

City of Fort Collins

Design Guide



Chapter 6: Turf Removal April 2024

An Introduction to Diversifying Urban Landscapes in Fort Collins

Acknowledgments

City of Fort Collins

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Design Guide:

An Introduction to Diversifying Urban Landscapes in Fort Collins

Introduction

Overview of the Guide

The purpose of this guide is to showcase a wide variety of diverse urban landscape options in Fort Collins. This guide will help you determine which landscape options are best for you, whether you are a homeowner, renter, business owner, school, developer, or part of a Homeowners Association. The overarching goal is to provide inspiration for your next dream landscape.

The examples in this guide apply to Northern Colorado Front Range ecosystems, however the context may be appropriate for projects in other regions, as well.

In this guide, you will find an introduction and the main considerations needed for installing each landscape option. Tips for design, installation, and maintenance are included in each chapter. In addition, each landscape option comes with its own curated plant list to help you select plants that will thrive in your landscape.

[Thank you for creating diverse, beautiful, and resilient landscapes!](#)

Why Diversify Landscapes?

Diverse landscapes are beautiful and resilient. They contain a variety of native and adapted species that provide important habitat and resources for wildlife and pollinators. They are naturally adapted to the Front Range's semi-arid climate and native soils, which translates to lower water and chemical inputs, and a better ability to withstand short- and long-term changes in climate. They invoke a Colorado landscape aesthetic and establish a sense of place. Spending time in them benefits our physical and mental health. In short, moving towards diverse landscapes is more sustainable and brings nature into the city, which provides considerable ecological, economic, and social benefits.

The use of plants that are native to Colorado is highly encouraged when you diversify your landscape. Native plants have evolved here and are adapted to our climate and soil types. In addition, our local pollinators and wildlife co-evolved with these plants and many are dependent on specific native plant species for survival. As such, native plants form the base of local food webs. However, it is also important to recognize that native plants may not be appropriate in all situations, e.g., your aesthetic preferences, the level of activity on site, HOA policies.



Navigating the Guide

This guide is broken into chapters (see Table of Contents), which primarily revolve around different landscape options (e.g., Pollinator Gardening, Lw Water Lawn). The guide also includes chapters on other relevant landscaping topics (e.g., Soil Amendment, Weed Management). It is highly recommended to start with Chapter One – Site Characteristics and Planning.



Within each chapter, you will find information on the following (when applicable):

- Overview of topic
- Physical requirements
- Design examples or case studies
- Irrigation
- Maintenance
- Plant list
- Additional resources
- Installation tips
- Fun fact!

FUN FACT

Converting your yard from turf to a xeriscape and or native garden is **On TREND!**

Over 390 residential projects in Fort Collins were granted Xeriscape Incentive Program (XIP) funding for a total of 462,100 square feet of converted landscape. That is 10 acres or approximately 7.5 football fields!



fcgov.com/xip

Definitions

Adapted Species	Non-native species that grow well in a given habitat with human adjusted changes to the environment such as water or nutrients.
Aggregate	A material or structure formed from a loosely compacted mass of larger soil or rocks.
Aspect	The direction the land is facing. eg: north, south, northeast etc.
Cues to Care	(CTC) are landscape elements that are immediately recognizable as designed, and that signal continuing human presence to care for a landscape.
Complementary Colors	Colors opposite from each other on the color wheel. They have a strong contrast that increases how noticeable they are when placed close together.
Exotic Plants	Plants not native to the area where they are planted.
Forb	A herbaceous flowering plant that is not a grass.
Hydrozone	Areas where plants with similar water needs are grouped together - very low water, low water, medium water, and high water plants should be grouped by water needs.
Impervious Surface	A hard surface that does not let water soak into the ground, causing puddling or resulting in runoff.
Larval Host Plants	Plants required for the growth and development of insect larvae such as caterpillars. Butterflies are often particular about the species where they host their eggs to support the larva.
Microclimate	Small areas that have a different climate than the overall climate of a site. They can be created by structures, topography, water, boulders, and impervious surfaces.
Native Plant	A plant species that grew in an area before colonization of that area.
Organic Matter	Any of the carbon-based compounds that exist in nature or material that comes from living things. This can include carbon-rich soils, manure, mulch, or compost.
Perennial	Any plant that persists for several years, usually with new herbaceous growth from a part that survives from growing season to growing season.
Permaculture	Permaculture stands for permanent agriculture. It uses whole systems thinking to create spaces for planting that encourages naturally flourishing ecosystems.
Pruning	Selective removal of certain parts of a plant such as branches, buds, or roots.
Resilient	Ability to bounce back after experiencing a setback.
Slope	A surface of which one end is at a higher level than the other; a rising or falling surface.
Soil Amendment	Anything that is added to a soil to improve water retention, nutrients, or drainage.
Xeriscape	Principles of sustainable design including use of low water plants, and sustainable gardening techniques.



