

SUSTAINABLE LANDSCAPE HANDBOOK

Developed with and for the towns of
Stoneham, Arlington, and Winchester



A Guide to Sustainable Landscaping for Amateurs and Pros

THE TOOLS YOU NEED TO DESIGN A SPACE, CONSTRUCT THE PROJECT, AND MAINTAIN YOUR SUSTAINABLE LANDSCAPE.

INTRODUCTION

What is a Sustainable Landscape?

Sustainable landscapes are designed to integrate more naturally with the local environment. A sustainable landscape reduces the need for irrigation, cleans the air and water, creates shading that can reduce energy costs and local temperatures, supports groundwater recharge, and restores wildlife habitats. Sustainable landscapes utilize native species that are hardy to Massachusetts's climate and are often easier to maintain. Therefore, integrating sustainable landscape features and practices into your yard can not only save you time and money in the long run, but also protect your property from increasingly extreme heat and storm events.

How to Use this Handbook

This handbook provides comprehensive yet user-friendly information on implementing sustainable landscaping practices at home. It is designed to help you design, implement, and maintain your landscape in a way that conserves water, takes the changing climate into account, and promotes the health of native habitats.

The guide is divided into three sections that correspond to the three main phases of a project – design, implementation, and maintenance – with guidance around whether you should do the work yourself or hire a professional. You are not expected to read this guide cover to cover. Rather, you should **use the links in the Table of Contents to jump to sections relevant to your needs.**

Throughout this document you will find icons that differentiate between sections designed for beginners () and experts ().



Details about various aspects of comprehensive sustainable landscaping techniques.



Steps for planning large-scale projects.



Simple actions that improve sustainability.



Options for creating your sustainable landscape one plant or area at a time.

We hope you find this handbook useful in inspiring and creating your own sustainable landscape. We thank you for doing your part to improve sustainability and resilience in our communities.

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PHASE 1: Design



The Design Process

- Determine Who Will Lead The Work
- Draw A Scaled Map Of The Property
- Analyze The Property
- Identify Your Needs and Design Elements
- Consider Layout Options
- Create Your Design

This handbook is intended to meet you, the reader, where you are. You are encouraged to dive as deeply, or not, as necessary.

Everyone is at a different level of knowledge and skill. To help you sort through information, sections of the book are flagged as **'beginner'** and **'expert.'** There will also be quick tips at the bottom of pages to simplify large chunks of information. Please do not be intimidated by the wealth of information provided. The book is intended to cover a breadth of landscaping topics with both detailed and simplified explanations.

You do not need to break the bank or commit to extensive changes to your landscape. This book presents you with options, some simple and some more involved. Take what you need and leave the rest.

STEP 1

Determine Who Will Lead The Work

Before you start your sustainable landscape project, remember to **START SMALL**. There's no need to take on everything at once.

You can tackle a project yourself, or enlist a local professional at any stage of the project.

How involved do you want to be? Think about whether you'd like professional help and how to divide the work. If you choose to 'DIY', resources in this handbook can help.

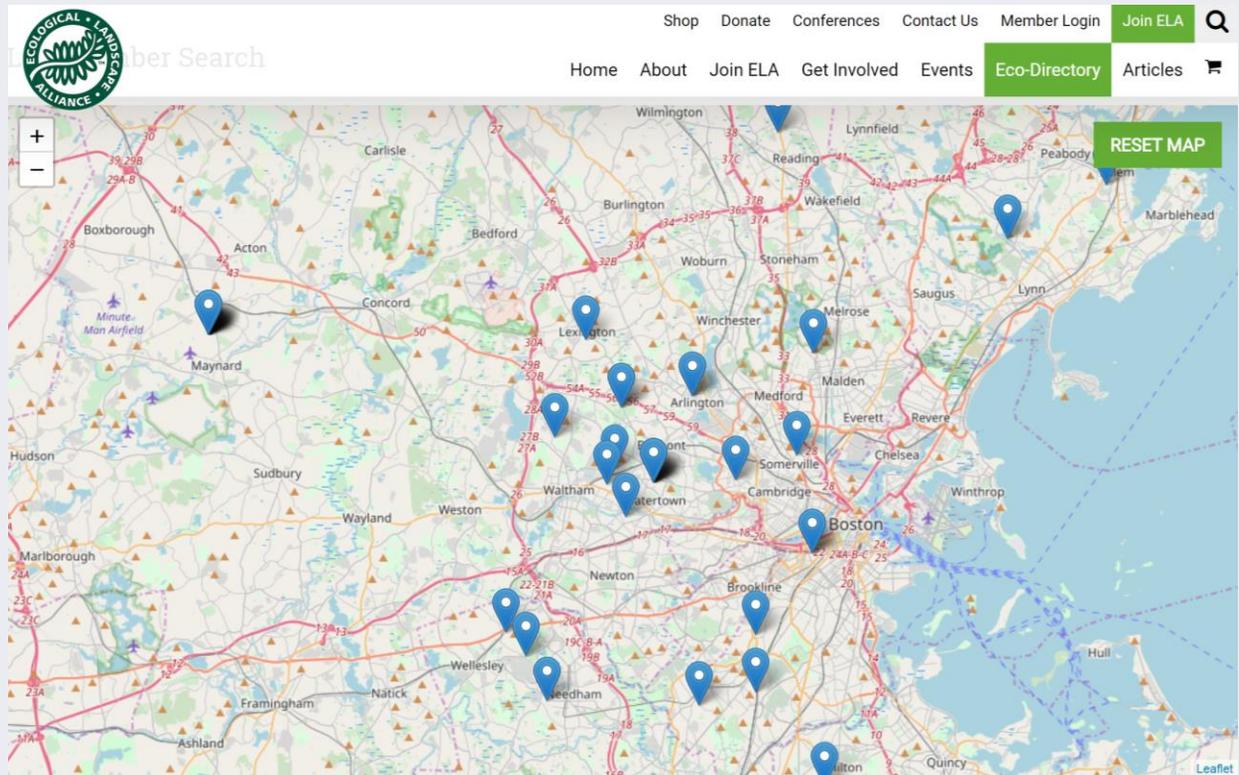
Below is a breakdown of how project stages can be divided by you and professionals:

	DESIGN		INSTALLATION	
OPTION 1	YOU	→	YOU	You can go through the design process and implement the project yourself. This handbook provides steps for each phase in the process. Set achievable goals and start small.
OPTION 2	YOU	→	CONTRACTOR	You can design the project and then have a contractor implement it. If the scope exceeds what you would like to get involved in, no worries! A contractor can work with you to bring your plan to life.
OPTION 3	PROFESSIONAL	→	YOU (with or without assistance of a contractor)	You can have a professional design your property's landscape and then you implement it (with or without help from a contractor). Working hand in hand with a professional designer can be a great way to bring in creative ideas.
OPTION 4	PROFESSIONAL	→	CONTRACTOR	You can hire a professional designer and a contractor to implement the design. There are companies that will take care of both design and installation. This is called a design/build firm. This allows for an easier transition between each of the different phases from planning to construction, and in some cases, even maintenance.

Find Professionals Who Prioritize Sustainability

The resources below can help you find a local professional focused on sustainable practices.

- [Tower Hill Botanical Garden](#) is a hub that can connect you to **local sustainable designers and builders**.
- [Ecological Landscape Alliance \(ELA\)](#) provides access to webinars, events, resources, and connections to **local professionals**.
- [Massachusetts Horticulture Society](#) has online resources and lists of local events.
- [American Society of Landscape Architects](#) and [Boston Society of Landscape Architects](#) have databases to search for **landscape designers** in the area as well as other resources.
- [Grow Native Massachusetts](#) provides a list of **landscapers with a sustainability mission**.
- **Many local nurseries offer landscape design and/or build services**. Ask around!



An example search result for sustainable landscape professionals in the Boston area through the Ecological Landscape Alliance.

STEP 2

Draw a Scaled Map of Your Property

A 'Scaled' drawing can fuel a productive conversation with a contractor, or enable you to create and implement your design accurately. "Scale" is described below.

Online Mapping Resources

- [MassMapper](#) can provide data about your property such as water bodies, topography, areas of critical environmental concern, and conservation areas.
- **Google Earth or your town's GIS mapping database** can also give you valuable information and a map to start from. These resources will have a scale bar on-screen for you.



[Arlington's GIS viewer](#) allows you to view FEMA flood zones, contours, parcels, light poles, wetlands, and other information layers.

[Stoneham's GIS viewer](#) allows you to view FEMA flood zones, contours, parcels, light poles, wetlands, and other information layers.

[Winchester GIS](#) allows you to markup, measure, and add buffers to your property. Parcels, contours, and other feature layers can be toggled on and off.

What to include on your map:

- **Property lines:** You will want to ensure you're working only on your property and not your neighbor's! If you are unsure where your property lines are, you can have a surveyor come out and identify them.
- **Footprint of existing structures:** Buildings, porches, sheds, decks, or existing patios.
- **Existing trees, shrubs, plant beds:** Indicate existing mulch beds, trees, or shrub locations.
- **Utility Locations:** Mark septic system, light poles, overhead wires, and underground lines. Call Dig Safe® (888.DIG.SAFE) if you need help locating underground utilities.
- **Environmental constraints:** Wetlands, streams, ponds, floodplain, vernal pools.
- **Scale reference:** Always draw your plan to scale (i.e., 1 inch = 10 feet). A **scale bar** allows you and others to measure anything on your map according to the scale. An inaccurate drawing can make implementing your design difficult. Online mapping resources makes this easier. If you choose to start on paper, use graph paper and designate one 'Box' as a certain number of feet.
- **North arrow:** This will help you determine the sunny and shady areas on your property.

STEP 3

Analyze Your Property

Identify challenges and areas of concern, as well as opportunities to highlight or preserve existing features. You can use this analysis to inform your design and make smart decisions.

Existing Site Considerations

Light

Different plants require different amounts of sunlight. The [Native Plant Trust](#) includes light and soil moisture considerations for all native plant selections.

Existing habitats

What habitats exist on your site? How can you preserve biodiversity?

Invasive plants

Invasive plants spread very quickly and can choke out other plants. The [Massachusetts Prohibited Plant List](#) identifies invasive species present in the state. There are also mobile apps, such as iNaturalist, PictureThis, FlowerChecker, and GardenGate that allow you to take a photo and identify the plant.



Soils

You can have your [soil tested](#) to understand what nutrients may be high or low in your soil.

Steep slopes or erosion

Notice areas with significant slopes. Is this causing erosion issues?

Water

Does your site experience flooding? Where does water collect? Some plant species will not tolerate frequent flooding. Some will thrive.

STEP 4

Consider Layout Options

Look at your scaled map.

- Analyze your site's challenges and opportunities. The ones you want to address will become your 'Needs'.
- From there, brainstorm design solutions that will address your needs.

Here are a few examples of design solutions to address specific needs:

Challenges	Needs	Design Solutions (How you can address the need)
Flooding at the bottom of a slope. Frequent ponding.	Reduce flooding and ponding.	Install a <u>rain garden</u> at the bottom of the slope to capture stormwater, or connect downspout to a <u>rain barrel</u> .
A section of lawn is consistently patchy and burnt/dying.	Fix unappealing patch of lawn, or eliminate it.	Listen to your lawn! Replace struggling sections of lawn with a <u>plant bed</u> .
Turf grass lawn maintenance is a pain. It's expensive, labor-intensive, and time-consuming.	Reduce cost and labor-intensity of yard maintenance.	Replace turf grass lawn with <u>lawn alternatives or plant beds</u> .
The backyard faces a main road. No privacy and the traffic is very loud.	Provide a visual and acoustic barrier from the main road.	Plant <u>evergreen trees and shrubs</u> between the yard and road. Maybe install a <u>water feature</u> to buffer the noise.
Large plant bed is mostly mulch with a few plants spaced very far apart. Weeds are popping up everywhere between plants. The yard could use some color.	Add visual interest. Decrease frequency of weed maintenance.	Plant native flowers and shrubs for a <u>pollinator garden</u> . This will add color and leave less room for weeds to grow.

Opportunities		
Leftover pile of scrap flagstone from previous project.	Find a use for the scrap / avoid buying new material.	Install a patio or walkway.

STEP 5

Consider Layout Options

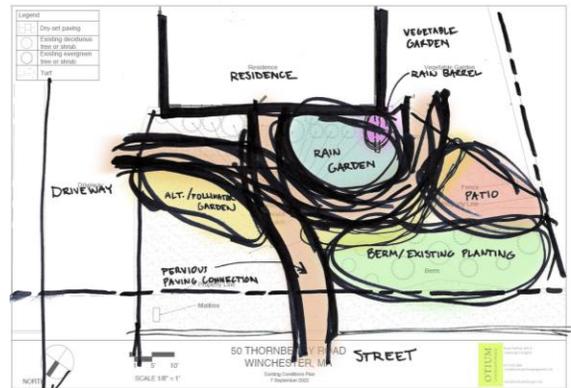
Once you have landed on some design solutions, brainstorm alternative layouts. Aim for at least 2-3 alternatives. Try different combinations in relation to door and window locations, sunlight, and surrounding areas. Don't get hung up on the details yet. Roughly sketch ideas.

