

DRY WELL

A stone-filled hole in the ground that collects runoff from gutter downspouts, roof valleys, and other areas where water concentrates and flows. It helps infiltrate runoff and reduce erosion.



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SIZING AND DESIGN

STEP 1 – Choose the location. A good location for a dry well can receive and infiltrate large amounts of concentrated runoff, such as from a roof gutter downspout. The area should be away from basements and septic fields and must pass the infiltration test.

STEP 2 – Perform an infiltration test. Test the ability of the soil to infiltrate water (allow it to soak in and drain through the soil). Dry wells should only be built in areas where soils drain within 24 hours. Follow the steps below.

- a. Using a shovel or a post hole digger, dig a 12-inch deep hole.
 - b. Fill the hole with water and allow it to drain completely (NOTE: if the hole fills with water on its own or if water is still in the hole after 24 hours, choose a new location).
 - c. Fill the hole with water a second time and do one of the following:
 - Place a ruler or yard stick in the hole. Note the water level and time. After 15 minutes, check the water level again and note the new water level. Multiply the change in water level by four to get the number of inches of infiltration in an hour. A rate of at least $\frac{1}{2}$ -inch of water per hour is appropriate for an infiltration practice.
- OR
- Cover the hole for safety and check back 24 hours later. If the water has completely drained, this indicates the soil is appropriate for an infiltration practice.

STEP 3 – Calculate runoff volume. To determine how large the dry well needs to be, you need to know the volume of water it will receive during a typical rain storm. Most storms in New Hampshire produce one inch or less of rain so designing for a one-inch storm will capture most runoff, as well as the dirtiest “first flush” of larger storms.

EQUIPMENT & MATERIALS

- ✂ Measuring tape
- ✂ Shovel
- ✂ $\frac{1}{2}$ " to $1\frac{1}{2}$ " washed stone
- ✂ Non-woven geotextile fabric or landscape weed fabric for smaller projects

OPTIONAL

- ✂ PVC or other plastic piping
- ✂ String or spray paint
- ✂ Splash guard
- ✂ Gutter downspout extension

TIP: One inch of rain will produce about 62 gallons of runoff for every 100 ft² of drainage area.

Complete steps a. through c. to calculate runoff volume.

- a. Calculate the square footage of the drainage area:
 $\text{DRAINAGE AREA LENGTH (ft)} \times \text{DRAINAGE AREA WIDTH (ft)} = \text{DRAINAGE AREA (ft}^2\text{)}$
- b. If multiple areas go to the dry well, calculate the square footage of each and add them together.
- c. Find the volume of stormwater from the total drainage area for a one-inch storm by dividing the drainage area by 12. This shortcut, in effect, multiplies the drainage area by one inch while converting the inch to feet.

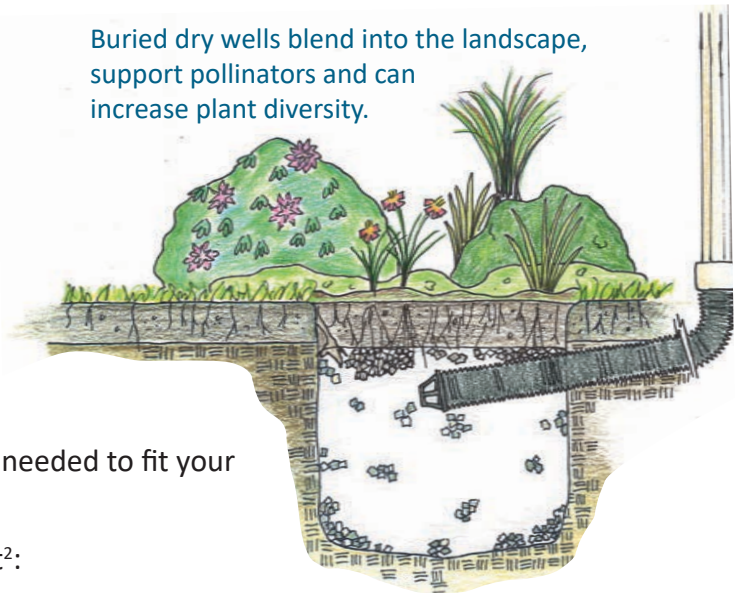
$$\text{TOTAL DRAINAGE AREA (ft}^2\text{)} \div 12 = \text{STORMWATER VOLUME (ft}^3\text{)}$$

STEP 4 – Design how runoff will enter the dry well.

For Open-Topped Dry Wells: Roof downspouts can direct runoff into the top of the dry well by simply directing and extending gutter downspouts. Shallow swales or trenches can also be used to direct runoff from the downspout into this type of dry well.

For Buried Dry Wells: Roof downspouts can be buried underground and extended through a flexible pipe/trench into the dry well. This allows the dry well to be buried and planted. Consider installing a flow diverter to allow you to easily disconnect the gutter from the dry well during winter months if you are concerned with freezing conditions.

Buried dry wells blend into the landscape, support pollinators and can increase plant diversity.



