SOIL QUALITY RESTORATION

Improving Soil Health

WHAT IS SOIL QUALITY RESTORATION?

Soil quality restoration (SQR) is the process of improving soil health on new or existing lawns. The process uses tillage, aeration, and compost to increase infiltration and organic matter content. Soil quality restoration leads to healthier, more functional soils and to landscapes that can absorb more rain and shed less runoff.

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Landscapes for clean water

WHY RESTORE SOIL QUALITY?

Grading activities associated with urban development create poor quality soils that are compacted and low in organic matter. Yards with poor soil quality require more time, money, water, and fertilizer to stay green and maintain a lush appearance. Problems such as standing water, inability to mow after rainfall, patchy grass, and poor grass establishment are associated with poor soil quality. These soil conditions also contribute to water quality issues by shedding runoff during rainfall events; and by transporting pesticides, sediments, and fertilizers to nearby water bodies. Soil quality restoration reduces compaction, increases pore space in the soil, and improves organic matter content. This improves the health and functionality of soils. Organic matter gives the landscape the ability to act like a sponge and absorb rain. Soils rich in organic matter also support entire ecosystems of beneficial organisms (microbes, worms, insects) that contribute to healthy lawns.

HOW TO **IMPROVE YOUR LAWN**

The soil quality restoration method chosen depends if the ground is bare or if the lawn has already been established.

Establishing New Lawns

Restoring your yard to an 8 inch layer of healthy, de-compacted soils requires a combination of tillage, topsoil, and/or compost. Soil quality restoration is best when performed as part of the final landscaping with new construction.

- Contact Iowa One Call to have utilities located.
- Deep tillage (4-8 inches) breaks up compacted soils.
- Adding 1-3 inches of compost will increase organic matter.
- Seed with turf grass or lay sod.

Improving Existing Lawns

Create healthier soils by adding organic matter to an existing lawn.

- Contact Iowa One Call to have utilities located.
- Locate and mark in-ground sprinklers and invisible fences.
- Mow lawn to a height of 2 inches.
- Aerate the lawn with a plug or deep tine aerator.
- Apply 1/2 to 3/4 inch of compost to increase the organic matter content of the lawn.
- Apply grass seed over patchy turf, if needed, with a species that matches current yard grass.

This new lawn will benefit from restoration to create healthy soils.

Poor soil often results in lawns with this patchy appearance.

USE QUALITY COMPOST

Quality compost for soil quality restoration is made from yard waste such as grass clippings and leaves. It is best to purchase compost that was made at a reputable facility because they maximize important variables including temperature, moisture, oxygen, and microbial activity to yield high quality compost.

The proper temperature is essential to destroy weed seeds and pathogenic organisms. The compost is also tested to ensure it is high quality. Good compost contains many beneficial microorganisms. It should be loose and granular, dark colored, and moist. It should also have an earthy smell and be free from debris, rocks, sticks, and trash.

COMPOST APPLICATION

Compost can be spread on bare ground or over existing lawns in a number of ways, depending on the size of the project.

Walk behind spreader

Pneumatic blower truck

Shovel and rake by hand

REASONS TO PERFORM SOIL QUALITY RESTORATION

Lack of water infiltration

Patchy or unhealthy grass growth

Compacted soil or subsoil

DO IT YOURSELF

Below are some helpful tips if you choose to complete a soil quality restoration yourself:

- Locate sprinklers, invisible fences, and call Iowa One Call to mark utilities before aerating the lawn.
- Borrow or rent equipment needed (aerator) from your local hardware or rental store.
- Buy yard waste compost in bulk from local composting facility or a retailer reselling in smaller quantities.
- Add 1/2 to 3/4 inch of compost to yard. For better results, repeat in a year or two.
- Spread compost using a wheelbarrow, shovel, and rake; or rent a walk behind spreader.
- Ensure compost is evenly spread to prevent thick spots that completely cover grass, killing it.
- Follow establishment maintenance guidelines on previous page.