Example 'Must-Have' Design Elements

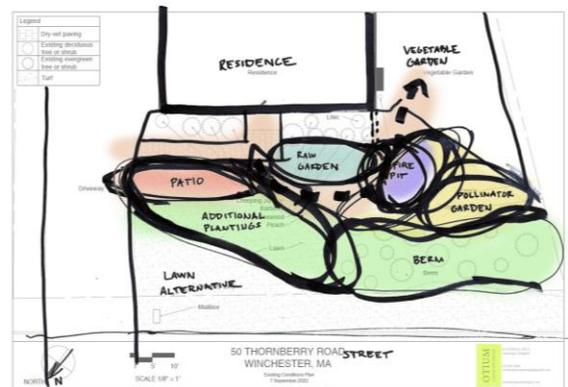
1. Rain Garden
2. Rain Barrel
3. Pollinator Garden
4. Walkway with Permeable Pavers
5. Patio
6. Lawn Alternatives

Questions to ask yourself:

- What needs am I meeting?
- Who is using this space, and for what? (Kids, pets, etc.)
- What are my 'must-haves'?
- What are my negotiable 'wants'?
- What do I like/dislike about other landscapes?
- Are there views I'd like to maintain?
- Where does the natural or artificial light come from?
- Do I want my space to feel private or public?
- Where are the access points?



Option 1



Option 2

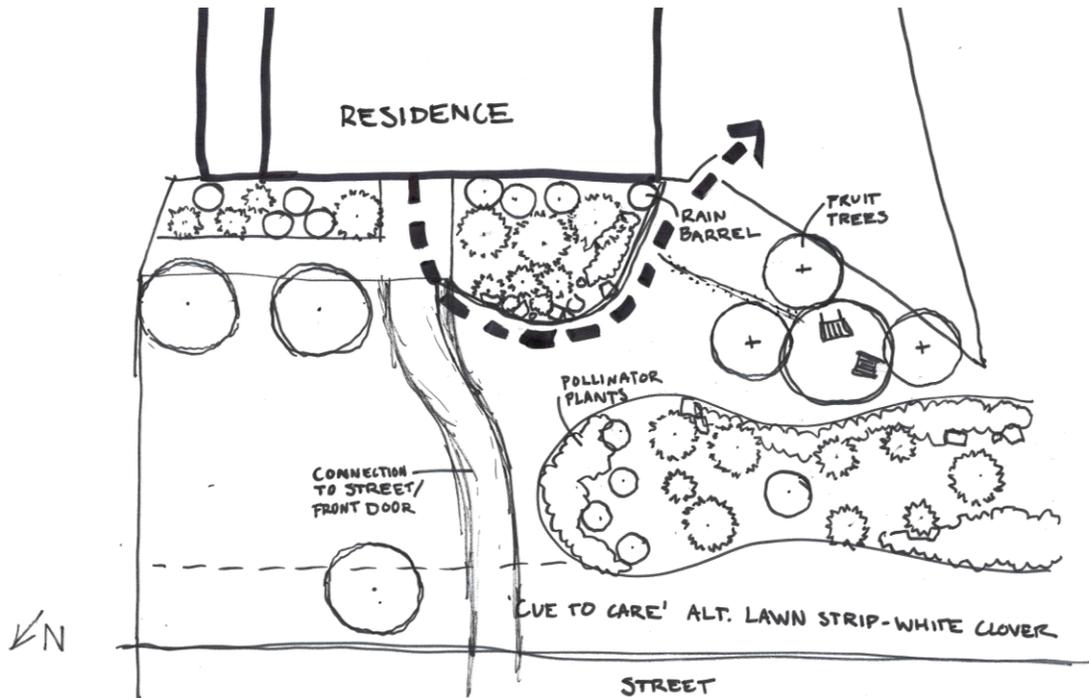


PRO TIP

Make a rough bubble diagram to determine your layout. A bubble diagram is a quick way to circle areas where potential upgrades could happen on your property. It doesn't need to be perfect. See the following page for how to refine your bubble diagram.



Combine the best elements of your layout options to create your final design. Enhance your site by preserving elements you love and adding new elements that address your needs.



Example of a final design that combines the best of two layout options.

Design Principles to Consider

There are no hard and fast rules in design. However, the University of Florida's [Basic Principles of Landscape Design](#) can help you understand how to create a pleasing landscape.

LINE: All lines in your design create spaces. Straight, curved, vertical, and horizontal lines divide your space in different ways. How do you want to divvy up your space?

SIMPLICITY: The best designs are rarely the most complex. Keep it simple.

PROPORTION: People tend to feel more secure in smaller/enclosed areas, such as patios and terraces.

REPETITION: Plants arranged in groups of three, five, and seven are usually the most visually appealing. Consider alternation or patterns to make repetition more interesting.

UNITY: Unity refers to the perceived sense that everything is connected and works together. Consider how your colors, plants, and layout work together.

Best Practices for Sustainable Landscapes



Sustainable Landscapes Aim to Meet the Following Objectives:

- ✓ Incorporate native plants
- ✓ Eradicate invasive species
- ✓ Decrease erosion and stormwater runoff
- ✓ Limit herbicide and pesticide use

Additional Actions You Can Take:

- ✓ Reduce the use of fossil fuels (through yard equipment and the construction phase)
- ✓ Use pervious hardscape materials for infiltration
- ✓ Support pollinators
- ✓ Conserve water



Best Practices for Sustainable Landscapes

Native plants are an extremely important element of sustainable landscape design. Whenever possible, use native species and eliminate invasive species.

What are native plants?

- Native plants are naturally occurring in the region.
- Because of this, they are well-adapted and likely to thrive. Find them [here](#).

Why is this distinction important?

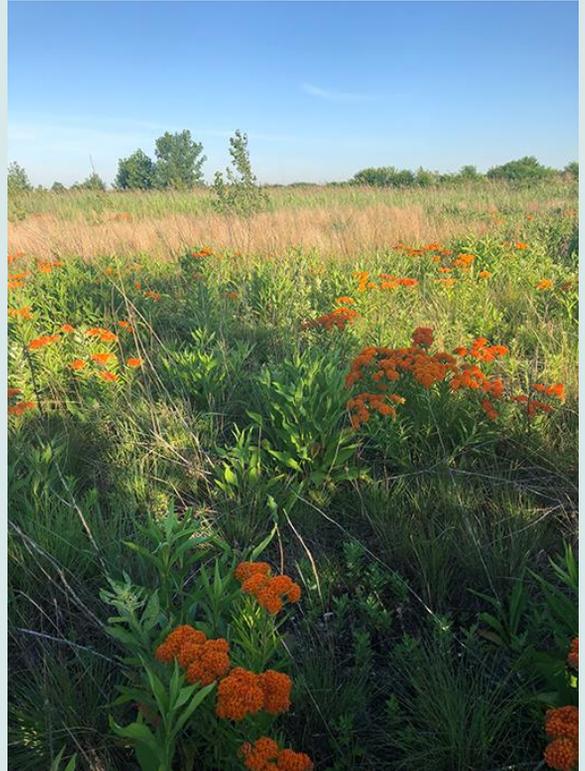
- Native plants provide [ecosystem services](#) that non-natives and invasives do not.
- Pollinators depend on native species to survive (Specifically, 'keystone' plants).

What are invasive plants?

- Invasives are both non-native and likely to cause harm to the environment. They spread rapidly and out-compete native plants.

What are ecosystem services?

- "Any positive benefit that wildlife or ecosystems provide" (National Wildlife Federation).
- Ecosystem services native plants provide: Pollination, decomposition, water purification, erosion and flood control, carbon storage, and climate regulation.



Butterfly weed, a food source for pollinators, grows on White Island, a grassland in [Marine Park, Brooklyn](#).



PRO TIP

Not all plants work for every spot. [Research your plants](#) to make sure they will thrive in the conditions of your landscape.

Best Practices for Sustainable Landscapes

What are keystone plants?

Keystone plants are native species that provide the most ecological benefit for the greatest number of pollinator species.

Basically, they are the most crucial plant species to pollinators. Native plants are great, but if you're looking to increase your garden's sustainability, start with keystone species. Read the full list for Eastern Temperate Forests [here](#).

WHAT ARE KEYSTONE PLANTS?

Keystone plants are native plants that support a significant number of caterpillars (butterfly and moth larvae). Planting keystone plants helps build complex food webs by forming the essential foundation — native plants and insects — that provide food for other organisms, directly and indirectly.

The majority of insect herbivores, like caterpillars, are specialized to feed on just one or a few host plants

Royal Maple Moth

By reviewing past data on insects and their host plants, we found that across the contiguous US, few plants support the majority of caterpillar species

In each US county we examined, certain plant genera were consistently important for supporting caterpillar diversity, sensitive species and food web stability. We call these genera **keystone plants**.

Including keystone plants in managed ecosystems will more efficiently restore insect diversity & support animals that need insects to survive

Naranjo, D.L., Tallamy, D.W. and Shropshire, K. J. 2020. Few keystone plant genera support the majority of Lepidoptera diversity. Nature Communications. Access the paper here: <https://rdu.ub.ca/KJ5>

#DNLNaranjo Share your gardens! #plantsfordivlife

Art: Eliza Cousins

For more on creating soft landings under keystone trees, visit: www.PollinatorsNativePlants.com/softlandings.html

Plant Type	Plant Genus	Sample of Common Species (not all encompassing)	# Caterpillar Species that Use this as a Host Plant	# of Pollen Specialist Bee species that Rely on this Plant
Trees	<i>Quercus</i>	White oak (<i>Quercus alba</i>), Black oak (<i>Quercus velutina</i>)	436	
	<i>Prunus</i>	American plum (<i>Prunus americana</i>), Black cherry (<i>Prunus serotina</i>), Chokecherry (<i>Prunus virginiana</i>)	340	
	<i>Betula</i>	River birch (<i>Betula nigra</i>), Sweet birch (<i>Betula lenta</i>)	284	
	<i>Populus</i>	Eastern cottonwood (<i>Populus deltoides</i>)	249	
	<i>Acer</i>	Box elder (<i>Acer negundo</i>), Silver maple (<i>Acer saccharinum</i>), Sugar maple (<i>Acer saccharum</i>)	238	
	<i>Malus</i>	Southern crabapple (<i>Malus angustifolia</i>), Sweet crabapple (<i>Malus coronaria</i>)	237	
	<i>Carya</i>	Bitternut hickory (<i>Carya cordiformis</i>), Pignut hickory (<i>Carya glabra</i>), Mockernut hickory (<i>Carya tomentosa</i>)	213	
	<i>Pinus</i>	Pitch pine (<i>Pinus rigida</i>), Eastern white pine (<i>Pinus strobus</i>), Virginia pine (<i>Pinus virginiana</i>)	200	
	Shrubs	<i>Vaccinium</i>	Northern highbush blueberry (<i>Vaccinium corymbosum</i>), Black highbush blueberry (<i>Vaccinium fuscum</i>), Hillside blueberry (<i>Vaccinium pallidum</i>)	217
<i>Salix</i>		Prairie willow (<i>Salix humilis</i>), Black willow (<i>Salix nigra</i>)	289	14
Flowering Perennials	<i>Solidago</i>	Stiff leaf goldenrod (<i>Solidago rigida</i>), Atlantic goldenrod (<i>Solidago arguta</i>)	104	42
	<i>Symphyotrichum</i>	Blue wood aster (<i>Symphyotrichum cordifolium</i>), Smooth aster (<i>Symphyotrichum laeve</i>)	100	33
	<i>Helianthus</i>	Woodland sunflower (<i>Helianthus divaricatus</i>), Small woodland sunflower (<i>Helianthus microcephalus</i>)	66	50

Best Practices for Sustainable Landscapes: Rain Barrels

Rain Barrels

Rain barrels collect stormwater runoff. They save water (and money) by allowing you to store rain for irrigation.

To irrigate plants, connect a hose to your rain barrel's spigot, or fill up a watering can.