Chapter 6 Turf Removal: Converting to Low Water Landscaping

What is turf grass?

Turf grass encompasses a variety of grass species adapted to frequent mowing and foot traffic. Turf grass species are selected for traits such as tolerance to shade, drought, foot traffic, and disease resistance. Conventional turf grass is relatively easy to maintain and performs well in a broad range of conditions. It is a great option for areas that see high activity such as a play space, walkway, or many pets.

Traditionally, turf is composed of non-native grass species. In Colorado, the most common turf used is non-native Kentucky bluegrass (*Poa pratensis*), fine and tall fescues (*Festuca spp.*), and perennial ryegrass (*Lolium perenne*). These species tend to have high water and fertilization needs. In addition, high quality lawns often require regular aeration and frequent mowing. Under the right conditions, conventional non-native turf can be replaced with more drought tolerant non-native grasses, native turf, or low water perennial beds.

Why remove conventional non-native turf grass?

Water Conservation

Northern Colorado has a semi-arid climate and receives, on average, only 16 inches of rain each year. There has been growing concern in recent years about the future of water security on the Front Range with the impacts of climate change and a growing population. According to CSU, outdoor water usage in Colorado accounts for 55 percent of residential water usage in urban areas along the Front Range, most of which is used for turf. In 2022, Fort Collins Water Utility customers used approximately 43% of treated water (2.1 billion gallons) on outdoor irrigation. Fort Collins Utilities does not serve all areas within the City limits, so 2.1 billion gallons only represents a portion of the water that was used on outdoor irrigation.

Urban lawn watering is the single largest water demand on most municipal supplies. Conservation and ecosystem stewardship are not just for preserves and parks, individuals can make a difference in their own yards or spaces. Converting your lawn to a low water landscape can save you money, reduce the strain on our water supply, and help your landscape thrive in Colorado's harsh climate. For example, a 5,000 sq. foot plot of Kentucky bluegrass needs on average 18,500 gallons of water a month, while the same area of native buffalograss (*Buchloë dactyloides*) would need only 3,000 gallons a month once established.

Wildlife Habitat and Sustainability

A study at the University of Delaware found that landscapes composed of at least 70% native plants were needed to support certain wildlife populations. In the US, turf is planted at an astounding rate. Americans add 500 square miles of lawn each year to the 40 million acres that already exist (Tallamy, 2019). All this turf is often replacing the native plant communities and ecosystems that are necessary to support the complex ecological functions that support humans: crop and plant pollination, water filtration, oxygen production, pest control, carbon sequestration, and erosion control. Converting turf to a more diverse landscape can help support the biodiversity that is lost with the development of buildings and turf.

<https://extension.colostate.edu/topic-areas/family-home-consumer/water-conservation-in-and-around-the-home-9-952>

Lawn Conversion Projects: Before and After Photos



Before



After

Planning Your Conversion

When planning to convert your turf to a low water landscape there are several things you will want to consider: project scale, turf removal method, city approval processes and permits, incentive programs, erosion control, and irrigation.

City Approval and Permits

Before you start your conversion, check with the City to see if you need to apply for any permits or plan amendments. Landscaping projects like turf removals may require a City permit called a 'Minor Amendment'¹ depending on the size and location of the project (not applicable for individual homeowner yards). An erosion control permit may be needed if the project area is over 10,000 square feet. You can find more information on city processes, permits, and amendments on the City's development review website² and on the application forms³.

Incentive Programs

Check with your water utility provider to see if they offer any incentives for converting turf to low water landscaping. There are many programs out there. Several programs currently offering rebates are the Northern Water grant program⁴, Nature in the City⁵ and the City of Fort Collins Xeriscape Program⁶ for residential and commercial properties.

Irrigation

Existing irrigation and sprinkler systems can be retrofitted and converted for low water landscapes. You will also need to prep your existing sprinkler system before starting turf removal if you plan to use a sod cutter or sheet mulch. If you are using a sod cutter you should flag the sprinklers and work around them to avoid damaging the irrigation system. If you plan to sheet mulch, you will want to flag sprinkler heads to find later in case they get buried.



