
Chapter 4

Facility Modifications To Reduce Adverse Impacts to Resources

When changing the drafting method alone will not achieve resource objectives, interdisciplinary teams may identify drafting equipment or redesign the facility to mitigate resource impacts.

Modifications to water sources include the following:

- Hardened facility.
- Dry hydrant.
- Standpipe.
- Off-channel ponds
- Tanks.
 - o Portable tanks.
 - o Aboveground tanks.
 - o Underground tanks.

Selecting the correct modification or site location depends on the goals and objectives identified during the interdisciplinary process. The water-source suitability form identifies limiting factors. In some cases the vertical-lift height is greater than the pump capability, or instream flows are not sufficient throughout the drafting season. Regardless of which indicator is limiting, the team identifies modifications or alternatives to achieve the objectives.

Hardened Facility

Hardened facilities use pavement or rock to reduce erosion and define the extent of the facility.

Application

Identify vehicle type and use intended at the site. Provide vegetated buffers between the facility and the stream to allow for stream function (flooding) and process. Design the access roads to drain away from the water source to prevent water-quality impacts. Harden sites with 8 to 12 inches of clean riprap and drain rock to prevent erosion on the access road. Limit the size and length of the access road and ensure proper road drainage is installed and maintained.



Figure 17—Boat launches provide emergency access.



Figure 18—Site is not well armored to prevent erosion and sediment delivery.

Considerations

Use existing hardened facilities such as boat launches and campground access ramps for emergency, short-term use instead of native-surfaced areas prone to erosion. If long-term use is needed at a site, design the facility to maintain stream function and process by including a stream buffer.

Hardened facilities should be installed where there is an adequate streamflow throughout the drafting season.

***Alternate and Complementary
Techniques***

Dry hydrants are constructed in locations with paved or hardened roads to ensure vehicle access.

Dry hydrant

A dry hydrant is a nonpressurized permanent pipe assembly system installed into a water source that permits the withdrawal of water by suction. The hydrant is primed with water from the fire engine or watertruck to begin drafting (Department of Forestry Virginia, Web site).



Figure 19—Dry hydrant.

Application

The dry hydrant is typically used in areas where all-weather access to an available water source is desired. Many local volunteer fire organizations favor the dry hydrant due to its ease and relative low installation and maintenance costs. The hydrant can be located further away from the water source to reduce impacts in riparian areas. Likewise, the likelihood of spills entering streams also is reduced. The dry hydrant has a vertical lift capability between 12 to 15 feet depending on the equipment used and the length of dry pipe (NRCS 2002).

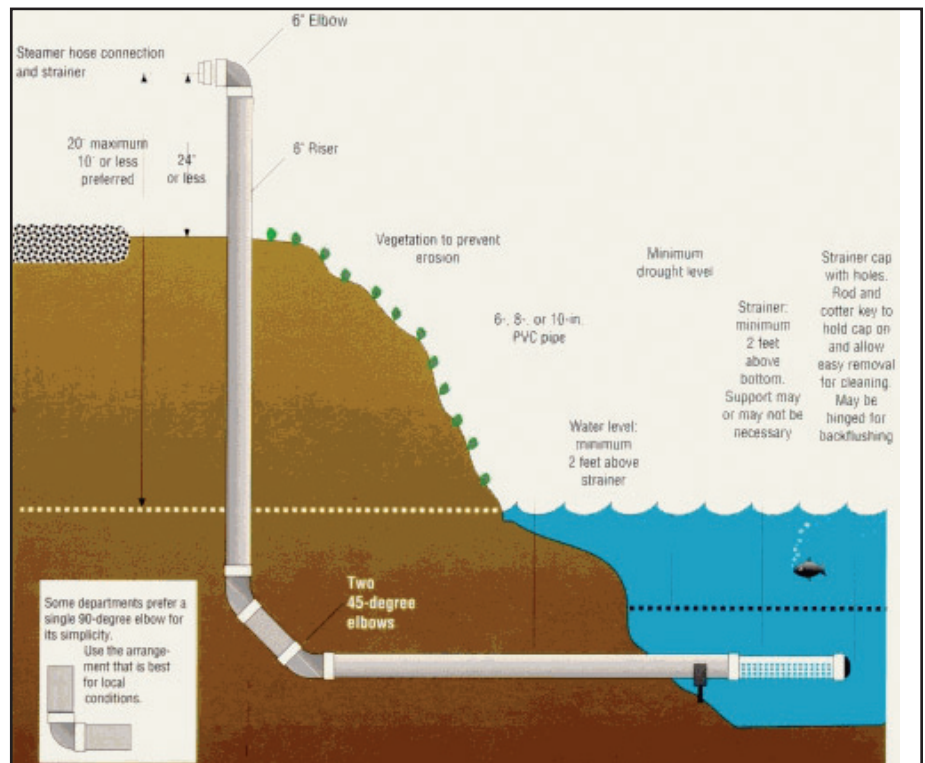


Figure 20—Dry-hydrant design.