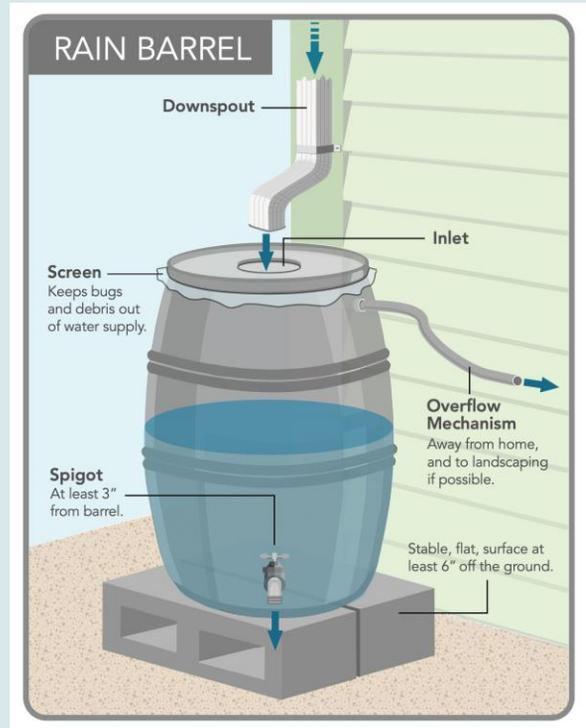
- Use collected water to water your indoor or outdoor plants.
- Prevent erosion by capturing water from downspouts.
- Barrels can be any color, **except black or white**. Black absorbs too much heat in the summer, and white can lead to algal growth via sun penetration.
- You can pressurize water by elevating the barrel off the ground. This can also make the spigot easier to access.

Capturing rain water prevents erosion and pollution.

During rain events, a high volume of water flowing down a slope can cause erosion.

As water travels, it picks up pollutants left by vehicles on driveways and roads. It also picks up chemicals sprayed on your landscape.

This water eventually reaches water bodies like ponds, lakes, and streams, carrying harmful pollutants with it.



Add rain barrels to downspouts. Hook up a hose for easier watering.

Best Practices for Sustainable Landscapes: Clean Edges

Clean Edges

It can be easy to shy away from low-maintenance, native landscaping for fear of a 'messy' yard.

A 'Cue to Care' is a clean edge that frames or contains planting areas, making them appear neater and more intentional.

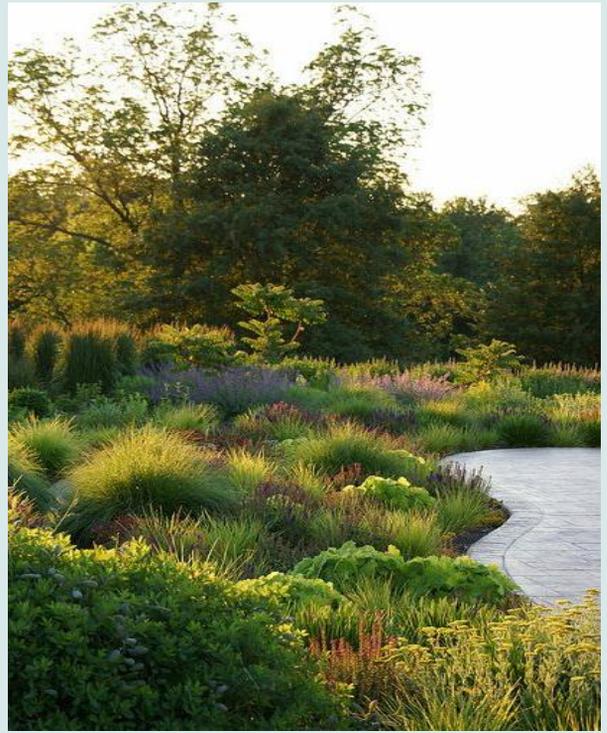
For example: A pollinator garden or rain garden might look unkempt to the average person. Buffering with a **paver band, patio, or mowed lawn strip** signals to others that your yard is being maintained. Cues to care tell others that your yard's appearance is intentional and attractive.



A lawn strip signifies maintenance and keeps the garden looking tidy.



This sign indicates that this wild garden is intentional and therefore, not unkempt.



Patio serves as a clean edge to the garden, or 'Cue to care'.



Large swaths of the same plant can provide order. Thoughtful design prevents a chaotic plant layout.



Simple log border.

PHASE 2: Implementation



Now that you have a design, you are ready to implement it. Whether you're converting a patch of lawn to a rain garden or transforming your entire property, this section provides guidance on successfully implementing your design.

Sustainable Construction Principles:

- ✓ Environmentally-conscious design
- ✓ Stay within your budget
- ✓ Conserve water
- ✓ Conserve energy (fuel and energy spent making and installing construction materials)
- ✓ Reduce waste
- ✓ Decrease stormwater runoff
- ✓ Treat water as a resource
- ✓ Value soil
- ✓ Remove invasive species
- ✓ Preserve existing native plants
- ✓ Install mostly native plants (70% native, 30% cultivar/adapted)
- ✓ Conserve construction materials: reduce/reuse/recycle

“Main goals of sustainable landscape design are to conserve water and energy, reduce waste and decrease runoff... Residential gardens should treat water as a resource, value soil, preserve existing plants, use only native/native cultivars or adaptive plants and conserve material resources.” [The Landscaping Network](#)

Sample Implementation Calendar



Now that you have determined who is doing this work and considered various design options, it's time to start the implementation phase of your project. Here is an example of a timeline you could use to help plan the implementation of a simple project that can be accomplished within one month. This example can easily be adjusted based on your needs and considerations. It is important to note that the installation process could take anywhere from one week to several months depending on project complexity.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5 Prioritize Based on Available Budget	6	7	8 Prepare a Materials List	9	10
11 Determine if Construction Equipment is Needed	12	13	14 Comply with Local Restrictions	15	16 Outline Design on Project Site	17
18	Prepare Your Site					24 Go Shopping
25 Arrange for Delivery	26	27	Install Your Landscape Design			30

Prioritize Based on Available Budget



Analyze what you can accomplish now and what needs to wait.

- ✓ Landscaping can be expensive, but it doesn't have to be. Your projects can be scaled back or modified based on your budget.

Average landscaping costs according to [Forbes \(2023\)](#):

LANDSCAPING COST BY PROJECT	
Planting trees	\$90 - \$1,650
Planting flower beds	\$800 - \$3,000
Sod installation	\$3,400 - \$5,100
Patio installation	\$2,300 - \$6,900
Fence installation	\$1,800 - \$6,200
Fire pit	\$330 - \$1,800
Retaining wall	\$3,550 - \$9,750
Deck	\$4,300 - \$12,200
Gazebo	\$5,300 - \$9,300

- Prices vary due to a wide variety of factors.
- Ways to save:
 - DIY where possible.
 - Purchase younger (smaller) plants.
 - Choose cost-effective materials.
 - Repurpose materials you already have.
- Create a phasing plan to complete the entire project.
 - What can you accomplish within the year?
 - In what order should projects be completed?
 - Can projects overlap? How long will they take?
 - Start early! Plan in the winter to prepare for spring work.

Prepare a Materials List

Based on your budget, list things you need but don't have yet. Some common examples are below.

Tools



Shovel



Metal Rake



Garden Hose



Level



Wheelbarrow



Scissors / Pruners / Loppers



Rubber Mallet
(edging or staking)

Raw Materials

Hardscape

- Paving
- Furniture

Softscape

- Plant material
- Soil amendments
- Mulch

Comply with Local Restrictions

It is crucial for Towns and the State to protect our natural environment. Each community has their own restrictions, buffer zones, and protected habitats. For more information about local environmental bylaws and sustainable landscaping, visit the [Garden Continuum](#).

Review state and local bylaws and regulations

Check out your Town's Bylaws to determine whether your plans are permitted and identify restrictions. Specific bylaws to review include:

[MA Wetlands Protection Act](#)

Local Bylaws:

[Arlington](#)

[Stoneham](#)

[Winchester](#)

Find out where underground utilities are located

Call DIGSAFE (811) before you dig. It's the law!

(This probably isn't necessary, however, if you're digging small holes with hand tools.)

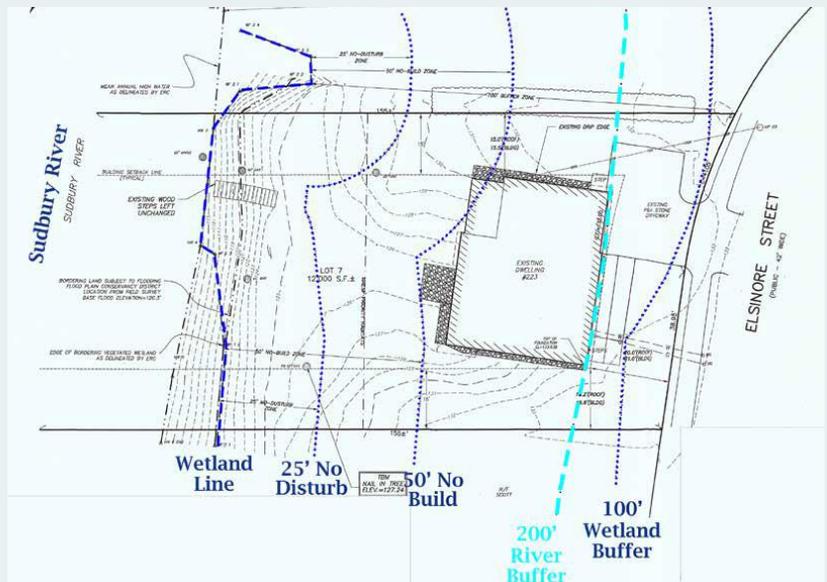


Are you in a wetland area?

If your project falls within 100 feet of a wetland resource area, including Certified Vernal Pools, or within 200 feet of perennial streams, review from the Natural Resources Commission may be required.

Check to see if your property overlaps with any of these zones:

- Wetland buffer
- Riverfront buffer
- Vernal pool buffer
- Perennial stream buffer
- No build zones
- [FEMA flood zones](#)



An example of wetland buffers shown on a site plan.

Determine if Construction Equipment is Needed

Can the work be done manually, or do you need to rent equipment or hire an operator?

Likely need rented equipment/operator:

- Removing a large lawn
- Excavating large boulders
- Tree/large shrub removal
- Delivering mulch, stone, or furniture to your site
- Delivering a large amount of plant material to your site

Likely can DIY:

- Creating a new plant bed
- Installing plants
- Installing a rain barrel
- Installing a patio or walkway
- Small shrub removal
- Delivering 5-10 plants to your site

Would it be easier to hire a professional to coordinate this construction?

If you decide to DIY, ask someone you know if they have access to the equipment you need. Ask people in your neighborhood who either own equipment or have finished a similar project.



Access restrictions

- Determine HOW rented/hired equipment will get to your yard. Do you have a fence? Will the equipment fit through a gate? Is your driveway wide enough for delivery vehicles?

Outline Design on Project Site



Translating your design from paper to real life can be intimidating. Physically outlining your area of work will help. This allows you to visualize the scale of design and make adjustments as needed.

Materials you can use to outline your project area:

- Garden hose (especially helpful for laying out garden beds)
- Wood stakes
- Spray chalk
- Landscape flags
- Rope
- Shovel (to lightly carve an edge in the soil or lawn)



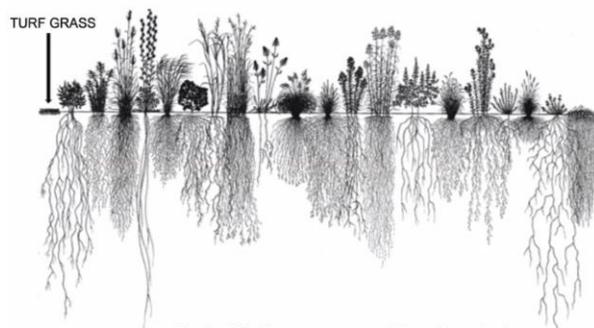
Prepare Your Site: Erosion Control



Before You Start

If you have problematic slopes, they should be managed before the rest of construction begins. Unstable slopes can cause problems over time, especially if they are constructed on. You should consider stabilizing slopes with erosion control techniques when:

- The slope is greater than 3:1 (horizontal to vertical distance).
- Water is being directed down the slope.
- Soil is loose and washes away easily (scoring/erosion is happening).
- Water is naturally draining near your house. You will want to direct water away from your house to avoid flooding and foundation issues.



Roots of turf grass compared to native plants

- Plants with fuller root systems are more effective at holding soil and stabilizing slopes. For this reason, turf grass lawns can be difficult to maintain on steep slopes.



Evidence of soil erosion. Flow of water is visibly carved out.



Securing netting over the slope and planting native grasses.