¹ <https://www.fcgov.com/developmentreview/pdf/minor-amendment-application.pdf>

² <https://www.fcgov.com/developmentreview/process>

³ <https://www.fcgov.com/zoning/what.php>

⁴ <https://www.northernwater.org/grants>

⁵ <https://www.fcgov.com/natureinthecity/>

⁶ <https://www.fcgov.com/xip>

Methods for Removing Turf

There are several methods for turf removal. When considering which to use for your space, consider the size of space to be converted, the time it will take to complete each method, the cost, the sustainability of each option and amount of labor required. You will also want to consider what you will be planting in the space afterwards – native grasses, forbs, shrubs, or a mixture. If you are converting a large space and replanting with native grasses, chemical treatment is the best way to go, while a smaller lawn or area that is being converted to forbs and shrubs can be converted using sheet mulching, solarization, or a sod cutter.

Turf Removal Method Comparison Table			
TURF REMOVAL METHOD	APPROPRIATE PROJECT SCALE	BENEFITS	CHALLENGES
Sheet Mulching	Small	Inexpensive, improves soil, minimal labor, environmentally friendly.	Slow process, will not kill perennial weeds, needs to stay moist.
Solarization	Small	Inexpensive, minimal labor, doesn't disturb soil, kills soil pathogens, and weed seeds.	Only works in full sun areas, can't recycle plastic, slow process, doesn't kill perennial weeds.
Sod Cutter	Small- Medium	Fastest method, turf can be composted, soil can be kept on site.	Labor intensive, chance of turf regrowth, need to rent equipment.
Chemical	Small- Large	Quick, cheap, minimal labor, keeps soil intact.	Chemicals can be harmful to human and ecosystem health.



Sheet Mulching or Lasagna Gardening

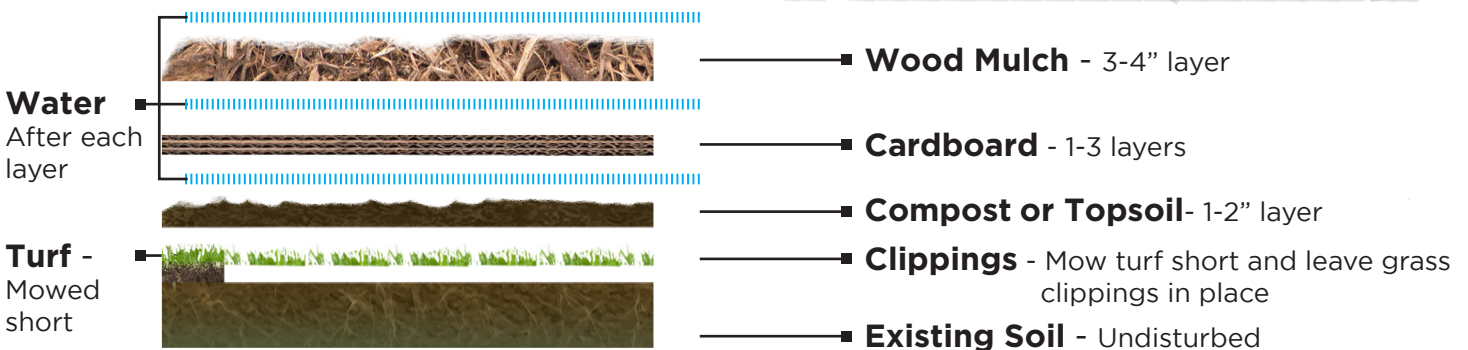
Sheet mulching, also known as lasagna gardening, is the process of smothering existing turf by covering it in cardboard and organic matter and letting those materials compost in place for several months. This method works best for smaller scale projects, such as a residential landscape.

Benefits: Inexpensive, improves soil, requires minimal labor, and environmentally friendly. This is one of the easiest methods for killing turf for smaller spaces and can be started any time of the year.

Challenges: It is a slower process that can take 3-6 months to kill the turf. It is best to start this process in the fall and let it sit over the winter when snowmelt will provide moisture. Otherwise it needs regular watering to keep moist and break down the cardboard. Certain perennial weeds, like bindweed, may persist through the sheet mulching and will need to be hand pulled or sprayed.