HOW MUCH COMPOST DO YOU NEED?

Square Feet (sf) x Depth (in) x .0031 = Cubic Yards (CY) of compost needed.

For example:
To apply a 1/2 inch on a 5,000 sf yard = 5,000 x .50 in x .0031 = 7.75 CY

To determine tons of compost to purchase in bulk, convert compost cubic yards to tons.
_____CY x 1,200 lbs/CY of compost = _____lbs compost needed.
Divide _____lbs of compost by 2,000 = _____ tons needed.

Compost stockpile delivered to a residential driveway for application. If rain is in the forecast, spread it quickly or protect pile with tarps to keep compost dry and prevent it from washing into the street and down the storm drain.

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rainscapingiowa.org

ISWEP
iowastormwater.org

USDA United States Department of Agriculture
Natural Resources Conservation Service
ia.nrcs.usda.gov

Polk Soil & Water Conservation District
polk-swcd.org

Iowa Department of Agriculture and Land Stewardship
iowaagriculture.gov

SRF State Revolving Fund
iowasrf.com

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SOIL QUALITY RESTORATION: **IMPROVING AN EXISTING LAWN**

Poor quality residential lawn prior to soil quality restoration.

Aerating lawn before spreading compost.

Compost spread over an existing lawn.

Residential lawn one year after soil quality restoration.

ESTABLISHMENT **MAINTENANCE**

While soil quality restoration reduces future yard work, some maintenance is required during the first 7-10 days while grass establishes. Below is a list of possible maintenance requirements:

- Identify areas of thicker compost and pull grass blades through compost layer with a rake.
- Do not let grass be completely covered for more than three days.
- Overseed areas without turfgrass and do not disturb those areas.
- Water as needed if seeded, depending upon rainfall.
- Loosen areas of crusted or compacted compost with a rake.
- Temporarily control erosion in steep areas.
- Clean compost off impervious surfaces (driveways and sidewalks).

Soil & Water Conservation District Policies and Procedures Manual

Division of Soil Conservation and Water Quality-Iowa Department of Agriculture and Land Stewardship

BUDGET & FINANCE (B & F)

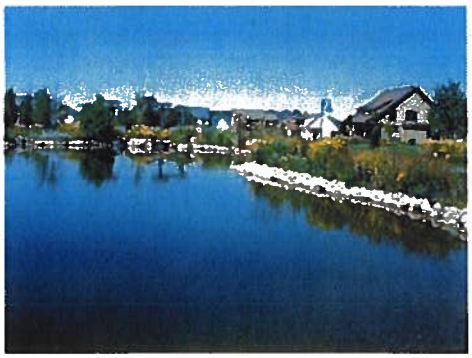
Urban Conservation

Urban Conservation Best Management Practices (BMP) (12/21)

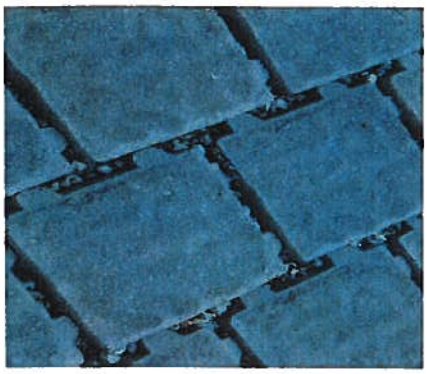
See the Iowa Stormwater Management Manual for information on all approved Best Management Practices (BMPs) https://www.iowadnr.gov/Environmental-Protection/Water-Quality/NPDES-Storm-Water/Storm-Water-Manual. Some of the BMPs are highlighted below and more information on each practice can be found at https://www.cleanwateriowa.org/urban.