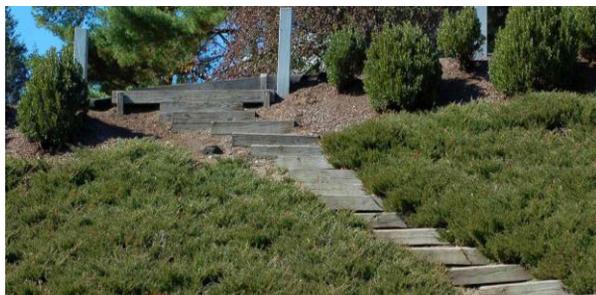


The slope reinforced by native plantings.

Prepare Your Site: Erosion Control

Stormwater runoff on slopes can create erosion issues. Techniques for protecting soil and redirecting water flow include:

- ✓ **Soil stabilizing plants.** Native plants have deep roots and provide the best long-term erosion control!
- ✓ **Riprap or a dry 'stream bed' made from on-site rocks.** Rocks can slow the flow of water downhill and hold soil in place. They can look very natural and attractive, especially when native plants are added. (Native blue fescue, salvia, and catmint planted in photo.)
- ✓ **Natural mesh or netting.** Mesh/netting can be made from jute, coir, or other biodegradable materials. They prevent topsoil from sliding. Adding native plants with deep roots helps stabilize the soil over time. Eventually the netting will decompose.
- ✓ **Retaining wall (professional installation recommended).** Retaining walls can be short or tall, but are often the solution for extremely steep slopes. Small retaining walls can be built on your own with a variety of materials. Precast concrete blocks are an easier material choice for DIY projects.



Junipers are excellent (sunny) slope stabilizers.



Planted rain garden at the bottom of a slope captures water.

Prepare Your Site: Invasive Species

Invasive species should be removed before you start planting any new plants. Plant natives as soon as invasives are removed to help prevent regrowth of invasive species. Invasives will need to be monitored and removed for a few seasons as there will still be seeds and roots in the soil that can resprout. Even if it takes a full growing season to completely remove invasive species, it will ultimately save you time. Invasive species are covered in more detail in Phase 3.

Managing invasive species organically

Herbicides should only be used as a last resort as they can run off during a storm, contaminating our waterways. Here are some alternative methods:

- **Full root removal.** Fully removing the plant with all its roots is critical to prevent the plant from sprouting again.
- **Consistent cutting.** Trimming, mowing, and weed-whacking puts a strain on plants and can deter them from growing back in full force. This needs to be done at least 8 to 10 times during the growing season to be effective at weakening invasive plants.
- **Solarization.** Let the sun do the work to overheat the ground and prevent noxious weeds from germinating.
- **Immediate replacement with native plants.** This helps prevent invasive plants from growing back in.
- If herbicides are necessary, they can be limited by cutting stems and dabbing the target plant with herbicide.



Herbicide application on cut stems.



Full root removal of barberry.

Resource: [Massachusetts Invasive Plant Advisory Group](#) provides a list of the 35 invasive species in Massachusetts with additional links and resources.

Managing invasive species with targeted herbicide

Some invasive species, such as Roundleaf Bittersweet and Knotweed, or large infestations of other invasives can be especially difficult to eliminate organically. If this is the case, limit the amount of herbicide needed by cutting the stems and dabbing what is left with herbicide. Avoid spraying plants to limit damage to surrounding plants and wildlife. If you need assistance, you can hire a licensed herbicide applicator.

If you are removing invasives within wetland resource areas or buffer zones, contact your local Conservation Commission before you begin.

Prepare Your Site: Relocate Existing Plants

Transplanting

To successfully replant either a whole plant or a divided portion of one:

- Thoroughly water the plant beforehand.
- Dig a new hole for your plant.
- Put the plant in the new hole at ground level or slightly higher.
- Backfill.
- Water, monitor, and mulch.
- Timing: Replant before the plant blooms, or after it's finished. Pick a mild day.

Relocating Lawn - Sod Rolls

- Where lawn is being removed for garden areas
- Harvest existing lawn
- Replenish other areas of your yard



Prepare Your Site: Soil Analysis



A [routine soil analysis](#) can aid in the diagnosis of plant problems and in quality plant production.

- Mail or drop-off your sample.
- One cup of dry soil in a Ziploc bag.
- **pH and nutrient recommendations are included with test results.**
- After you receive your results, you can amend existing soil as necessary. As a note, native plants likely won't need any amendments.



UMass Soil & Plant Nutrient Testing Laboratory
 Paige Laboratory, Room 203
 161 Holdsworth Way
 Amherst, MA 01003
 (413) 545-2311
soiltest@umass.edu
<http://soiltest.umass.edu>

USE THIS FORM FOR ROUTINE SOIL ANALYSIS – HOME GROUNDS AND GARDENS

Visit our website to download a copy of [Sampling Instructions for Routine Soil Analysis](#), which includes a description of routine and optional soil tests offered. Send your sample(s), completed submission form and payment to the address listed above. Enclose check payable to UMass for \$20 for each sample plus additional fees for optional tests requested below.

Main Contact	Send Copy to	Method of Receiving Results <input type="checkbox"/> US Mail (Please include \$2 per order for postage & handling) <input type="checkbox"/> Email
Name:	Name:	
Business Name:	Business Name:	
Street Address:	Street Address:	
City, State, Zip	City, State, Zip:	
Phone:	Phone:	
Email Address:	Email Address:	

LAB # (Leave blank)	Sample ID (You create this)	Approx. area Represented by Sample (Sq. ft. or Acres)	Crop Code, limit of 3 (See reverse side of this form)	Routine Analysis (\$20.00)	Organic Matter (\$6.00)	Soluble Salts (\$6.00)	Nitrate (\$8.00)
				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Order Total \$ _____.

Office Use Only	
Received	Due
Check#	PO#
Cash	Date

Please make check payable to the University of Massachusetts or "UMass"

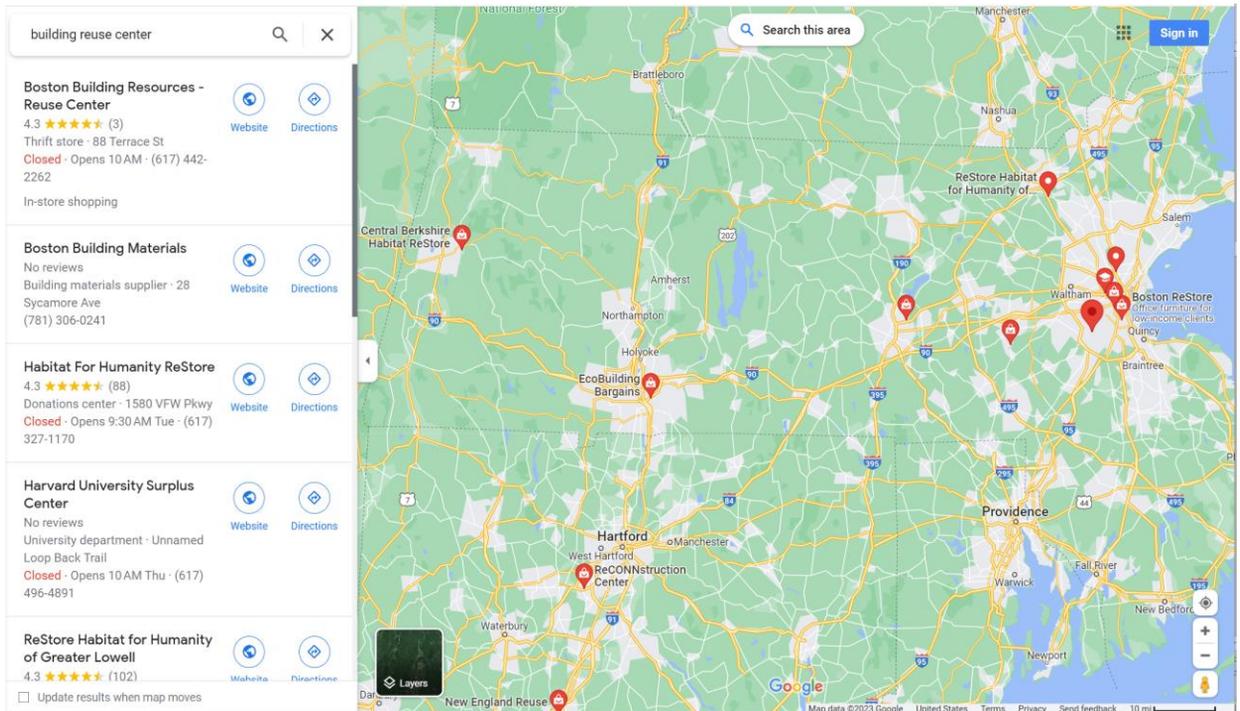
Go Shopping



As you select and purchase your materials, think about how you can limit the amount of waste produced. Do you already have materials not serving a purpose? How can you incorporate them into your landscape? Are you able to avoid buying new materials?

Securing used materials can be tricky. It might require asking around, but the payoff for free, sustainable materials is worth the effort. Here are some places to try:

- Local construction sites
- Facebook Marketplace or 'Buy Nothing' groups
- Building re-use centers
- Friends, family, and neighbors
- Yard sales/garage sales



Map showing local building reuse centers in MA.

Go Shopping



Ideally, shop for materials that are:

- ✓ Locally sourced
- ✓ Renewable
- ✓ Made from recycled materials
- ✓ Re-purposed, reclaimed, or 'freecycled'
- ✓ Pervious, porous, or permeable
- ✓ Not carbon- and energy-intensive when produced



Pallet patio (not for garden beds)



Reclaimed brick



Dig! Free rocks!



Plant swaps



Kiddie pools



Urbanite (used, broken concrete)



Urbanite plant beds



Leaf mulch

Arrange for Delivery



Designate an area for your delivered materials to be stored or staged.

- This area should be outside of the project work zone.
- Consider laying out a tarp for most materials to be delivered on.
- Make sure the delivery vehicle will be able to access this spot.
- Be prepared to cover materials if it rains before they are installed.



Install Your Design: Planting Trees and Shrubs



Before Planting

Can I plant a tree by myself?

It depends. Trees are very heavy, even small ones. Large shrubs can also be unwieldy. Moving and planting them is strenuous, so it should be a two-person job. Consider asking the nursery (or other hired professionals) to plant them for you. Tree [size](#) will be labeled by either **caliper size** (trunk diameter from 6" above ground) or **height**.



This tree looks about .5-1" caliper and could be planted by one person.

Example Tree (not for sale, just for reference)

Variety: Northern Spy
Caliper: 2.5"
Price: \$500*
*Plus delivery or loading fee



This tree is about 2.5" caliper and should be planted by more than one person.

Soil Preparation:

- Avoid creating spots where standing water exists.
- A soil test can help determine the nutrients your soil needs.

Organic Amendments:

- If needed, place throughout the area where roots will spread, not just in the hole.

Ideal Planting Time:

- FALL: September through mid-October.
- SPRING: Before buds break.
- It's important to mention that trees *can* be planted outside these windows, but establishment might require more work.

Install Your Design: Planting Trees and Shrubs



There are three ways nursery-grown trees are packaged and delivered to you. The installation process varies slightly based on how your tree is packaged.

- Nursery-grown trees are packaged in one of three ways:



Ball and Burlap



Container or Potted



Bare Root

Steps for trees and shrubs with Ball and Burlap packaging:

- Prepare a planting hole that is twice the width of the root ball.
- The root flare is the area where the trunk meets the roots. Scrape off clay and excess soil to reveal the root flare. This should be level with, or slightly above the ground.
- After placing the plant in the hole, add half the soil back in, then water the hole. Fill the rest of the hole and water again.
- Native plants planted in the right conditions require little to no soil amendments. Don't use compost – it is too nutrient-dense for native species.

Plants come in all shapes, sizes, and varieties.

Use [this guide](#) for more thorough instructions. [See here](#) for Arlington's tree planting information and recommended tree species.