Materials Needed:

- Large pieces of cardboard: enough to cover your space in 1-2 layers
- Mulch: Sources of free organic mulch include arborist companies, free mulch days with the City, free mulch bins at the Timberline Recycling Center and the Gardens on Spring Creek, and Chip Drop
- Plant based compost or topsoil

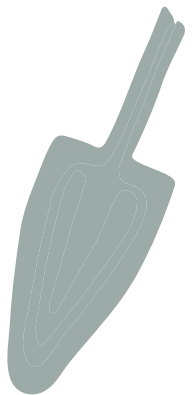


Steps

1. To prep the site, cut the grass as short as possible and leave the clippings in place. Dig a trench about 3" wide by 5" deep along any hardscapes and remove grass manually from these edges. Lay down 2-3" of plant-based compost on top of the turf. Water thoroughly.
2. Lay cardboard down over the compost and grass. Overlap the cardboard so the ground is covered completely and cannot be seen.
3. Soak your cardboard layer in water and then add 2" of plant-based compost or topsoil on top.
4. Cover your site with 3-4" of organic mulch or 1-2" of inorganic mulch. Place rocks or weights throughout the site to weigh down cardboard so it doesn't blow away if it gets dried out. Water mulch thoroughly.
5. If you sheet mulch over the winter, the snow should keep it moist enough to break down. If you do sheet mulching during the warmer months, you will need to water it occasionally.
6. Let the sheet mulching sit for about 3-6 months to allow time for your turf to break down. You can check on your progress by pulling up a corner of the cardboard. If your grass has fully died back, you are now ready to plant.
7. To plant into sheet mulching, pull mulch away from your planting spot, cut a hole in the cardboard and plant into the soil below.



Photo of sheet mulching from Everybody Grows project illustrating the lasagna method of adding wood mulch over cardboard.



Solarization

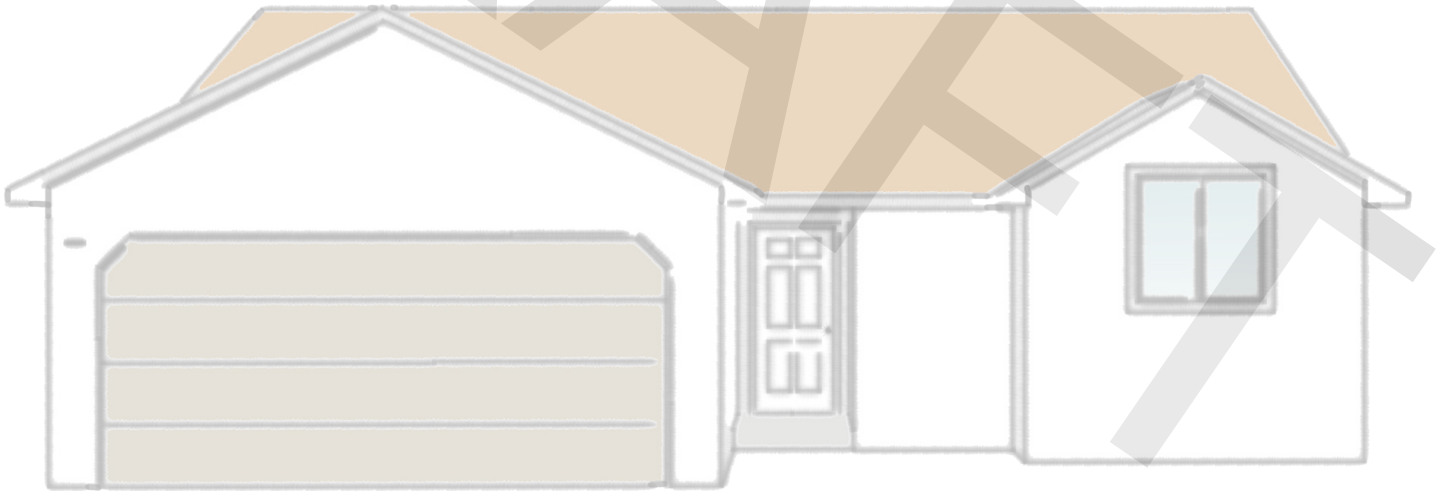
Solarization is the process of killing turf by covering it with a clear plastic sheet. The plastic traps heat from the sun and bakes the vegetation underneath it. This method is best used in smaller landscapes with full sun. Solarization is best for small scale projects.

Benefits: Inexpensive, minimal labor, doesn't disturb soil, kills soil pathogens, and weed seeds.

Challenges: This method only works in hot, sunny areas during the summer months. It can take up to two months to kill turf and several years to kill persistent perennial weeds with deep taproots or rhizomes. Finally, plastic can rip, is unsightly, and cannot be recycled.

Materials Needed:

- Clear plastic*:
- Thin plastic (1 mm) is more effective at trapping heat, but is also likely to tear from wind, debris, or animals.
- Medium thickness plastic (1.5 to 2 mm) is ideal for windy areas.
- Thick plastic (4+ mm) can be used if the treated area is small.
- *Black plastic can be used; however, clear plastic is more effective at capturing heat and thus ideal for solarization.

