP will be used to address a resource concern dealing with concentrated livestock and animal waste, an Agricultural Waste Management System (AWMS) Plan is required (NEH, Part 651, VA651.0203). The design for the HUAP will include provisions to collect, store, utilize, and/or treat manure and contaminated runoff.

### **Watering Facilities**

To the extent possible, the HUAP associated with a watering facility should be flush with the ground in order to decrease the potential for erosion around the facility.

## Heavy Use Areas for Feeding

Complete the risk assessment in Virginia Technical Note – Water Quality #1, Risk Assessment of Water Impairment from Animal Concentration Areas prior to planning an animal concentration area or feeding area.

Note: If the Risk Assessment score is less than 120, a hardened HUA may not be the best solution on this site. Other management alternatives should be utilized. Examples of alternative practices include unrolling hay bales in different locations each time, using prescribed grazing across the upland pasture acres, strip-grazing of stockpiled forages, or relocating hay rings every few days during the feeding season.

Design:

1. The size of the heavy use area is dependent on the cooperators' management system, type and number of animals, confinement periods, and the intended use of the area. Tables 1 and 2 show the recommended requirements for beef cattle and dairy cattle. The surfaced feeding area will have a maximum size of 75 square feet per head. If the system will be used for other animals, consult the grazing land specialist.
2. Construct the HUA on a relatively level area. Use Virginia Engineering Design Note 2 – Separation Distances for Animal Waste Facilities to determine the needed separation distances from vulnerable water features, environmentally sensitive areas, and other features. Prevent uncontaminated water from entering the site. When an HUA is located on a point or a ridgetop, fencing may be used to control access to and from the feed site to decrease the size of the disturbed area and prevent excessive erosion on side slopes near the site.
3. Select a surface treatment that is stable and appropriate to the purpose of the HUA. Use concrete for areas that will need to be cleaned frequently by scraping. A curb may be installed on one edge to assist with scraping.
4. If an HUA is designed in conjunction with Virginia CPS *Vegetated Treatment Area (Code 635)*, the criteria in the VTA Standard will affect the design features of the HUA.
5. Use fencing to limit access to the HUA where erosion around the perimeter could occur. All entrances to the pad will be treated in accordance with the requirements of the HUAP CPS.
6. For a roofed HUA:
  - a. Design the pad so that there will be no runoff from the pad.
  - b. Control erosion from roof runoff by use of a stone splash pad under the roof line or by installing a roof runoff system. Use Virginia CPS *Roof Runoff Structure (Code 558)*.
7. All denuded areas outside of the HUA will be vegetated or treated according to Virginia CPS *Critical Area Planting (Code 342)* or the *Virginia Plant Establishment Guide*. An unroofed HUA will be located such that runoff from the pad will not contaminate surface water.
8. Use Virginia CPS *Waste Storage Facility (Code 313)* to design waste storage components.
9. Other companion practices should be utilized when needed to meet the intended purpose of the heavy use area protection. The pad and surrounding area will be managed to avoid creation of a water quality concern.

## Loafing Lot Management Systems

Where disturbed loafing lots are being improved on a dairy farm for water quality purposes, establish three or more grass loafing paddocks and one sacrifice area unless an existing facility, such as a free stall barn, is available to use as a sacrifice area. The loafing lot management system is used to complement a feed operation, not to provide forage for grazing. All nutritional and dry matter needs of the livestock must be provided in feed multiple times a day for this system to work. Loafing lot management systems are primarily used for dairy cows. However, the same concept can be used on some stocker feeding operations. Stocker feeding operations typically require a higher level of management and more vegetated lots based on soil productivity, slope, and rock outcrops, etc. Assistance from the grazing land specialist is strongly recommended if a loafing lot management system will be used for stockers.

Basic concepts:

1. Each grassed loafing paddock would typically be used for 4-7 days before the next paddock is used. Since the loafing paddocks must be managed in permanent cover, the condition of the grass will determine length of use.
2. The grassed paddocks will only be used when the ground is dry or frozen.
3. In a planned loafing lot management system, the livestock must be fed 100% of their nutritional and dry matter needs. The paddocks are strictly for loafing, not for providing forage.
4. Use the sacrifice lot (or barn) when the ground surface is wet and vegetation would be damaged or when the grassed paddocks need more time to recover.
5. Feed and water areas in this system will need hardened HUAs.
6. Plan companion practices such as fence and animal trails and walkways to control livestock movement and prevent excessive use and loafing around the feeding area.