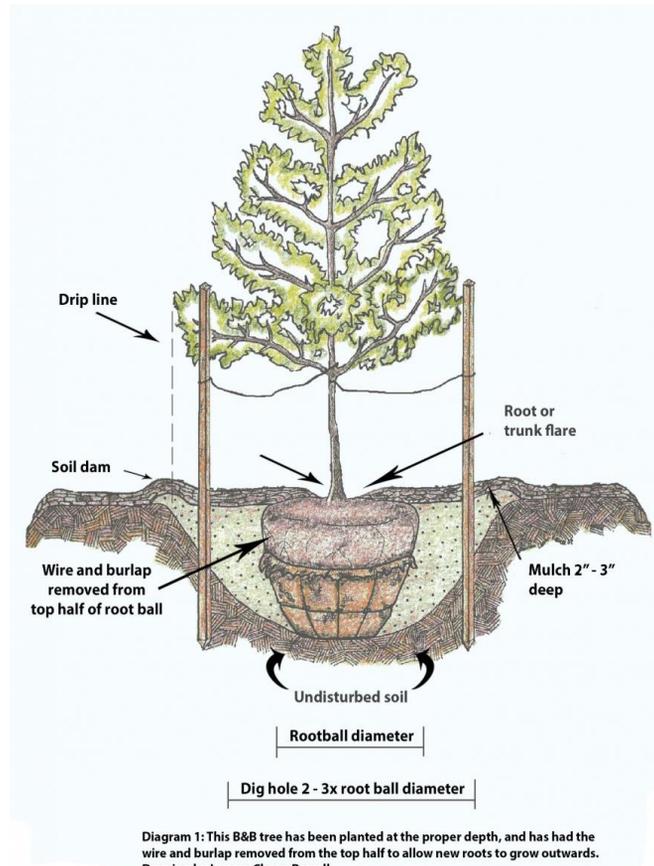


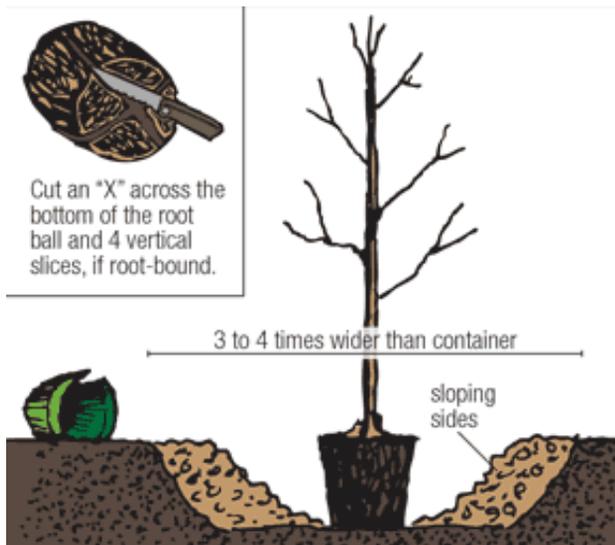
Diagram 1: This B&B tree has been planted at the proper depth, and has had the wire and burlap removed from the top half to allow new roots to grow outwards. Drawing by Lauren Chase-Rowell

Install Your Design: Planting Trees and Shrubs



Steps for installing trees and shrubs with Container packaging:

- Carefully remove container.
- Gently break up roots to encourage growth (use knife if roots are tightly packed).
- Dig a hole 2-4x wider than the container.
- Place the plant in hole. Keep trunk base/top of roots level with ground.
- Fill the hole halfway with soil. Water.
- Fill the rest of the hole. Water again.



Root-bound/pot-bound plant.
The roots ran out of space!
Break them up before planting.



PRO TIP

Lay a shovel across your hole to test the depth. The **ROOT FLARE**, or top of your plant's roots, should be level with or barely above the ground.

Install Your Design: Planting Trees and Shrubs



Steps for installing Bare Root trees and shrubs:

- Bare root trees and shrubs are not contained in soil. However, you can use a similar installation process as plants with Ball and Burlap or Container packaging.
- Roots *must* be kept moist. Bare roots are more fragile than those contained in soil.
- Make sure to “root wash” your plants, meaning wash the soil off of the roots. This allows you to remove heavy clay soil and non-native soil that the tree might have been packaged with and ensure that you plant at the proper depth.



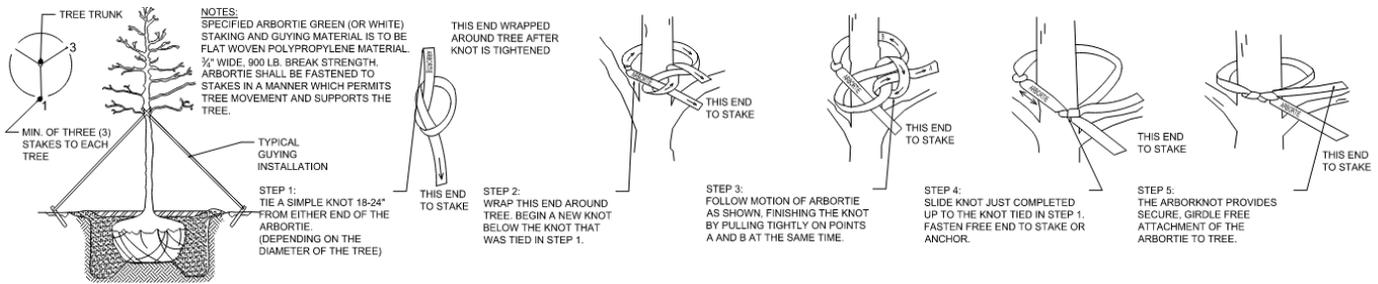
Root washing



Install Your Design: Tree Staking and Mulch

Tree Staking

- Tree staking is not always necessary, or even a good idea. It may not be necessary unless your site is windy and there's a high chance that the tree could fall over.
- If you do use stakes to stabilize your tree, remove them after one year.



Mulch

Mulch retains moisture and, when spread to the proper thickness, prevents weeds from germinating. When spreading mulch:

- ✓ Keep mulch 1-2" AWAY from the trunk.
- ✓ Spread a 2-4" layer of mulch in a saucer shape.



Avoid creating a mulch "volcano."



Example of a proper mulch saucer.

Install Your Design: Watering

Watering during the first year is crucial to establish new plants.

How To Water

- Try to keep soil moist, but not soggy. Plants will rot if consistently exposed to too much moisture.
- *When?* Early morning or evening to retain moisture.
- *Where?* Water the mulch surrounding your plant, not the leaves. Water from the trunk out to the edge of the branches.
- *How?* **Slowly** and **thoroughly**.
- If the ground is dry to the touch, your plants need water.
- Water during any dry periods for the first two years after planting.



Watering Schedule

- ✓ Immediately after planting.
- ✓ The day after planting.
- ✓ Daily for the first week.
- ✓ Twice a week for the next month or so.
- ✓ Gradually decrease the frequency after that.

SAMPLE WATERING SCHEDULE						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7 PLANTING DAY	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3



PRO TIP

If your garden is dry to the touch, your plants need water. Water slowly, and thoroughly. Water at the plant's base, *not* the leaves.



Install Your Design: Rain Gardens



Rain gardens are depressions in the landscape designed to capture and infiltrate stormwater. They reduce the amount of stormwater runoff carrying pollutants into water bodies. **The most effective rain gardens are planted with native species, as they have deep roots that can soak up water efficiently.**

Benefits:

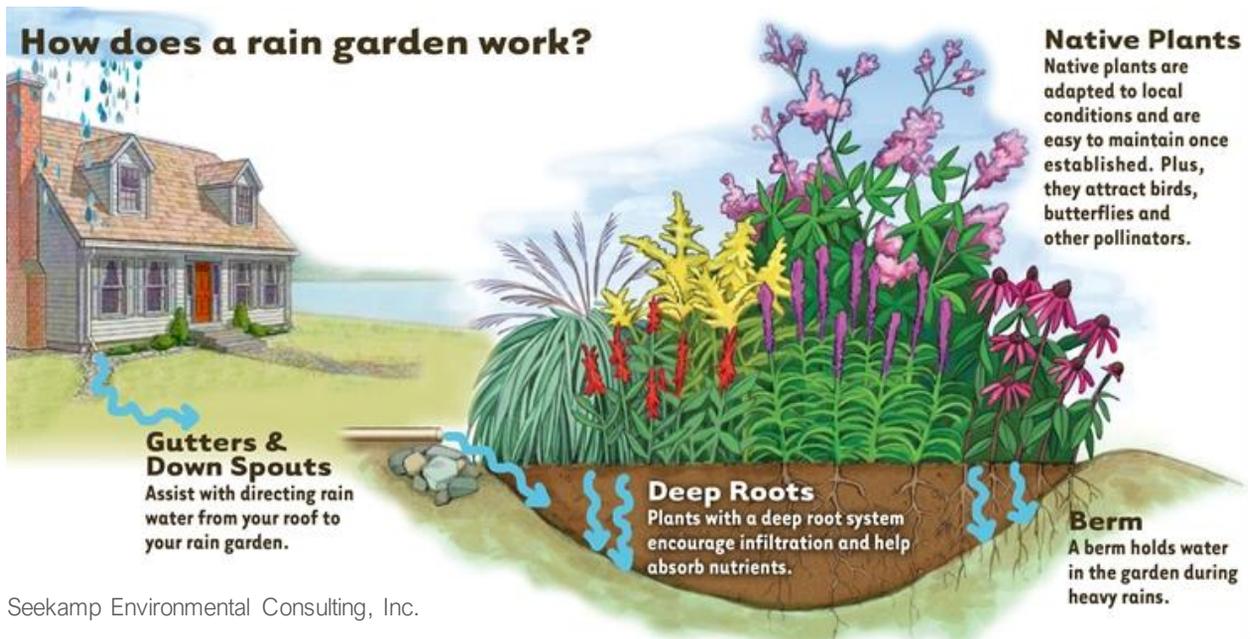
- Prevents erosion and diverts stormwater runoff.
- Plants absorb water and filter pollutants.
- Provides food and shelter for wildlife, especially if 'keystone' plants are used, which will provide the most benefit.

How To Build One:

1. Lay out proposed rain garden. Use a hose or stakes to outline the area. Generally, it should be at least 10' from buildings/structures.
2. Dig a shallow bowl-shape about 6-8" deep (relatively). Deepest in the middle, with slightly sloped slides.
3. If you're working on a slope, build a berm on the downhill edge to help hold stormwater.
4. Add native species (water until established).
5. Mulch.



The down-slope edge of this rain garden is bermed to hold water like a bowl



Creative Use of Spaces



If you don't own the landscape around you, you can still make a difference (with permission).

Low-Impact Landscaping



Window Boxes



Deck / Patio / Balcony Containers

Low-Budget, Low-Effort Wildflower Garden

Wildflower seed packets can cover a large area at a low price.

How: The easiest way is to just sprinkle seeds on the ground! Most will germinate this way.

Amount	Coverage
1/4 Pound	250 - 500 sq. ft.
1/2 Pound	500 - 1,000 sq. ft.
1 Pound	1,000 - 2,000 sq. ft.
5 Pounds	5,000 - 10,000 sq. ft.
10 Pounds	10,000 - 25,000 sq. ft.
25 Pounds	1/2 - 1 acre
50 Pounds	1.5 - 2 acres

[American Meadows](#) seed mix coverage chart



Native northeast wildflower seed mix



PRO TIP

Purchase wildflower seeds from your local nursery or an online supplier for a fast-growing, cost-effective garden!

PHASE 3: Maintenance



Whether you have implemented a new landscape project or want to maintain your existing landscape, this section provides information, tips, and images that will help you nurture your landscape over time.

Your Landscape is Constantly Changing

An installed project is not the final product; your landscape will change and grow. There are multiple variables that will affect your plants and lawn's survival: drought, flooding, changing temperatures, and extreme weather events will change a landscape's needs. Phase 3 offers low-maintenance practices to care for your landscape's needs.



Maintenance on the high line in New York City. Photo Credit: Steven L. Cantor

Multifamily, Mixed-Use, and Rental Properties



If you don't own the landscape around you, you can still make a difference.

- Ask the owner of your residence about hiring landscapers who implement sustainable practices.
- Generate buy-in from the owner. If you have ideas, recommend them.
 - Proper maintenance can prevent potential plant replacement costs.
 - A beautiful landscape increases property value and curb appeal.
 - Plants create privacy/screening.
 - If you don't have much horizontal space, think vertical (hanging plants, container plantings, window boxes, trellises).
- Communicate with other residents to help build support for your ideas.



Sample Seasonal Maintenance Schedule

Some maintenance activities can be done any time, and some are time-sensitive. Some even need to be done throughout the entire growing season. Time-sensitive projects are listed below. Use the links to access related information throughout the handbook.



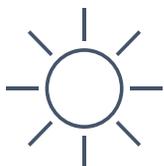
WINTER

1. [Planning for the growing season](#)
2. [Determining if a maintenance contractor is needed](#) (contact early!)



SPRING

1. [Spring cleanup](#): Pruning, deadheading, picking up leaves
2. [IPM](#) (Integrated Pest Management)
3. [Invasive plant removal](#)
4. [Composting](#)
5. [Lawn topdressing](#)
6. [Mulching](#)
7. [Weeding](#)
8. [Planting](#)



SUMMER

1. [Lawn mowing](#)
2. [Watering new plants](#)
3. [Weeding](#)



FALL

1. [Fall cleanup](#)
2. [Watering new plants](#)
3. [Lawn mowing](#)
4. [Planting](#)
5. [Composting](#)
6. [Weeding](#)

Watering



How much water do my plants need?

While the amount of water you need can vary greatly based on your soil, the general recommendation is **1 inch of water per week**.