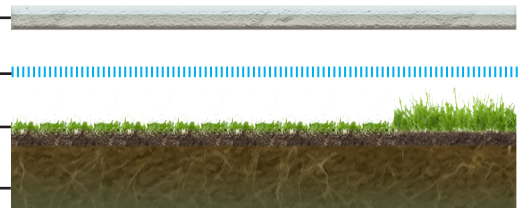


Plastic Sheet - 1-4 mm thick layer ■

Water - Ensure soil is moist 1 foot deep ■

Mowed Lawn - As short as possible! ■

Existing Soil - Undisturbed ■

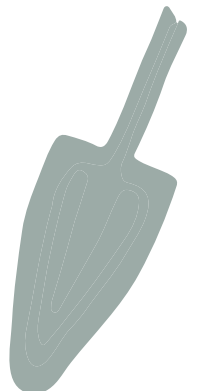


Steps

1. Solarization should be done only on sites with full sun during the hottest summer months: June-August. To successfully kill your turf, you will need to keep temperatures under the plastic between 110 -130 degrees Fahrenheit for 4-8 weeks.
2. Prep your site: Solarization will work best when the plastic has good contact with the soil, so you want the area to be as smooth and debris free as possible. Cut your lawn as short as possible. Rake up and remove all lawn clippings, other vegetation and any rocks or sticks that may rip plastic. Rake out soil to as smooth a surface as possible.
3. Dig a trench along the edges of your site deep enough to bury the edge of the plastic sheeting to weigh it down.
4. Thoroughly water the site, until the soil is soaked 12" deep. You want your soil to be moist, but not swampy or puddling.
5. After watering, immediately cover the site in a layer of clear plastic. Bury the edges of the plastic in the trenches and backfill with soil.
6. Let your site "cook" for 8 weeks. If tears or holes develop in the plastic sheeting, repair with duct tape.
7. If the site has pernicious perennial weeds such as Canada thistle (*Cirsium arvense*), field bindweed (*Convolvulus arvensis*), or crown vetch (*Coronilla varia*), it will often require two or even three years of smothering to deplete their extensive root reserves and kill the plants. Targeted herbicide applications can be used post-solarization if you have species such as these.



Use of clear plastic to solarize sod in a field as part of a University of Minnesota Extension project.



Sod Cutter

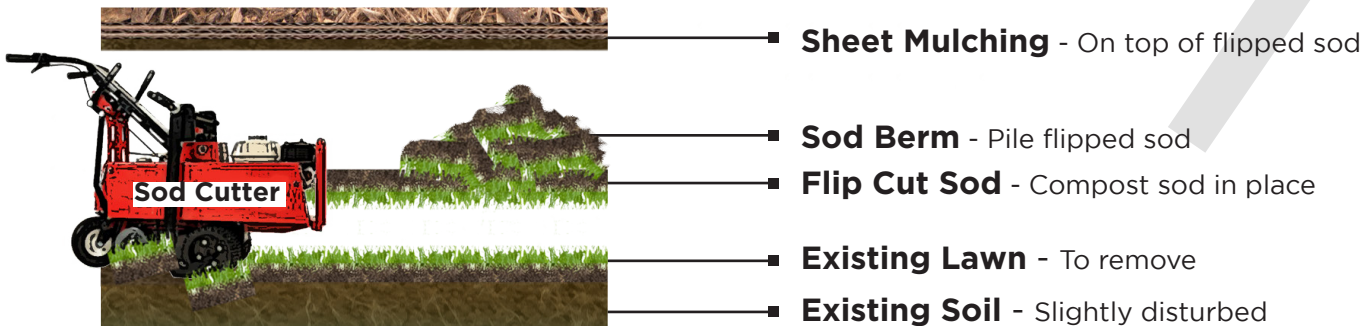
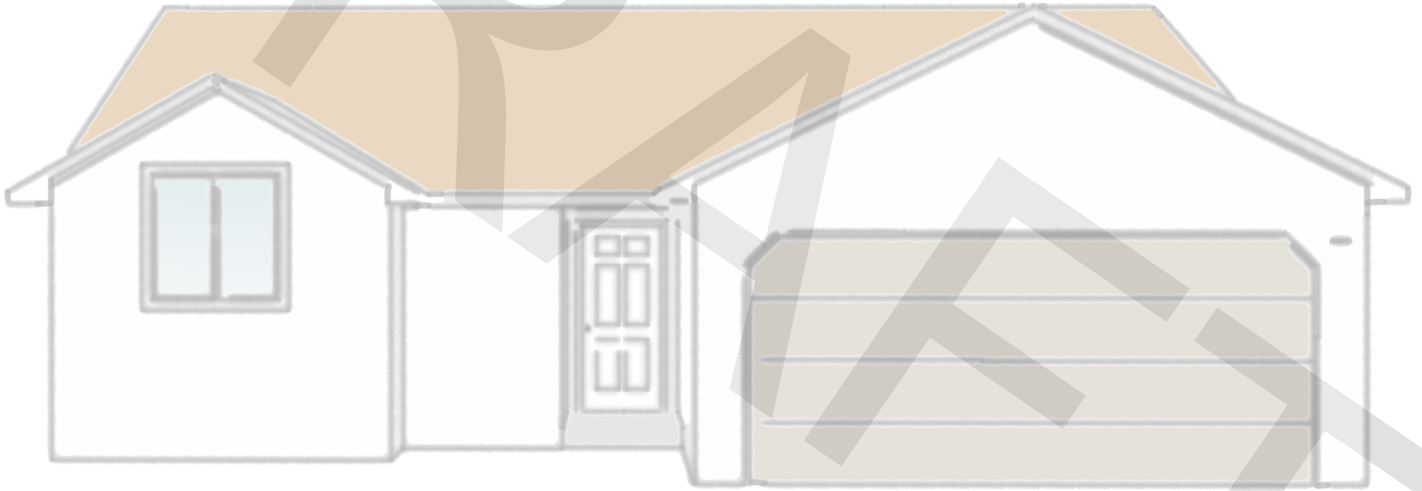
Using a machine to cut the sod and roots out of the ground. The result is a shallow cut in the ground exposing bare dirt. Strips of sod can be rolled up and used in other areas.

