

# 1. Disconnect your roof from the creek



Downspout disconnection heading to the creek. Photo by Environmental Protection Agency. Public Domain. Available at: <http://www.ellerbecreek.org/en/act/be-creek-smart/103-act/creek-smart/174-disconnect-your-roof-from-the-creek.html>

Downspouts heading to the creek. Photo by Ellerbe Creek Watershed Association. Used with permission. Available at: <http://www.ellerbecreek.org/en/act/be-creek-smart/103-act/creek-smart/174-disconnect-your-roof-from-the-creek.html>

**-Problem:** Many of our homes have gutters and downspouts that are piped directly to the driveway, sidewalk, or street, allowing the stormwater to run unmanaged to the stormwater pipes, which go directly to the creek. This contributes massive amounts of runoff to the creek. For example, if you have a 2,000 square-foot home, your roof sheds over 1,000 gallons of water during a one-inch rainfall! With so many people piping the runoff directly to the creek, it never gets the chance to recover.

**-Solution:** Most yards have some area downhill that can safely infiltrate that water. So, run the downspout to where they can benefit trees, plants, or grass in your yard without affecting structures on your property or your neighbor's.

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## 2. Harvest rainwater



Rainwater flowing off roof. Photo by Flickr user s58y. CC BY 2.0. Available at: <https://www.flickr.com/photos/s58y/7719391630/in/photolist-cl8Uc9-aagaG-bc5YyK-bc5UuV-bc5VWD-bc5XJF-bc5ZoT-bc5Tjt-bc5V3T-bc5Qy8-naP9EK-6sdUc-dD6Fx8-2P3PHb-bhUoNn-5j3mQo-8z6aYM-8z6g3X-8z9gZC-8z9eZU-8z9k8f-8z9meC-8z6bZV-8z9n1E-8z68F4-nYP8mo-8qfP37-8qcDyg-8qfNKq-oi5Ds2-6aQs61-8u2TGu-8hqRY3-8qfM4d-8qcCXn-8hqMPN-8qfMyl-8hnFrc-8hnCkZ-8hnF66-8hnB9e-8hqUsG-8tYNDX-8qfLQN-8qcCHt-8hnDbe-8qcCBR-8hqVLd-8qfMef-8hnAHe>



200 gallon cistern in backyard. Photo by Ellerbe Creek Watershed Association, Used with permission. Available at: <http://www.ellerbecreek.org/en/act/be-creek-smart/103-act/creek-smart/175-harvest-rainwater.html>

**-Problem:** A huge source of demand on our drinking water supply comes from yard and garden irrigation. There are several major problems with this. First, municipal drinking water is expensive and was treated for you to drink. Your tap water isn't as good for your garden as rainwater, which has lots of nutrients. And during every one-inch rainfall, the average 2,000-square-foot roof can yield more than 1,000 gallons of rainwater. Unfortunately this rainfall is usually piped directly to the street, which damages the creek downstream because it enters the creek at a high volume and carries pollutants and trash.

**-Solution:** Collecting rainwater from your roof with a cistern can help protect the creek while at the same time providing valuable, healthy water for your yard and gardens. Rain water is naturally high in important plant nutrients like nitrogen, so the plants will like it much better than your treated tap water.

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### 3. Build a rain garden



Downspout outlet at curb. Photo by Ellerbe Creek Watershed Association, Used with permission. Available at: <http://www.ellerbecreek.org/en/act/be-creek-smart/103-act/creek-smart/176-build-a-rain-garden.html>



Rain garden. Photo by Ellerbe Creek Watershed Association, Used with permission. Available at: <http://www.ellerbecreek.org/en/act/be-creek-smart/103-act/creek-smart/176-build-a-rain-garden.html>

**-Problem:** A huge source of demand on our drinking water supply comes from yard and garden irrigation. We spend good money watering plants and lawns with drinking water, while we treat rainwater as waste, sending it through gutters, downspouts, driveways, sidewalks, and pipes directly into the stormwater system. All of this rainwater is problematic for the creek downstream because it contributes to pollution and stream bank erosion, and the opportunity to capture and use the water in our yards is lost.