Bioretention Cells: Bioretention involves the capture and infiltration of stormwater runoff from impervious urban surfaces to treat pollutant loads. Bioretention also reduces the volume of hot, dirty runoff that reaches receiving waters via storm sewers. Bio-cells are depressions that are sized and located to capture and temporarily pond runoff. Below ground, an engineered subgrade goes down 42" to 48". The subgrade has a perforated drainpipe in a rock bed, covered by a sandy loam soil mixture. Typically, ponding depth will range from 6" to 9" and should drain down in 12 to 24 hours. Bio-cells are planted to appear garden like and use of native plant species is encouraged. Bio-cells typically are used in settings with large impervious surfaces (i.e., parking lots) where extensive land grading (disturbance) has occurred.

Bioswales: Bioswales are vegetated drainage ways that convey runoff. Typically, the subgrade of a bioswale is engineered to ensure infiltration of runoff from small rains. When big rains occur, the bioswale will infiltrate the dirty first flush of runoff and then convey excess runoff to receiving waters. Maintaining and enhancing natural drainage ways can save money by eliminating the need to install storm sewers.



Native Landscaping: One of the easiest ways to enhance the landscape's ability to manage water more sustainably is to strategically install landscaping that features native plants of the tallgrass prairie region. Native plants have deep root systems that will help build soil quality which increases infiltration and reduces runoff. Native plants are tolerant of weather extremes and don't need fertilizers or pesticides. Native plants also create habitat for birds, wildlife, butterflies and other species. After establishment, native landscaping is cheaper to maintain.



Permeable Pavement: Transportation surfaces (roads, parking lots, driveways) account for over 60% of impervious urban surfaces. Permeable pavement allows rainfall to infiltrate down rather than running off into storm sewers. Rainfall moves into a rock chamber below the pavement. A biofilm develops on the aggregate of the rock chamber where microbes live. The microbes capture pollutants such as hydrocarbons and break them down. Water in the 2 of 2 pore space between the aggregate either percolates out and down through surrounding soils or moves to a perforated drainpipe installed in the rock chamber. Water is slowly released to become ground flow or enter surface waters after it has been cleaned and cooled by moving through the pavement and underground rock chamber.

Rain Gardens: Rain gardens perform bioretention services but do not have an engineered subgrade. Rain gardens rely on healthy soils with good infiltration and percolation rates to manage ponded runoff water. A thorough soils investigation is needed to ensure a proposed rain garden site has soils with adequate percolation rates. Rain gardens are typically used in residential settings to manage runoff from smaller impervious surface surfaces like roofs. In some residential development, soils are altered and compacted and require an engineered subgrade to ensure drain down time of 12 to 24 hours.

Soil Quality Restoration: Healthy soils can infiltrate and store large quantities of rainfall. A typical prairie soil should have had the pore space to store about 2.5" to 3" of rain in the top foot of soil, and probably twice that much in the first 4 feet of the soil profile. If soils have been altered and compacted by grading or construction activities, they lose their ability to infiltrate and store water. Poor soil quality means lawns will generate runoff after only a small amount of rain. Restoring soil quality involves increasing organic matter in the soil and increasing pore space. Deep tillage and compost applications will help restore soil quality after new construction. Aeration and compost applications will increase water holding capacity on existing lawns with poor soil quality.

BUDGET & FINANCE (B & F)

REAP Practices

Eligible Practices (12/20)

WATER PROTECTION PRACTICES--WATER PROTECTION FUND

(REAP Practices Fund)

Unless otherwise noted, all cost-share is 50% of the eligible or estimated cost, whichever is less.

REAP-P funds can be used in combination with other public funds to provide a total cost-share rate up to 75%; REAP-P funds cannot exceed 50% of the total funding.