Benefits: This is the fastest way to remove turf. Removed sod makes great compost or can be used to build berms, and it leaves most of the soil intact. This method is great for small to medium sized projects when removing Kentucky bluegrass/fescue turf with limited weed pressure.

Challenges: This method is the most labor intensive, and has a higher chance of turf regrowth. A sod cutter does not remove deep roots and you will need to rent and transport equipment. Using a sod cutter disturbs the top soil structure. Finally, if cut sod isn't composted on site then topsoil is removed and lots of material will need to be hauled away.

Materials Needed:

- Sod Cutter: rent from hardware store for around \$125/day *2022 price
- Flags: to mark sprinkler heads

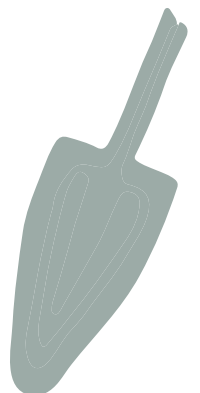


Steps

1. Hand dig a 6" by 6" trench along any hard surfaces, like sidewalks, and remove grass manually to avoid damaging walkways or rock edging. Flag all irrigation heads so that you can avoid hitting and damaging them with the sod cutter.
2. Rent a sod cutter from an equipment or hardware store. Follow the directions in the manual to remove the sod.
3. You can either compost the sod on site or pay to have it hauled away. If you choose to haul away the sod, you will need a dump trailer, or a dumpster delivered to your house - sod is very heavy. Keeping your sod on site costs nothing, will be less labor and it keeps native soil on site.
4. If you choose to compost the sod on site, you can flip it in place and then do sheet mulching on top of it, following the sheet mulching instructions above. You can also use extra sod pieces to build berms to catch precipitation.
5. Add 2-3" of topsoil on top of your new site to amend the soil and level the site to match existing topography and maintain positive drainage away from structures.
6. You may have some resprouting of grass after removing turf via a sod cutter. Water the area you have removed grass and wait to see if it resprouts. If this happens, you can solarize the area, follow up with a treatment of herbicide, sheet mulch on top, or hand weed the remaining grass.



Sod cutters create strips of sod including the roots that can be rolled up and moved.



Chemical Application

When working with very large lawn conversions or lawns that will be replanted with native turf, herbicide is the most effective option. Avoid using chemicals that have long residual activity, as replanting will be difficult.