When installed correctly, drip irrigation is one of the most efficient ways to distribute water across your landscape. Wi-Fi irrigation systems can be a great way to monitor and control the amount of water you use. They automatically adjust based on the weather.

If you do not have an irrigation system, **rain gauges** show how much water your landscape is getting from rainfall.

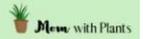


DIY rain gauge to measure rainfall (mason jar and ruler)

If less than 1 inch of rain falls per week, consider supplemental watering to keep new plants vigorous.

Watering guidance: deep, less frequent watering is more effective than shallow, frequent watering.

Why you should water trees deeply



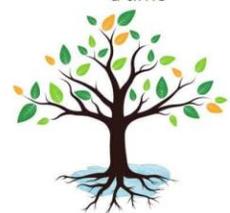
Less frequent, watered deeply

VS

Watered often, little amounts at a time



Water has a chance to drain and soak into soil which trains roots to grow down



Soil remains soggy so the roots remain shallow



When watering plant beds, micro-drip irrigation can be highly effective. These systems allow you to install mini emitters with various drip speeds, aimed directly at plant roots.

Integrated Pest Management



Integrated Pest Management is an environmentally sensitive approach that uses a combination of practices that account for the target pest species, their life cycle, and how they interact with the environment.

IPM requires you to know the pest species you are attempting to control and target that species.

What is a pest?

A pest can be a plant species (weeds, invasives) or animal/insect species negatively impacting your landscape. IPM applies to troublesome plants or critters. We will be discussing control methods for all types of organisms.

What are pesticides?

'Pesticides' are substances meant to control pests. Pesticides can be herbicides or insecticides.

- Herbicides are intended to control plant pests (weeds)
- Insecticides are intended to control insect pests

Pesticides are used as a last resort, and only after a problem occurs.

Overzealous use of pesticides will kill your target but will also harm others and the environment in the process.



PRO TIP

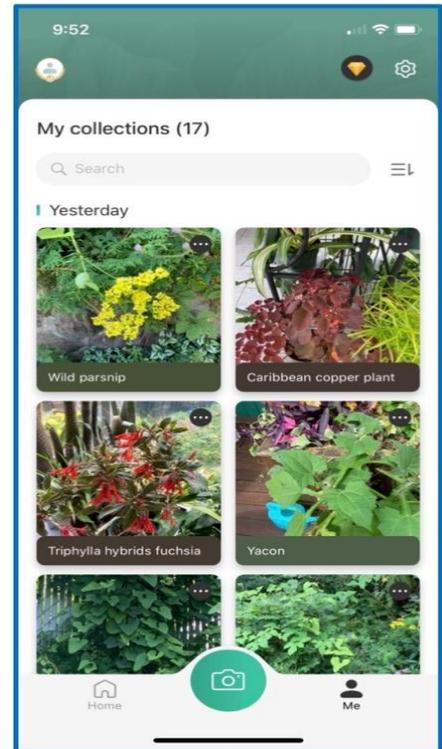
If your plants are being eaten, they're part of the natural ecosystem.

Integrated Pest Management

IPM requires some knowledge of the species you're dealing with. Online tools can help you identify pests (as well as non-pests) around you.

Take/upload a photo of the plant/insect and learn what it is!

- Recommended mobile apps for identifying pests/weeds:
 - [Picture Insect: Bug Identifier](#) (Insects)
 - [Google Lens](#) (Plants and insects)
 - [iNaturalist](#) (Plants and insects)
 - [Seek by iNaturalist](#) (Plants and insects)
 - [PictureThis - Plant Identifier](#) (plants)
 - [PlantNet](#) (Plants)
 - [Mass Audubon](#) (Insects)
 - [UMASS Resources](#) (Insects)
 - Ask questions in a gardening Facebook group!



Examples of garden insect pests in Massachusetts



Asian long-horned beetle (Invasive)



Aphids



Spotted lantern fly (Invasive)



Bagworm



Emerald Ash Borer



PRO TIP

You can use [Irish Spring soap](#) to repel unwanted animals. There are plenty of [easy ways to prevent deer damage](#).

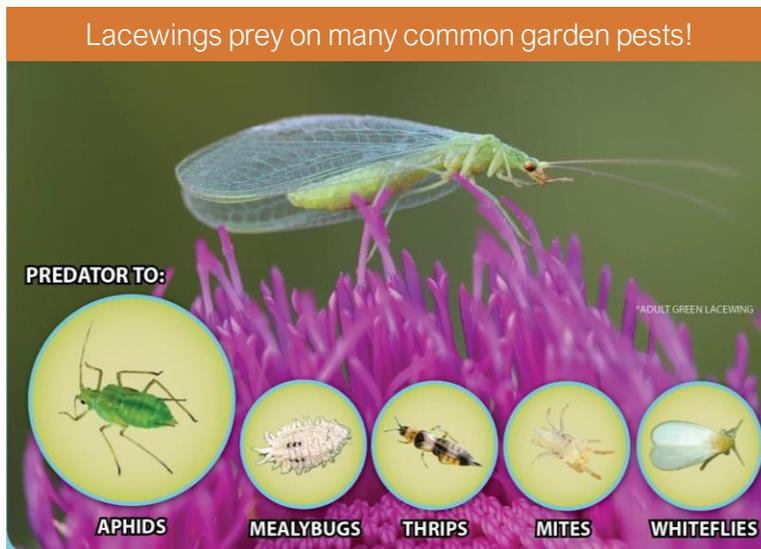
Integrated Pest Management

A five-step approach while conducting IPM



There are 3 methods of control:

1. Biological (using the pest's natural enemies)
2. Chemical (pesticides/natural solutions)
3. Mechanical / Physical



Integrated Pest Management: Biological

Biological controls = Weaponizing your pests' natural enemies.

This means using natural predators, or plants that deter pests. Some research on your pest will be required to determine your weapons.

- **Attract birds (natural enemies of many insect pests)**
 - Birds eat problematic insects. Keep a healthy balance in your landscape ecosystem by attracting creatures that control pests.
- **Attract beneficial insects like these (not an exhaustive list):**



Ladybugs eat aphids, mealybugs, mites, scales, and whiteflies (all pests).



Praying mantis eats grasshoppers, moths, beetles, and flies.



Green lacewings eat mealybugs, thrips, mites, and whiteflies.



Tomato hornworms eat tomatoes. **Wasps** are parasitic towards the worms. They lay their eggs in the worms, killing them.

How to attract?

Plant dill, fennel, coreopsis, cosmos, marigold, and other plants. They want pollen and your pest bugs.

How to attract?

Plant dill, fennel, raspberry, tall grasses, marigold.

How to attract?

Plant dill, verbena, coreopsis, cosmos, oregano.

Many pests dislike strong smells. You can plant herbs or sprinkle spices on the ground.

- **Spices to Deter Pests**
 - Sprinkle cinnamon, cayenne, paprika, turmeric, bay leaves, ground coffee, or citrus peels around affected plants.
- **Plantings to Deter Pests**
 - Plant mint, basil, lavender, rosemary, lemongrass, marigolds, lemon balm, (other herbs) - especially deterrent of mosquitos and flies.



If you can help it, leave spiders alone. They eat pests in your house and are rarely dangerous.

Integrated Pest Management: Chemical

Chemical IPM *limits harm* to non-targets: other species, humans, and the environment. Pesticides (herbicides and insecticides) are used only when necessary – NOT as a preventative measure.

Chemical solutions for insect pests:

- Boric acid
- Soap spray
- Milky spore (grubs)
- Neem oil
- Diatomaceous earth (slugs and snails)
- White vinegar
- Bait stations (Can use very small amounts of pesticides in targeted areas)

DIY a solution at home or find it at your local hardware store or garden center.



Dish soap spray



Diatomaceous earth



Herbicides are a last resort. They can be applied directly or wiped onto cut stems.



Neem oil

Integrated Pest Management: Mechanical/Physical

There are **physical** barriers you can implement to prevent weed growth or animal grazing.



Mulch (weeds)

- A 2-4" layer of mulch blocks sunlight from penetrating underneath the mulch. Seeds need sunlight to germinate, and mulch prevents weeds from germinating. If weeds begin emerging through your mulch layer, you probably need to add additional mulch to that area to block sunlight. However, do not exceed a mulch thickness of 4".



Soil solarization (6-8 weeks) (weeds)

- Water the soil, then cover the area with clear plastic. The plastic will trap the sun's heat, which will heat the ground underneath the plastic to a temperature that will kill pests (weeds and insects). You can remove the plastic after 6-8 weeks for pest-free soil.



Fencing/barriers/screens (animals)

- This method is specific to non-plant pests like rabbits or deer. Physical barriers don't harm animals, they just prevent them from entering an area. Deer can jump higher than most fences, so a wire 'roof' might be needed if your plants suffer from deer damage.



Cultivating soil (weeds)

- Cultivating will not guarantee all weeds are killed, but the churning motion does interrupt the germination process and bring weeds to the surface.



Hand-pulling (pull weeds or insects)

- Often the most effective way to remove weeds and invasive plant species. Fully removing a plant's roots from the soil ensures it will not continue to grow. The photo on the left shows a full root removal of invasive barberry. You can also hand-pick problematic insects and submerge them in soapy water.



Weed filter fabric (weeds)

- Filter fabric (not plastic) has pros and cons. It is effective in the short-term by preventing sunlight from reaching weeds. However, it might prevent organic matter from feeding plants. The fabric can fail over time, so this is not the best long-term solution.

Invasive Plant Removal: Common Invasive Species

To nip invasive species in the bud, you need to first identify them and then determine the most effective removal method. Then, you can replace them with [native alternatives](#).



Burning bush

An extremely common ornamental shrub. This might have been planted purposely in your yard or a neighbor's. Its leaves turn bright red in the fall. Try native red chokeberry, ninebark, or viburnum instead.



Black swallow-wort

Competes with our native milkweed, which monarch butterflies are dependent on. The roots are prone to snapping at the base of the plant, so removal requires digging up the roots. See [this fact sheet](#) for removal tips.



Garlic mustard

Luckily, this plant is very easy to pull out. Visit the [East Multnomah Soil & Water Conservation District's website](#) for removal tips.

Invasive Plant Removal: Common Invasive Species



Glossy buckthorn

Has glossy leaves and dark bark with light spots. If it hasn't been cut, it is very easy to take out. See the [Ecological Landscape Alliance's fact sheet](#) for removal tips.



Invasive honeysuckles

Loose roots are easy to remove. Invasive honeysuckles are shrubs, whereas the native species is a vine. See the [Ecological Landscape Alliance's fact sheet](#) for removal tips.



Roundleaf bittersweet

Strong vine with bright orange berries that strangles trees and, if left unchecked, will eventually pull them down. Birds eat the berries, which spreads the seeds. See the [Ecological Landscape Alliance](#) for removal tips.

Pruning

- **Why prune?**
 - Maintain shape and size
 - Encourage flowering
 - Remove dead stems
 - Discourage pests
- **Spring cleanup**
 - **Do not start before late April-May.** This is important for a few reasons: Pruning/picking up debris too early disturbs natural life cycles of pollinators. It also can stress your plants!
 - Prune summer bloomers in early spring
 - Prune spring bloomers right after flowering
- **Deadheading = Removing faded or dead flowers**
 - Ensures continued blooming throughout growing season
 - Pinch or cut below the flower, but above the first set of leaves.



NOTE: Process varies based on species. Know the plant you're working with first.

Tools

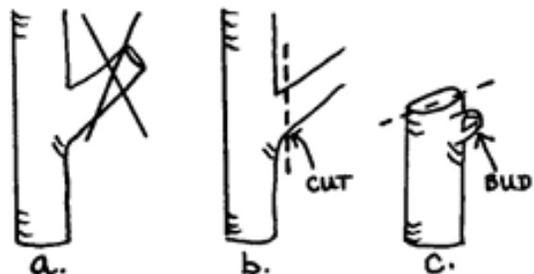
Hand shears – use to cut branches up to 3/4" in diameter



Lopping (long-handled) shears – use to cut branches 3/4" – 1 1/2" in diameter



Pruning saw – use to cut branches larger than 1 1/2" in diameter



- Do not leave stubs!**
- Cut cleanly, back to a main supporting stem.**
- Head back to just above a bud; cut on a slight angle.**

Weeding

What is a weed, anyway?

According to the U.S Bureau of Land Management, “in the broadest sense, it is any plant growing where it is not wanted. Weeds can be native or non-native, invasive or non-invasive, and noxious or not noxious.”

Weeds are just plants that grow where you don't want them to.

They will need to be managed throughout the growing season. A one-time removal will not prevent more from growing in, unfortunately.

Best way to remove weeds: Manual Pulling

- Easiest after rain
- Wear gloves
- Use the right [tools](#)! Don't strain yourself.