Considerations

Consider the depth of the existing or planned water source when designing the dry-hydrant application. The low-water surface level should be approximately 4-feet deep. The suction strainer is roughly 2 feet above the bed and then another 2 feet to the minimum drought level for a total of 4 feet. If you are in a location where the water source may freeze over during the winter, an even deeper water depth is required (ETTfire, Web site).

The composition of the bottom material should be sand, gravel, or rock to prevent decaying vegetative material from clogging the suction screen. Protect the dry-hydrant site from vandals or accidents with protective housing or an impact barrier.

Dry hydrants require inspection, testing, and maintenance. After initial installation, flush the pipes to ensure removal of debris that could be harmful to pumps. Inspect the water intake to ensure silt or aquatic growth has not clogged the intake. More frequent inspections are needed on slow-moving water sources (Department of Forestry Virginia, Web site).

***Alternate or Complementary
Techniques***

The dry hydrant is used in many applications including drafting from an underground water tank or positioned on a bridge above the stream.

Standpipe

A standpipe is a tank or pipe for holding water in an elevated position to create pressure in a water-supply system.

Application

As a temporary facility, the standpipe is moved from location to location. With a pump and hose lay, the standpipe is located away from the stream or water source. Adverse impacts within the buffer area are mitigated by moving the operation outside of the most sensitive area.



Figure 21—Standpipe used for drafting.

Considerations

Standpipes are generally temporary facilities used for the length of the operation. Long-term water-source facilities can also accommodate standpipes depending on the site layout. Drafting from the water source is still required and necessary protection against hazardous material spills should be included in the pump set up. Use of a mini dam to contain spills is highly recommended (SEI, Web site).

Alternate and Complementary Techniques

The standpipe can be combined with drafting from off-channel ponds, hydrants, or wells.

Off-channel ponds

Off-channel ponds are constructed to take a portion of stream flow into a pond for drafting. The off-channel pond reduces impacts to riparian areas and streambanks by constructing the water-source development in less sensitive areas. The off-channel pond maintains stream-flow requirements and reduces streambed alteration impacts that occur with limited pool depth.



Figure 22—Off-channel pond using partial diversion of spring.



Figure 23—Off-channel pond diverts partial flow from stream.



Figure 24—Off-channel pond utilizes existing road.

Application

Off-channel ponds may use springs, diversion ditches, or pipes to move a portion of the streamflow into a pond. The pond serves as the drafting site which avoids impacts to streambanks. Off-channel ponds have been successfully constructed in areas fed by steep, stable channels where a portion of flow can be directed into the pond. Overflow pipes are used to return water to the main channel.

Off-channel ponds also may be constructed in meadows. The high water table helps maintain a minimum pool elevation which can be augmented by diverting a portion of the channel. Ensure that resource objectives are met when constructing an off-channel pond in the meadow.

Considerations

Locate the off-channel pond in an area where it will not be inundated with sediment during high flows. Minimize the access roads in sensitive locations to have a smaller “footprint” for access. Evaluate the need for an overflow back into the main channel. Off-channel ponds may have a continuous stream flow that needs to be routed into the stream. Locations adjacent to spring sites have been used successfully in this manner.

***Alternate and Complementary
Techniques***

Consider relocating off-channel water sources that are in meadows or sensitive habitat.

Portable Tanks

Portable tanks are available in a variety of sizes and can be easily assembled with few tools. Portable tanks support hard suction hose and clapper valves to maintain the prime between a pumper and a low-level or floating strainer (Fol-Da-Tank, Web site).



Figure 25—Portable tanks come in a variety of shapes and sizes.

Application

Portable tanks are designed for standby water containment and water shuttling situations to provide a continuous portable water supply. A portable pump or water tender can fill the tank. Tank sizes range up to 10,000 gallons. Portable tanks should be located away from sensitive resources to reduce impacts to riparian areas (USDA Forest Service 1994).

Consideration

Identify if your resource objectives are for emergency- or long-term needs. If long-term needs are required consider an alternate and complementary technique. If the needs are short term or emergency in nature, identify suitable sites for portable tank deployment that can be put into effect in the WFSA.

Alternate and Complementary Techniques

Permanent aboveground or belowground tanks provide a continuous water supply.