**-Solution:** A rain garden is a practical and beautiful solution for many yards. By capturing rain water in your yard and allowing it to infiltrate into the soil, you help protect the creek from pollution, reduce sedimentation and recharge groundwater sources. By planting the garden with native plants, you help attract native pollinators, increase biodiversity in the watershed, and create beautiful landscape features. There are specific guidelines to ensure that your rain garden's site will properly capture rainwater while protecting structures on your property.

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## 4. Don't fertilize the creek



Applying liquid lawn fertilizer. Photo by David Reber. CC BY-SA 2.0. Available at: <https://www.flickr.com/photos/davidreber/4502902732/in/photolist-7RUy71-6nFX3L-qLhK5y-6LWg8c-aJQCtF-dajit73-rH6Y3s-qLc38U-rqLn1p-4oTcE-qTGe6P-axye6w-9H2xBb-rp13ui-rb2MbW-bJb47P-bvghMA-bJb1f4-agwGp5-raYnxz-raYnFR-bJaZHF-bvgfwj-bJbdqa-bJbfae-bvgezU-bvghrw-bJb3MP-bJbe4k-bJbcXB-bvgq7w-bvgsK1-bJb4Fx-9H2xBj-5ShH79-qZDsLN-5Kj3X5-aHXdaK-qRnDcz-agG7pD-8tQWn3-ktpk5g-rqB1nC-qejzux-qTGeNF-6rM6ig-amw2hs-ruZgBd-aHXcdH-sapcKA>



Lawn Cared For Organically. Photo by Sarah McGowen. CC BY-NC-SA 2.0. Available at: <https://www.flickr.com/photos/sarahmcgowen/3625109623/in/photolist-6wkCN4-qLdHxU-7ZCsfp-7ZCs6V-7ZFD1o-7ZCstk-7jbKig-4PCVrp-ssa5KL-7RUy71-6nFX3L-qLhK5y-6LWg8c-aJQCtF-dajit73-rH6Y3s-qLc38U-rqLn1p-4oTcE-qTGe6P-axye6w-9H2xBb-rp13ui-rb2MbW-bJb47P-bvghMA-bJb1f4-agwGp5-raYnxz-raYnFR-bJaZHF-bvgfwj-bJbdqa-bJbfae-bvgezU-bvghrw-bJb3MP-bJbe4k-bJbcXB-bvgq7w-bvgsK1-bJb4Fx-9H2xBj-5ShH79-qZDsLN-5Kj3X5-aHXdaK-qRnDcz-agG7pD-8tQWn3>

**-Problem:** Stormwater runoff collects everything in its path and carries it to the creek. Fertilizer runoff from yards and other landscaped areas is a major source of nitrogen and phosphorus pollution in our creek. Excessive nitrogen and phosphorus contribute to harmful, even toxic, algae growth in downstream water, which is dangerous to aquatic life and to us.

**-Solution:** Having some lawn can help manage stormwater by allowing some stormwater infiltration, especially if you combine this with a downspout disconnection. Keeping your grass to around three inches tall helps reduce water use and protects the soil. Often, unhealthy soil is the problem, so testing your soil and building a healthier soil can help get your lawn off drugs. But, if you must to fertilize, keep the stream in mind and: use as little fertilizer as possible, don't fertilize before a big rain, don't get fertilizer on the street, sidewalk, or driveway because it will wash into the creek.

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## 5. *Protect your backyard creek*



Stream erosion from storm water runoff. Photo by Flickr user Kid Cowboy. CC BY-SA 2.0. Available at: <https://www.flickr.com/photos/70278809@N00/3419411046/in/photolist-6danLS-72QRzM-4B14Ky-pN9v8W-eisuQU-uqLpZq-k6ermg-uHAHrv-ahvahx-5dWVwj-4CCEKG-4Jc4Rz-4JcivB-57ffxw-e8Z1nz-862jpG-gc6E6D-gc714c-4Jc4QV-dpuYnC-gXJkFJ-gXJaLK-dpuZHy-gc4V8f-7HELLE-4CtBb7-2CpWN5-s532i9-dpv2yW-3kYG7G-my5NXF-4P8irg-7Q46o8-39Hfev-diZjGp-7KNbDd-4erUAc-92yvKS-5qAS8n-9UPRpZ-5GID7m-4Se8fe-9UPWLz-6w2Fu2-6jEKFd-9UPQST-5sqsgX-7dVQWB-4B7aGV-bC3p5F>