Stand-up Weed Puller



Handheld Weed Puller



Hori Hori Garden Knife



Weeder and Cultivator



Steam Kills Weeds!
This is less practical and needs to be done every few weeks, but it does work.

Weeding

Food for Thought

Reconsider what you classify as a weed.

Some plants commonly considered weeds are edible!

Of course, if you suspect weeds have been exposed to herbicide use, ***do not eat!***

Natural Pest Repellant

Many weeds are natural pest repellants (especially ones with strong fragrances).

All weeds shown below are edible, and there are many more. Find out what plants are growing in your yard before removing them. Many 'pest' animals feed on weeds as well.



Dandelion



White Clover



Purslane



Henbit



Purple Dead Nettle

Compost

Composting: A process that converts organic materials into a nutrient-rich soil amendment or mulch through decomposition.

- Reduces waste
- Minimal costs
- Contributes to healthy soil and plants
- Nature’s way of recycling

What You Can Compost

What You Can Compost at Home	What to Avoid Composting at Home
Nitrogen-Rich Material (“Greens”)	Meat, fish and bones
Food and vegetable scraps	Cheese and dairy products
Most grass clippings and yard trim	Pet waste and cat litter
Coffee grounds and paper filters	Produce stickers
Paper tea bags (no staples)	Fats, oils and greases
Eggshells (crushed)	Glossy paper
	Treated or painted wood
Carbon-Rich Materials (“Browns”)	Aggressive weeds/weeds with seeds
Dry leaves	Diseased and pest-infested plants
Plant stalks and twigs	Compostable food service ware and compostable bags*
Shredded paper (non-glossy, not colored) and shredded brown bags	Cooked food (small amounts are fine)
Shredded cardboard (no wax coating, tape, or glue)	Herbicide treated plants
Untreated wood chips	Dryer lint



Plastic outdoor compost bin



Kitchen compost bin

Lawn Topdressing with Compost

1. Fertilize lawn a few weeks prior.
2. Mow and rake/thatch the day prior.
3. Spread a thin layer (1/4" - 1/2") of compost.
4. Avoid walking on/mowing the lawn for a week.

Topdress in the spring. It adds nutrients to the soil, increases moisture retention, soil health, and builds stress/disease resistance.



Compost pile



Topdressing with compost



Mulch

There are many types of mulch to choose from, bark mulch being the most common. Price points and availability vary. Some types you can even make at home for free! Avoid DYED bark mulch.



Pine Needle Straw



Natural Bark Mulch



Compost



Ground Cover



Grass Clippings



Leaf Mulch



Straw



Aged Sawdust

How much mulch?

Unless you buy individual bags, mulch is sold in cubic yards.

To calculate how many cubic yards you need:

- Total length x total width (of planting area) x 3" (depth of mulch) = cubic feet of mulch needed.
- Cubic feet / 27 = cubic yards required.
- Add 20% to account for compaction. There are free mulch calculators online as well!

Spreading Mulch

1. Clean up beds and weed.
2. Water plants.
3. Spread mulch 2-4" deep.

Remember:

- Best time to spread is late spring.
- Don't bury plants.
- Keep 1-2" away from base /trunk of plants.

Mulch Calculator

Mulch Area: Rectangle ▼

Length = 5 ft ▼

Width = 20 ft ▼

Depth = 3 in ▼

Optional

Pricing in: Bulk Bags

\$ 40.00 price per cubic yard ▼

Clear Calculate

Answer:

Cubic yards = 0.93 yd³

Cubic feet = 25 ft³

Cubic meters = 0.71 m³

Cost = \$37.20
at \$40.00 per cubic yard

Maintenance Tools You'll Need

Using the right tools makes maintenance more efficient and less physically taxing. Consider electric and cordless equipment when possible.

Electric Equipment



Battery-powered
Leaf Blower



Lawnmower or
Thatcher



Weedwacker



Chainsaw



Hedge Trimmer

Manual Equipment



Loppers



Shears



Hand Pruner



Wheelbarrow



Push Spreader



Cultivator



Hose



Push Mower



Leaf Rake



Metal Rake



Hand Trowel



Gloves

Work smarter, not harder...

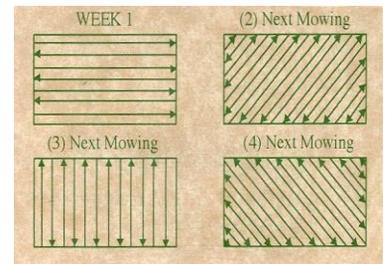
Protect yourself while doing yard work.

- Use knee pads.
- Wear socks, gloves, and closed-toe shoes.
- Stay hydrated and take breaks.
- Stay in the shade when possible.
- Don't over-exert yourself.

Better Lawn Care

Turf Grass Lawn Mowing Schedule

- Determine frequency by plant height, not a set schedule.
- Never remove more than 1/3 of the grass blade in a single mowing.
- Mow in alternating patterns for healthier/stronger grass.



Keep Mower Blades Sharp

Dull blades = Brown, injured, shredded grass

Sharp blades = Clean-cut, healthy grass

Watering

Generally: 1 hour, 1-2x per week between 4-6AM, or 4-6PM

(Lawn needs 1" of water/rain per week)

Test: A tuna can is 1" tall. Put an empty one on your lawn and turn your sprinkler on. See how long it takes to fill the tuna can. That's how long you should water your lawn for.



Lawn Edges: Clean edges between lawn and adjacent materials provide a tidy appearance.

Use manual or motorized tools to edge your lawn.

Edge Tools



Manual Lawn Edger



Electric Edger and Trencher



String Trimmer

Edge Materials



Brick/Pavers



Metal Edging



Wood Posts

Better Lawn Care

Lawn Chemicals

Open space for kids and pets to play is great, but over time lawns can become an issue if fertilizers and herbicides are used. Chemicals used on lawns turn into harmful runoff that pollutes our water bodies. Lawns are also contributing to [decreasing biodiversity](#). Alternative lawn care can reduce the negative environmental impacts of lawns.

Naturally Replenish Soil Nutrients

Loss of nutrients is why imported chemical fertilizers are often used. Instead:



Rake compost across your lawn. This is typically done in the spring to help promote healthy soils all season long.



Make DIY mulch out of lawn clippings or leaves.

- Run over leaves with a lawn mower.
- Then, either:
 - Put the leaves and lawn clippings in a pile and use them later as mulch for garden beds.
 - Keep leaves where they are. They'll decompose and fertilize your lawn.



BEST PRACTICE

Mt. Auburn Cemetery in Cambridge, MA has a no-rake policy for leaves. Instead, they chip and spread leaves on the lawn. At first, the organic content of the soil was 2-3%. After 10 years, it's 8-10%.



PRO TIP

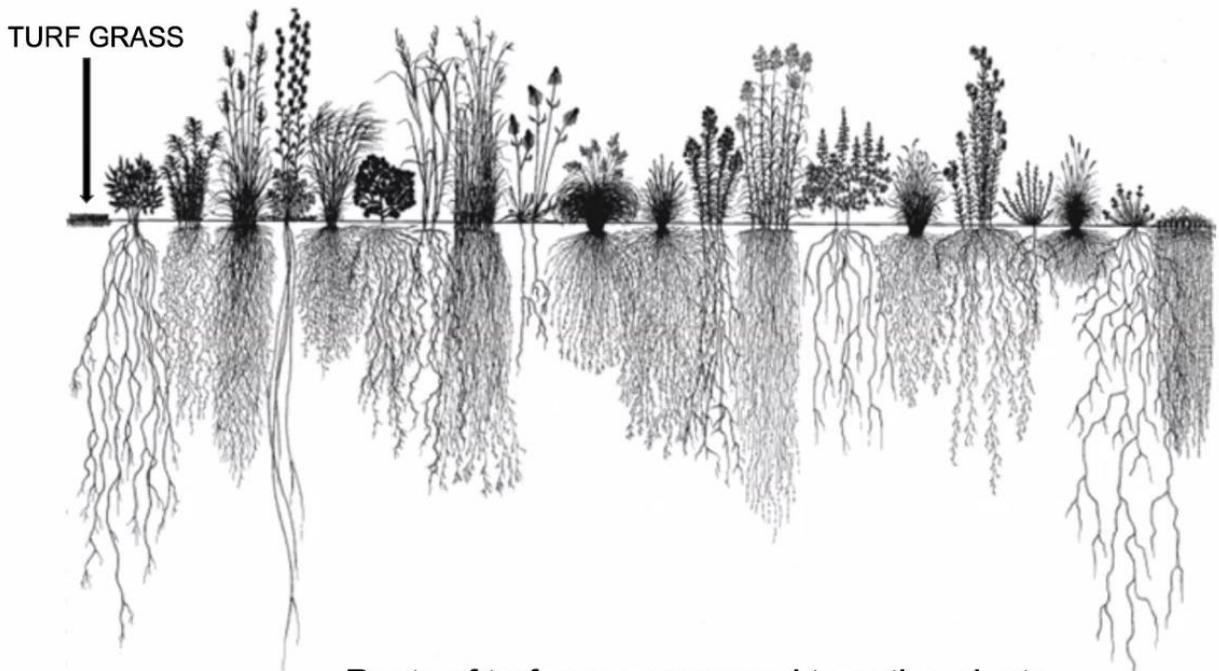
Clover is not the enemy! Naturally occurring species, like dandelions and white clover may have unexpected benefits, like keeping rabbits away, fixing nitrogen, providing nectar and pollen for bees, and being evergreen during times of drought.

Better Lawn Care

A Case for Lawn Alternatives

Root depth of a plant is important for a number of reasons. **Turfgrass is not drought-resistant** and requires frequent watering. It has shallow roots that cannot stabilize soil or reach water stores.

Deep roots contribute to soil fertility – they give back and replenish the soil. Turf grass does not contribute in this manner due to its extremely shallow root system.



Roots of turf grass compared to native plants

The Wonder Underground

Prairies look a bit like upside-down forests because so much of them is found underground. Prairie plants have extensive root systems that make them extremely drought resistant, unlike turf grass, which means that prairies excel at building rich soil, storing carbon, reducing erosion, increasing water quality, and minimizing flooding. States like Illinois owe their agricultural success to that rich soil. Due to the proliferation of agriculture in the United States, however, the tallgrass prairie is the most endangered ecosystem in North America. (Chicago Botanic Garden Exhibit)

Better Lawn Care: Lawn Alternatives

The traditional lawn does more harm than good. Fortunately, there are many alternatives that will be healthier for the environment and your pockets.

Clover (red, white)

Drought tolerant, beautiful flowers that attract pollinators and can be mowed or unmowed. Grows densely and fills in bald patches. Different varieties of clover have different appearances.



Wild Strawberry

Has white flowers and does not require mowing or watering once established. Not easily trampled. Edible lawns provide food and habitat.



Moss

Moss lawns are better for shaded, damp areas. They require no mowing and are pest-resistant. Great for slopes. They do not need watering after establishment. Most mosses prefer acidic soil (5.0-5.5 PH), so testing your soil first might be a good idea.



Better Lawn Care: Lawn Alternatives

Creeping Thyme

Evergreen, drought-tolerant, no mow, flowers in late spring/early summer, walkable, spreads well, edible as an herb, and there are a few lawn varieties!



Pearl's Premium Grass Seed

Drought tolerant, requires no watering, mow monthly (or so), thrives in sun or shade.



Low-Mow Fescue

Low or no mow, drought tolerant. Different species of fescue have slightly different characteristics.



Better Lawn Care: Lawn Alternatives

Try Before You Buy

Next time you're in Concord, MA, swing by one of the town's three [Lawn Alternative Demonstration Gardens](#).

See for yourself what an alternative to turf grass might look and feel like. Each lawn is planted with a different plant species. You can still achieve the green look with lawn alternatives.

Check out Concord's [blog](#) tracking the lawns' performance.

<p>Pennsylvania Sedge <i>Carex pensylvanica</i></p> <p>Watering: Minimal once established</p> <p>Maintenance: 1x year (June/July)</p> <p>Height: 5 inches</p>   	<p>Green Carpet/Rupturewort <i>Herniaria glabra</i></p> <p>Watering: Minimal once established</p> <p>Maintenance: No mowing</p> <p>Height: 3 inches max</p>   	<p>Micro-clover Fescue Mix <i>Microclover™ Black Beauty Blend</i></p> <p>Watering: Minimal once established</p> <p>Maintenance: 1-2x month</p> <p>Height: mow to 3-4 inches</p> <p>Used by the New York City Parks Department</p>    
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Better Lawn Care: Easy Options

Not Ready to Switch? That's Okay!