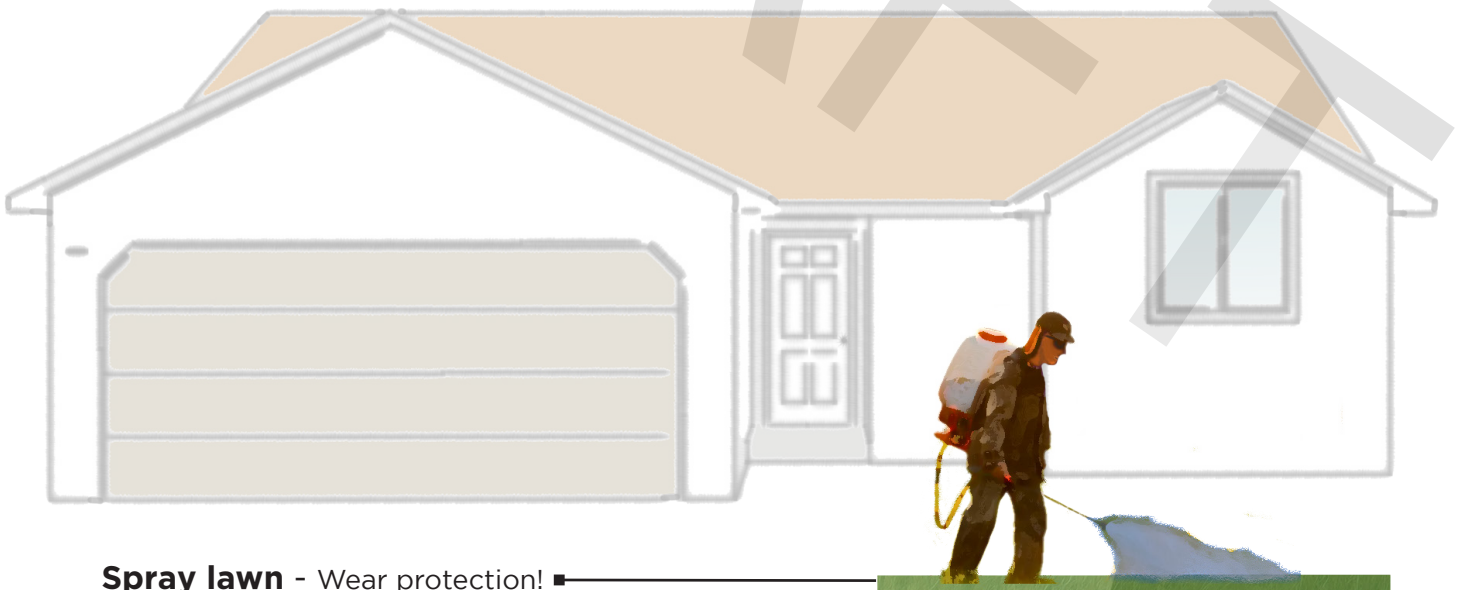
Glyphosate is the most effective chemical for killing turf and takes about two weeks to kill grass. If removing Kentucky bluegrass or fescue turf, chemical application is most effective when they are actively growing in the spring or fall when temperatures are in within the range stated on the product label and grass is not stressed in the summer heat. Glyphosate is absorbed through the leaves of the plant and pulled down into the plant, so **DO NOT** cut your grass before applying it.

Benefits: This method is quick, cheap, not labor intensive, the grass doesn't need to be removed (which is important if the area being converted is over 10,000 square feet), and it can be directly planted into as dead grass acts as a weed barrier. It is the best option for large spaces.

Challenges: Chemicals can be toxic and have unwanted health and environmental effects if they are not applied correctly. Proper Personal Protective Equipment (PPE) such as rubber boots and chemical gloves can help mitigate risks or consider hiring a qualified individual to apply. Follow all herbicide label instructions – the label is the law!

Materials Needed:

- Hand, backpack, or boom sprayer
- Personal Protective Equipment (PPE): rubber boots, pants, long sleeve shirt, chemical resistant gloves, eye protection, optional: face mask. Some chemicals require additional PPE, follow the product label.
- Glyphosate formulation