Aboveground Tanks

Aboveground tanks provide a continuous water supply for a permanent water sites. These storage tanks vary in size from 100 to 5,000 gallons. They may use solar pumps or gravity-feed systems to fill the tank. The tanks should be located outside of riparian areas to reduce impacts to stream environment.

Application

Forests use the tanks for fire suppression and road maintenance. Locate tanks outside of riparian and sensitive areas to reduce adverse impacts.



Figure 26—Aboveground tank for fire suppression needs.



Figure 27—Aboveground tank located outside of riparian area.

Considerations

Aboveground tanks are susceptible to vandalism. Solar pumps and connections can require maintenance.

Alternate and Complementary Techniques

Temporary portable tanks for emergency situations may meet team objectives for use. If an above ground tank poses risks from vandalism, an underground tank may serve the needs better.

Underground Tanks

Underground tanks are similar to aboveground tanks in that they provide a continuous supply of water. Tanks vary from 10,000 to 30,000 gallons.

Application

Underground tanks are used in areas where a permanent water-source location is required. The tanks can be filled from a variety of sources including a waterline fed by a stream or spring. Piping water to the tank allows the designer to locate the tank outside of the riparian area. The tank and fill-up area also share the same location so a much smaller facility can be designed. The defined fill-up area is often associated with an existing road. Impacts to the riparian areas or streamside zone are eliminated. All tanks provide storage of water, which is useful during low stream flows or drought conditions.

Considerations

Underground tanks require maintenance to perform reliably. Inspect the tank waterlines annually. Depending on the drafting method (dry-hydrant-suction holes) the pipe size and type may change. Consult with tank manufacturers prior to any further design (ETTfire, Web site).

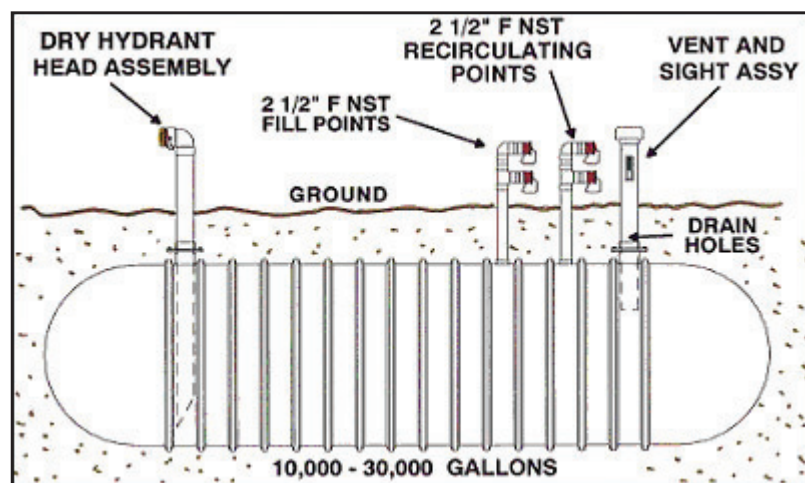


Figure 28—Underground tank.

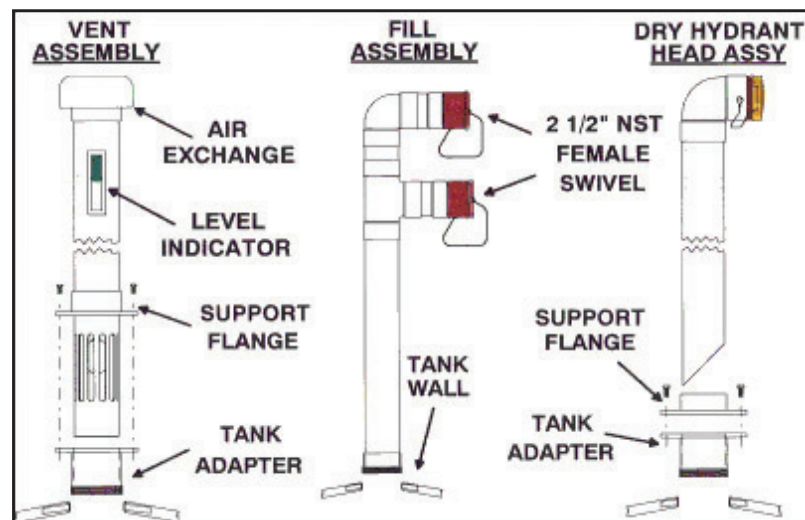


Figure 29—Pipe components for underground tanks.

Alternate and Complementary Techniques

Aboveground or portable tanks serve as alternatives for underground tanks.