STEP 5 – Determine the dimensions. Dry wells are typically three feet deep and should be designed to accommodate the stormwater volume (determined in Step 3). Adjust the dimensions of your dry well as needed to fit your site.

- a. Calculate the surface area of your dry well in ft²:
 $\text{STORMWATER VOLUME (ft}^3\text{)} \div 3 \text{ ft (depth)} = \text{DRY WELL AREA (ft}^2\text{)}$
- b. Identify any limitations on the length or width of the dry well in the chosen location, i.e., tree roots, large rocks or other structures that could be limiting factors. Use the most limiting dimension to help determine the shape.

For example, if the dry well area should be 12 ft² and it can only be two feet wide, it will need to be six feet long to accommodate the stormwater volume.

STEP 6 – Determine materials needed.

Washed stone: To calculate the volume of stone needed, use the dimensions of the dry well, determined in Step 5. If burying the downspout, purchase extra stone to fill in the trench around the inlet pipe. Convert cubic feet to cubic yards by multiplying by 0.037.

TIP: Washed stone takes up about 60% of the space in a dry well, leaving about 40% for water storage. A typical dry well is 3'x3'x3'. This will store about 11ft³ of water, which is equal to the runoff from a 132ft² drainage area in a storm that produces one inch of rain.

Landscape fabric: To prevent migration of soil from the sides of the dry well into the stone reservoir, it is recommended to line all four sides of the dry well with landscape fabric. For ease of maintenance, or if your dry well will be buried, you may also want to line the top of the stone with landscape fabric. Variations on dry well design are discussed below.

Downspout adapter and flexible pipe: If you are trenching your downspout into the dry well underground, you will need to purchase a downspout adapter and flexible pipe, which can be purchased at most local hardware stores.

INSTALLATION

STEP 1 – Mark the boundaries. Once you have determined the location and dimensions, clearly mark the boundary of your dry well to identify where to dig. Landscape flags, string or spray paint work well.

STEP 2 – Dig the dry well. Excavate down three feet within the marked dry well boundary. Consider separating the good topsoil from the deeper soil layers to use as a planting bed if you are installing a buried dry well.

STEP 3 – Dig the trench. If your dry well will be buried, also dig a trench to bury your inlet pipe from the gutter downspout to the dry well. Carefully remove and set aside the sod growing over the trench to recover the trench once installation is complete. Be sure to pitch the trench toward the dry well so that the water easily drains from the gutter to the dry well and doesn't back up.

STEP 4 – Shape the bottom. Slope the bottom of the dry well away from your house or other buildings so that water drains away from the foundation.

STEP 5 – Line with landscape fabric. Extend the life of the dry well by lining the sides with non-woven landscape fabric.

For Open-Topped Dry Wells

STEP 6 – Fill with stone. Fill the excavated dry well with washed stone to within three inches of the ground surface.

STEP 7 – Cover with landscape fabric. Fold a flap of fabric over the top of the washed stone.

STEP 8 – Topcoat with stone. Fill to ground level with stone.

STEP 9 – Connect to dry well. Extend gutter downspout to the dry well. A splash guard, flat paver or flat stone can be placed under the downspout to soften the force of the water entering the dry well. If using a shallow swale or trench, dig it out and stabilize the trench with washed stone, river rocks or plants, per your design.

For Buried Dry Wells

STEP 6 – Fill with stone. Fill the excavated dry well with washed stone to the depth where the pipe from the gutter will be laid. Be sure to place the pipe deep enough to allow for a six-inch planting bed or sod layer on top.

STEP 7 (OPTIONAL) – Install the flow diverter. Flow diverters allow you to easily direct flow from your gutter downspout into your dry well during warm seasons. They can be closed during winter months, which allows your gutter to operate normally. To install the diverter, cut the gutter with a hand saw and install per manufacturers instructions at a height that allows the water to flow from the diverter into the dry well.

STEP 8 – Connect pipe to dry well. Attach the pipe to the downspout or flow diverter, if using one. Lay the pipe in the trench with the outlet near the center of the well. Use washed stone and a level to make sure it is pitched toward the dry well so it will drain.

STEP 9 – Continue to fill with stone. Fill with stone to within six inches of the ground surface.

STEP 10 – Cover with landscape fabric. Fold a flap of fabric over the top of the washed stone.

STEP 11 – Topcoat with soil. Cover landscape fabric with six inches of good planting soil. Densely plant buried dry wells with native groundcover, grasses or other perennials. Fertilize sparingly and only as needed.

MAINTENANCE

INSPECT: Check seasonally and after large storms. Look for signs of clogging, such as ponding at the surface. If your downspout is buried, look for water backing up into gutter.

CLEAN OUT: The use of filter fabric will extend the life of dry wells, but will eventually clog over time. If clogging occurs, remove and wash or replace stone and fabric.

PLANT CARE: If your dry well is buried, inspect, prune, thin or replace plants as needed on the surface of the dry well.

DESIGN REFERENCE

Maine Department of Environmental Protection. *Conservation Practices for Homeowners*. Fact Sheet Series. May 2006.