REAP Practices (REAP-P)	Cost Share Rate	Maintenance/Performance Agreement Length
Critical Area Planting (342) **acre**	- 50%	5 yr
Filter Strips (393) **acre**		
includes Prairie Buffer Strips (STRIPS)	- 50%	5 yr
Field Border (386) **acre**	- 50% of the cost up to $25 per acre	5 yr
Pasture & Hayland Planting (512) **acre**	- 50%	5 yr
Contour Buffer Strips (332) **acre**		
includes Prairie Buffer Strips (STRIPS)	- 50% of the cost up to $25 per acre	10 yr
Access Control (472)	-$200/ac flat rate	20 yr
(can include only permanent fencing)	-50% not to exceed $14/rod	20 yr
Restored or Constructed Wetlands (657 or 658) **acre**	- 50%	20 yr
Streambank & Shoreline Protection (580) **ft.**	- 50%	20 yr
Agricultural Drainage Well		
plugging & cistern removal **no.**	- 50% not to exceed $500	20 yr
Tile Outlet from plugged agricultural		
drainage well to a suitable, legal outlet **no.**	- 50% not to exceed $2000	20 yr
Stormwater Best Management Practices		
Soil Quality Restoration	- 50%	5 yr
Bio-Retention	- 50%	10 yr
Infiltration Basin	- 50%	10 yr
Infiltration Trench	- 50%	10 yr
Native Landscaping	- 50%	10 yr
Permeable Pavement	- 50%	10 yr
Rain Garden	- 50%	10 yr
Sand Filter	- 50%	10 yr
Stormwater Filter Strip	- 50%	10 yr
Stormwater Pocket Wetland	- 50%	10 yr
Underground Sand Filter	- 50%	10 yr
Dry/Wet Swale – Wetland Channel	- 50%	20 yr

Dry Detention Basin	- 50%	20 yr
Extended Detention Shallow Wetland	- 50%	20 yr
Extended Dry Detention Basin	- 50%	20 yr
Micro-Pool Extended Detention Pond	- 50%	20 yr
Shallow Wetland	- 50%	20 yr
Stormwater Grassed Swale	- 50%	20 yr
Stormwater Pond/Wetland	- 50%	20 yr
Wet Detention Basin	- 50%	20 yr
Wet Extended Detention Pond	- 50%	20 yr

Districts have the option to use REAP-Practices funds for REAP-Forestry/Native Grasses (REAP-F/NG) practices when all of the REAP-F/NG funds have been obligated. REAP-F/NG cost-share rates, rules, and regulations would apply.

Note: A district cannot cost-share with landowners on the following practices until the commissioners have a State Soil Conservation and Water Quality Committee (SSCWQC) approved designated priority watershed in their county. Districts cannot cost-share on a Waste Storage Facility System unless they have a water quality problem that has been approved by the SSCWQC.

REAP Practices (REAP-P)		**Maintenance/Performance Agreement Length**
Grassed Waterway (412) **acre**	- 50%	10 yr
Grade Stabilization Structure (410) **no.**	- 50%	20 yr
Terrace (600) **feet**	- 50%	20 yr
Water & Sediment Control Basin (638) **no.**	- 50%	20 yr
Diversion (362) **feet**	- 50%	20 yr
Waste Storage Facility (313) **no.**	- 50%	20 yr

INELIGIBLE LAND:

- **Privately owned land not used for agricultural production shall not qualify for water protection practices funds. Exception to this rule – Streambank and Shoreline Protection and Stormwater Best Management Practices are eligible whether or not the land is in agriculture production.**
- **There is no minimum acre or dollar limit.**
- **REAP-P funds shall not be used to reimburse other units of government for implementing soil and water conservation practices.**

NOTE: Refer to Iowa Administrative Code - Agriculture and Land Stewardship Department [21] - Soil Conservation and Water Quality Division [27], Chapter 12 http://www.legis.iowa.gov/law/administrativeRules/agencies, the "Iowa Stormwater Management Manual" https://www.iowadnr.gov/Environmental-Protection/Water-Quality/NPDES-Storm-Water/Storm-Water-Manualand the "NRCS Technical Standards and Specifications" https://efotg.sc.egov.usda.gov/#/details for more information pertaining to the above practices.