Requirements (Dairy):

1. Loafing paddocks should be sized at no smaller than one acre per 20-25 cows (1,000 lbs equivalent).
2. A sacrifice area shall be sized at 600-750 SF per 1,000 lb. animal unit. Provide a surface that will accommodate the anticipated use. Manure accumulation on the sacrifice area must be collected and managed in accordance with the AWMS Plan.
3. Avoid slopes that are less than 1% or greater than 8%.
4. Seed paddocks to establish dense sod to prevent erosion in accordance with the Virginia Plant Establishment Guide.
5. To prevent the buildup of nutrients, harvest hay and remove from the loafing lot system at least annually when growth is excessive.
6. Develop an operation and maintenance plan which addresses field rotation, use of sacrifice areas, fencing patterns, access roads, etc.

7. Provide a watering system that makes water available to the livestock in the loafing lot system and protects water quality.
8. Fence cattle from all surface water and concentrated flow areas such as drainage ways and sinkholes.
9. Provide field filter strips in accordance with Virginia CPS *Filter Strip (Code 393)* for all grassed paddocks and sacrifice areas. Maintain a minimum 35-foot grass buffer between grassed loafing lots and streams unless the runoff is collected and managed in a method outlined in the AWMS Plan.
10. Prepare a plan for establishing the vegetation on the grassed paddocks. It may take several phases to achieve full implementation. During the establishment of the vegetation, it may be necessary to utilize an unroofed sacrifice area extensively. Management of this area during this time will be described in the AWMS Plan. When a housing facility is part of the loafing lot management system, the outdoor sacrifice lot used during the establishment period will be vegetated for use as an additional paddock after the grass in the other paddocks is completely established.

### **Runoff Treatment**

Do not discharge contaminated runoff from the site into surface water bodies or drainageways. If used to treat a concentrated livestock area, this practice shall be a component of an AWMS Plan. Runoff from the area shall be collected and contained in a *Waste Storage Facility (Code 313)* or treated in a method compliant with the AWMS Plan. Other components of the plan may include but are not limited to: *Roof Runoff Management (Code 558)*, *Filter Strip (Code 393)*, *Diversion (Code 362)*, *Grassed Waterway (Code 412)*, and *Critical Area Planting (Code 342)*. Local, state, and federal laws and regulations may also dictate treatment methods. The AWMS Plan must be developed and approved before the *Heavy Use Area Protection (Code 561)* is designed and installed. To the extent possible, clean water shall be excluded from the area.

**TABLE 1 – RECOMMENDED SPACE REQUIREMENTS – BEEF CATTLE<sup>1</sup>**

(Square Feet Per Head)

TYPE OF AREA	COW-CALF	PRE-CONDITIONING	FINISHING 600LB. - MARKET
<b>Feeding Lot:</b>			
Surfaced	60 – 75	40 – 50	50 – 60
Unsurfaced (w/ mounds)	-	150 – 300	250 – 500
Unsurfaced (w/o mounds)	350 – 800	300 – 600	400 – 800
<b>Mound</b>	40 – 50	20 – 25	30 – 35
<b>Open Front Shelter</b>	25 – 30	15 – 20	20 – 25
<b>Shade</b>	-	-	20 – 25
<b>Handling Facilities:</b>			
Total area	60 – 80	40 – 50	50 – 60
Holding pen	20 – 25	12 – 15	15 – 20
Crowding pen	12 – 15	6 – 8	8 – 12

<sup>1</sup>Source: Midwest Plan Service, Structures and Environment Handbook, MWPS –1, June 1987 revision, Planning 511.1 (Midwest Plan Service, Structures and Environment Handbook, offers some excellent suggestions for beef cattle planning livestock heavy use areas. The concept of “mounding” which is used extensively on operations in the Western U.S. is discussed in Chapter 511.)

**TABLE 2 – RECOMMENDED SPACE REQUIREMENTS FOR FEEDING DAIRY CATTLE<sup>2</sup>**

(Square Feet Per Head)

TYPE OF AREA	AGE OF DAIRY ANIMALS IN MONTHS				
	3 – 4	5 – 8	9 – 12	13 – 15	16 - 24
<b>Resting Area</b>	20	25	28	32	40
<b>Surfaced Outside Lot</b>	30	35	40	45	50

<sup>2</sup>Source: Livestock Waste Management Handbook, Volume 1, 1983 CRC Press, Overcash, Humenik, Miner