Natural Stream Buffer. Photo by US Department of Agriculture. Public Domain. Available at: <https://www.flickr.com/photos/usdagov/14143095273/in/photolist-eiJaTB-aCxbB4-eiQ69L-eiPRvA-aCx9xk-h4RXGT-nxM4ue-cNzYyE-cNzYrS-nevx2V-bugmto-dCLKvE-bugmu7-cDyz9d-eiJ9Ve-5cztTV>

**-Problem:** Before the Ellerbe Creek watershed was developed in the 1800's, there were 3 miles of small, headwater streams for every one mile of larger streams. Lacking modern stream protections, the early developers often built houses too close to these streams. The stormwater management approach of the time was to get the water off of the property as quickly and efficiently as possible, the opposite of how a natural system functions. Unfortunately, this additional stormwater overwhelmed streams with runoff, causing massive stream erosion. As a result, Ellerbe Creek's small tributary streams are often deeply eroded and lacking protective natural streamside buffers.

**-Solution:** To help protect the streams from further impact, build at least a 10-foot natural stream buffer, by planting native trees or shrubs, removing invasive plants and removing all the pipes leading to the creek. The buffers and natural infiltration allows stormwater to enter into the stream slowly, helping to protect the creek from damage and drought.

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## 6. Build a wetland garden



Standing water in garden. Photo by Flickr user circulating. CC BY-NC-SA 2.0. Available at: <https://www.flickr.com/photos/circulating/3342816155/in/photolist-66oNMI-6MWJqQ-5q7zJx-9zaDKn-4F4rsr-tsbWrv-taEcmF-tsbTFV-opMFsN-dCPeZ8-drj8os-ekj7C4-7PAPar-aVfbwR-toJSb8-7USvQW-auH7gp-qNjhZK-q7EyXm-qF79m3-ci8BA5-bj8212-46TK8o-ACy3Kc-vM5wTo-ee1smN-qPF9aW-rF8YUa-aHXhrt-nrCHp9-tawEjf-cukuD9-9NGcs4-hQVYtz-ocN4XR-6o5qBy-yamRYD-hAXjhc-8FEESU-eHeJhe-cQSfjy-bkSvGT-5XR6ZT-z6RtLy-cxyFvN-qwKvrM-dRdzqP-fu2LSm-oNDAFg-9xDCxk>



Constructed wetland. Photo by Flickr user SuSanA Secretariat. CC BY 2.0. Available at: <https://www.flickr.com/photos/gtzecosan/5375751550/in/photolist-9c38Dy-nNkFc-feq2py-hQWq1M-cg28mN-oQfnff-cBm9V3-ff93GJ-m5THYM-tvGY4r-gZz8Xw-feaN8r-mK9TEs-s6Km9C-eFr1Nz-oaMhpz-ousUxw-9hdq3Z-9haDdt-cWmmS1-9BQSRX-feviau-gb1ecA-cBm5XS-gtKjt8-ejPWgI-ek5uCo-poFqAL-cBme49-bt6j15-m4Ma4D-bLQYZZ-uFaopg-qvH5cq-9ViaNH-pBR3wA-yLkPWV-eFz9Xs-9frWmo-oo1MMc-ekxSfj-j2IRTY-dVEpUv-qnnfAN-d5mgAW-rwig3b-gaZwk5-d7eibw-m5UhmY-AjRziR>

**-Problem:** In some yards, stormwater runoff can create an area of standing water that lasts for longer than three days. This perennial moisture is often caused by a heavy layer of clay soil and/or a high water table.