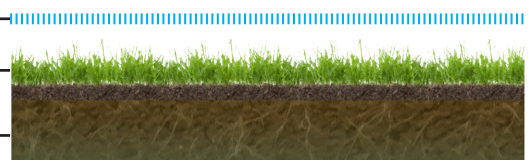


Spray lawn - Wear protection! ■

Keep Dry - Ensure grass is dry before spraying ■

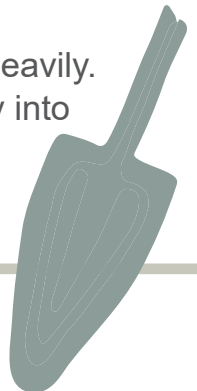
Unmowed Lawn - **Do not mow!** ■

Existing Soil - Undisturbed ■



Steps

1. Cover any desirable plants that you don't want chemicals on with plastic sheeting or use cardboard as a shield to protect nearby plants.
2. Carefully read the directions and follow all safety information on the chemical label. Over applying or not applying according to the label instructions is illegal. Glyphosate formulations typically do not need additional ingredients like surfactant.
3. Glyphosate kills plants by entering through the leaves, so do not cut grass before applying. For best results, make sure that grass has been adequately watered before applying. DO NOT apply when rain is expected in the next 24 hours or if it is windy (more than 10 mph).
4. Get suited up in your personal protective equipment. Mix the chemical according to the label. There are glyphosate formulations that come ready to use and do not require additional mixing, minimizing user exposure. Do not exceed the recommended rate on the label - this is illegal!
5. Spray grass in the early morning hours in the spring or fall when temperatures are within the range stated on the product label, there is no wind, and grass is still green. Spray the leaves until they are wet and shiny. Walk backwards as you spray to avoid walking through areas that have already been treated with the chemical.
6. DO NOT water your lawn for the next 24 hours. After 24 hours, water the lawn like normal. Gradually decrease watering over the next two weeks. Allow about two weeks for the chemical to kill the grass, then check to see if there is any grass remaining alive. If there is still living turf, reapply glyphosate and repeat the process.
7. Some broadleaf weeds are glyphosate resistant and may require hand removal or an alternative chemical application.
8. After the turf has been thoroughly killed, scalp the dead grass using the lowest setting of your lawn mower and rent a power rake to de-thatch. Leaving the dead turf roots, instead of tilling it in, can help control weeds as you convert the landscape. You can now plant directly into the old sod.
9. If reseeding the area, you can rake seed in, use a seed drill, or aerate heavily. If you are planting with plugs or transplants, they can be planted directly into the old sod.



Methods Not Recommended

Simply tilling your soil or scalping your lawn is not recommended. These methods are not effective. Tilling will encourage more weed growth with soil disturbance and scalping the lawn without the use of chemicals allows the grass to grow back. Kentucky bluegrass is persistent and will not be killed by tilling or scalping.



Soil Amending

Improving Soil Texture and Structure

Topdressing your soil with organic matter such as plant-based compost, wood mulch, or leaves can help improve soil structure and improve water infiltration, drainage, air infiltration, and allow for deeper rooting of plants.

If you need to amend your soil, CSU Extension recommends adding 2-3 inches of plant based compost or 1 inch of manure based compost to your landscape. Compost should be incorporated to a depth of 6 to 8 inches. You can learn more from their fact sheet on Choosing a Soil Amendment.⁷

Soil Amendment Types

There are inorganic and organic amendments. Organic amendments are materials that were once alive such as wood mulch, manure, plant-based compost, and straw. Inorganic amendments (made from non-living material) include perlite, vermiculite, and pea gravel. Some slow release fertilizers such as Osmocote continue to fertilize small amounts for four to five months.

Manure based amendments are typically not recommended in Colorado because of their high salt content. If converting your turf to native turf and plants, plant-based composts are best because they can help improve soil structure by adding organic content, without adding excessive nutrients. Native plants do not like over-amended soils high in nutrients. Most natives do best in soil that is un-amended with an inorganic mulch.

⁷ <https://extension.colostate.edu/topic-areas/yard-garden/choosing-a-soil-amendment/>

Over Amending

It is important to test your soil, as it is possible to over amend your soil. Over amending soil can lead to high salts, nutrient imbalance, holding excess water, high ammonia, groundwater contamination, and micronutrient imbalances. You can get a soil test done at the CSU Soil Lab.⁸

Turf Removed, Time to Replant

There are many options for how to replant your new landscape and perhaps you already know exactly what you want to do. Some options to consider if you have not already done so include adding a pollinator garden, low water turf or putting in a parkway strip with plants that survive in very hot and dry conditions. For more information on plants for these types of gardens, check out Chapter 2 on Pollinator Gardens, Chapter 4 on Low Water Lawns and Chapter 5 on Parkway Strips. Each of these chapters provides a list of appropriate plants for you to start out with, but you can also find more information on plant species for our area in the City of Fort Collins Vegetation Database.⁹

New landscapes will require some maintenance with weed control being especially important in the first few years. Remember, converting your lawn is a worthwhile endeavor, but it is also a process. Mistakes will be made, lessons learned, and ultimately you will end up with a new low water landscape that will be more sustainable and will save you money. There is a community of folks in Northern Colorado who have been through this process and that you can connect with by reaching out to the City of Fort Collins Xeriscape and the Nature in the City programs, or other local organizations like Wild One's: Front Range Chapter, or the Northern Colorado Chapter of The Native Plant Society.

FUN FACT

Did you know that Turf grass is the most common crop in America?

If we replaced half of the acres of lawn with native plants, that would be more land than all of the national parks combined!

ON THE MAP!



<https://www.homegrownnationalpark.org/>

8 <https://agsci.colostate.edu/soiltestinglab/>

9 <https://www.fcgov.com/vegetation/>