**-Solution:** Standing water can be a nuisance, but not necessarily. If the wet area is in a part of your yard that is away and downhill from your house or other structures, go with the flow! Use native wetland plants to filter pollutants from stormwater runoff. Native wetland plants can handle having their roots in standing water for long periods of time. The plant roots will also help to improve soil quality, and therefore infiltration, by helping to break through the heavy clay layer and adding organic matter to the soil which in turn encourages more soil organisms which help to build soil. Many wetland plants are very pretty, and will create a beautiful garden that will attract dragonflies and frogs.

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## 7. Build Healthy Soil



Compacted soil. Photo by Flickr user srv007. CC BY-NC 2.0. Available at: <https://www.flickr.com/photos/savidgefamily/8226509948/in/photolist-dwX1Nq-fyWpHZ-dwX2Ky-53Rj9E-aveZsv-6t8QAV-avhGkf-aveZ24-avhEXw-aveZjF-avhFsb-avhEMY-avf1F6-avf1DF-avhFqC-avf1vr-avhFWw-avhFS7-avhFVY-avhECs-avhExE-avf18c-avhFeb-avf112-aveZnT-avf1qr-avhF19-avf1tK-avhFoh-avf1U4-avhFJY-avhFmC-avf1a6-avf1X6-avhF63-avf27c-avf1rV-avhES1-avhFF7-avhDUu-aveZgT-avhE4q-avhEju-aveYPF-aveYYz-aveYSB-avhECJ-FKvoN-dzavEd-f1F48G>



Native garden with lawn. Photo by Ellerbe Creek Watershed Association. Used with permission. Available at: <http://www.ellerbecreek.org/en/act/be-creek-smart/103-act/creek-smart/178-build-healthy-soil.html>

**-Problem:** Many of our urban soils lost their natural layer of topsoil or were compacted during development. These unhealthy, compacted soils cannot maintain healthy plants or infiltrate large amounts of rainfall the way a native landscape would do. Since these soils cannot retain water and lack nutrients, homeowners end up using excessive water and fertilizer to grow plants and grass. The result is that unhealthy soils create lots of nutrient-laden runoff that goes directly to Ellerbe Creek, causing flooding and stream bank erosion.

**-Solution:** Consider converting at least 20% of your yard to a more natural landscape to help protect the creek. Start by building new topsoil that can support native plants or a beautiful garden for you to enjoy. A healthy forest soil has up to 50% air, so just 1,000 square feet (a 33x33 foot area) of a healthy, 6-inch deep soil can store over 1,500 gallons of water. Having a diversity of plants, specifically native plants and trees, helps build healthy soil and provides biodiversity for wildlife and pollinators. Using no or minimal fertilizer allows soil organisms to break down leaves and other organic matter, creating healthier soil which provides nutrients for plants and holds water naturally for dry times.

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## 8. Add a green roof



Storm water flowing into storm drain. Photo by EPA. Public domain. Available at: <http://www2.epa.gov/nutrientpollution/sources-and-solutions-stormwater>



Green Roof. Photo by EPA. Public domain. Available at: [http://www2.epa.gov/sites/production/files/region8/images/greenroof\\_floor9.jpg](http://www2.epa.gov/sites/production/files/region8/images/greenroof_floor9.jpg)

**-Problem:** Many roofs contribute massive amounts of stormwater runoff to the creek because the downspouts are sent directly to the street. In a 1- inch rainfall, a 3,000 square-foot roof can shed 1,800 gallons of stormwater. Across a city, thousands of rooftops create millions of gallons of stormwater runoff that fill the creeks in an unnatural and harmful way. This runoff also carries with it any pollutants from the roof itself, such as animal droppings or grit from roof shingles.

**-Solution:** Catch and treat the runoff where it falls by adding a green roof to your house or garage. Green roofs are the gold standard for urban stormwater management, consisting of a layer of vegetation and soil installed on top of an impermeable layer on an existing roof. In addition to reducing stormwater runoff and pollutants, green roofs may also: reduce roofing maintenance, improve energy efficiency, reduce the urban heat island effect, provide habitat for wildlife, and improve air quality. While green roofs have been used for centuries in Europe, modern versions are engineered to be used on existing rooftops. However, green roofs usually require professional engineering to ensure that the integrity of the roof is not compromised by the weight of the material and retained water.

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