If you're not ready to commit to an alternative type of lawn, there are other things you can do to be more sustainable:

- Carve out mulch beds for planting areas. Especially where your lawn is burnt or failing, add a bed instead.
- When weeds pop up in your lawn, consider leaving some of them alone. Consider why and all weeds should be eradicated from your lawn. Who are you doing this for?

Clover often sprouts in patches where turfgrass has failed. Clover is a naturally-occurring, drought-tolerant plant that fills in your lawn. What's so bad about that?



A diverse pollinator meadow provides more visual interest and ecological value than traditional turf grass. Beauty is a matter of perspective. From a sustainability perspective, this is beautiful.



Are weeds always bad? A lawn sprinkled with dandelions can be beautiful and interesting. If you didn't already know dandelions were weeds, would you find them beautiful? Think about what your lawn provides for the ecosystem. Who is it serving?

Fall Cleanup



**LEAVES:
LOVE 'EM
AND LEAVE 'EM**

Love 'Em and Leave 'Em

- Leaf 'Mulching-In-Place' is the practice of *leaving your leaves where they are!* They will decompose over the winter, nourishing your lawn and garden. Free and labor-free!
- You can also run leaves over with a mower to cut them up into **leaf mulch**.

Soft Landings

- Soft material under trees provides safe havens throughout pollinators' life cycles. This is another reason to leave leaf litter alone!

SOFT LANDINGS

Soft landings are diverse native plantings under keystone trees (or any other regionally appropriate native tree). These plantings provide critical shelter and habitat for one or more life cycle stages of moths, butterflies, and beneficial insects such as bumble bees, fireflies, lacewings, and beetles. In addition to plants, *soft landings* also include leaf litter, duff, and plant debris.



Funded by a grant from Wild Ones Minnesota. © 2021 Heather Holm and Neighborhood Greening. Developed in consultation with Desiree Narango, Ph.D.; artwork by Elsa Cousins. More information: www.PollinatorsNativePlants.com/softlandings.html



Leaf 'mulch'



Example of a 'soft landing' to protect pollinators



Fall Cleanup

Seeds

In Autumn, seeds fall naturally. During this time, there are fewer weeds to compete with them.

- [Leave native wildflower seed heads](#) to increase the number of wildflowers next year. You can also collect native seeds for future use.
- [Divide and transplant plants](#) across your property to create larger plant beds for next season.

Seed Libraries

Many public libraries have 'seed libraries' where plant seeds can be 'borrowed'.

How it works: Community members borrow seeds, grow them, and harvest new seeds from the mature plant. Then, they return the newly harvested seeds back to the library.

Check out [Arlington's Fox Seed Library](#). Does your local library have one?



Seeds from the Concord Seed Lending Library

Places to purchase native plant seeds:

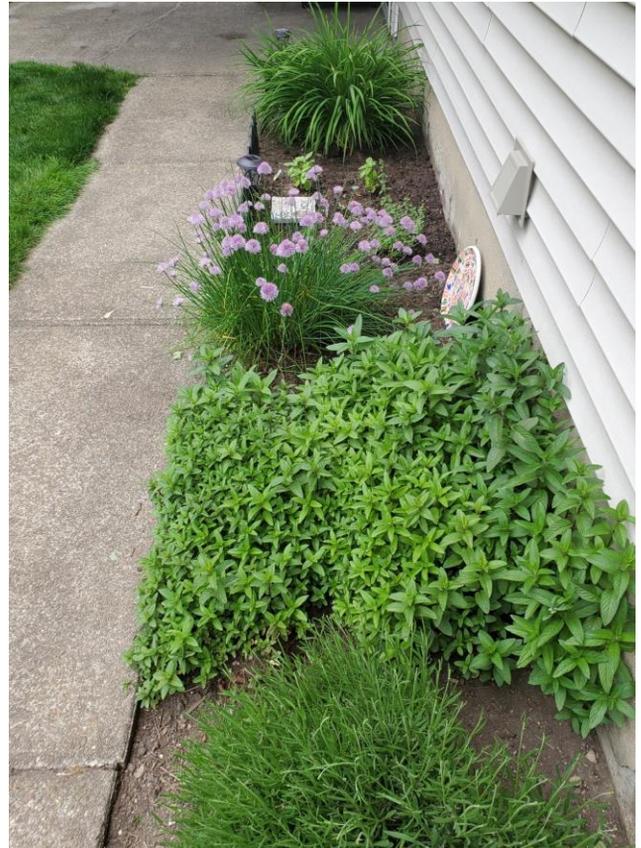
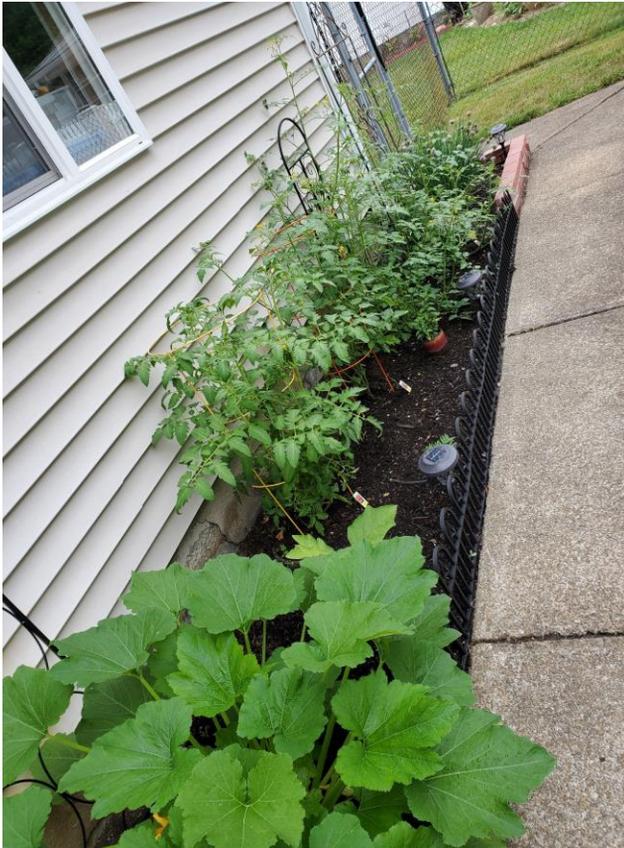
- [Wild Seed Project](#)
- [New England Wetland Plants](#)
- [Prairie Nursery](#)
- [Prairie Moon Nursery](#)
- [ERNST Seeds](#)
- [Vermont Wildflower Farm](#)
- [Grow Native Massachusetts](#)

Things You Can Start Today

	Actions	Cost
Easy	Create a budget	Free
	Talk to professionals	Free
	Get cost estimates	Free
	Explore lawn alternatives	Free
	Avoid raking leaves	Free
	Practice healthy lawn care (water less frequently, use organic fertilizers, avoid pesticides)	\$
	Switch to bio-based products	\$
	Weed manually	Free
	Limit or quit using Roundup	Free
	Use sustainable materials (locally sourced, recycled, repurposed, or what you already own)	\$\$
	Use Integrated Pest Management instead of Raid	\$
	Start a compost pile or bin	\$
	Switch to electric or manual tools	\$\$
	Remove invasive species	\$
	Create a native pollinator garden	\$\$
	Use pervious or permeable paving (walkways, driveways, patios)	\$\$\$
	Create a stormwater capture system (rain gardens, rain barrels)	\$\$\$
Difficult	Grow your own food (plant fruits, vegetables, herbs)	\$\$

Remember: Start Small

- Start small. You don't need a large space to make an impact.
- See what you can easily accomplish at home!
- Use resources for guidance.
- Don't be intimidated.
- Ask your design professionals or contractors questions. Ask them about implementing sustainable practices.
- Buy a little more material than you think you need.
- Use what you already have and be creative.



Certified Landscapes

Want to show off your sustainability?

There are a few ways to formally certify your landscape as meeting certain sustainability criteria.



You can certify your landscape as a Wildlife Habitat through the [National Wildlife Federation](#).

"Wildlife habitat gardens are a haven for local birds, butterflies, and other wildlife. Tell us how your yard or garden provides habitat and the National Wildlife Federation will recognize it as a Certified Wildlife Habitat®. Once certified, you can share your accomplishment and commitment to helping wildlife with your whole neighborhood by purchasing and posting an exclusive Certified Wildlife Habitat® sign." (NWF)



EPA WaterSense: has a number of [certification programs](#) for both professionals and homeowners.

Additional Resources

Native Plant Resources:

- Native Plant Trust
<https://www.nativeplanttrust.org/>
- National Wildlife Federation Keystone Plants by Ecoregion
<https://www.nwf.org/Garden-for-Wildlife/About/Native-Plants/keystone-plants-by-ecoregion>
- Audubon Society Native Plant Database
<https://www.audubon.org/native-plants>
- Wildflower.org Plant Database
<https://www.wildflower.org/plants/>
- What Are Native Plant Materials? - USDA
https://www.fs.usda.gov/wildflowers/Native_Plant_Materials/whatare.shtml
- Department of Energy & Environment - Invasive Plant Control Methods
<https://doee.dc.gov/page/invasive-plant-control-methods#:~:text=Herbicides%20are%20among%20the%20most,BGone%E2%84%A2%20and%20Garlon%E2%84%A2>

Pollinator Resources:

- Xerces Society, Native Plants for Pollinators and Beneficial Insects
<https://www.xerces.org/publications/plant-lists/native-plants-for-pollinators-and-beneficial-insects-northeast>
- Native Plant Trust Garden Plant Finder
<https://plantfinder.nativeplanttrust.org/Plant-Search>
- National Wildlife Federation Plant Finder
<https://www.nwf.org/NativePlantFinder/>
- Mass Pollinator Network
<https://masspollinatornetwork.dreamhosters.com/reduce-pesticides/>
- Ecological Landscape Alliance
<https://www.ecolandscaping.org/member-directory/>
- Northeast Pollinator Plants (Mail Order Pollinator Plant Nursery)
<https://www.northeastpollinator.com/>
- National Wildlife Federation – Pollinators
<https://www.nwf.org/Educational-Resources/Wildlife-Guide/Pollinators>
- Soft Landings
<https://www.pollinatorsnativeplants.com/softlandings.html>

Sustainable Landscape Books:

- *Bringing Nature Home*, Douglas W. Tallamy (2009)
- *Nature's Best Hope: A New Approach to Conservation That Starts in Your Yard*, Douglas W. Tallamy (2019)
- *Planting: A New Perspective*, Noel Kingsbury & Piet Oudolf (2013)
- *The American Meadow Garden: Creating a Natural Alternative to the Traditional Lawn*, John Greenlee & Saxon Holt (2009)
- *Designing the Sustainable Site: Integrated Design Strategies for Small Scale Sites and Residential Landscapes*, Heather L. Venhaus & Herbert Dreiseitl (2012)
- *Sustainable Landscape Construction*, Kim Sorvig and J. William Thompson (2008)
- *Bringing Nature Home*, Douglas W. Tallamy (2009)
- *Planting: A New Perspective*, Noel Kingsbury & Piet Oudolf (2013)

Additional Resources

Design Resources:

- MASSMapper (To Create a Scaled Map of Your Own Home)
<https://maps.massgis.digital.mass.gov/MassMapper/MassMapper.html>
- UMASS - Rain Gardens: A Way to Control Water Quality
<https://ag.umass.edu/landscape/fact-sheets/rain-gardens-way-to-improve-water-quality>
- Massachusetts Clean Water Toolkit
<https://megamanual.geosyntec.com/npsmanual/default.aspx>
- Urbanite: Creating Broken Concrete Patios & Walls
<https://www.concretenetwork.com/concrete/demolition/urbanite-recycled-concrete.html>
- Massachusetts Clean Water Toolkit
<https://megamanual.geosyntec.com/npsmanual/porouspavement.aspx>
- Landscape Water Conservation Extension
<https://landscape-water-conservation.extension.org/using-sustainable-hardscape-materials/>
- Concord Lawn Alternative Demonstration Gardens
<https://concordma.gov/2425/Lawn-Alternative-Demonstration-Gardens>
- Woody Invasives - Management
<https://woodyinvasives.org/management/>
- Concord Lawn Alternative Demonstration Gardens
<https://concordma.gov/2425/Lawn-Alternative-Demonstration-Gardens>
- Sustainable Sherborn – Sustainable Landscaping
<https://community.massenergize.org/SherbornMA/actions/2303>
- Forbes Landscaping Costs
<https://www.forbes.com/home-improvement/lawn-care/landscaping-cost/>

Construction Resources:

- Gardening Know How – Watering Newly Planted Trees
<https://www.gardeningknowhow.com/ornamental/trees/tgen/watering-newly-planted-tree.htm>
- Arbor Day Foundation – Container Tree Planting
<https://www.arborday.org/trees/planting/containerized.cfm>
- UMASS - Fall Planting For Trees and Shrubs
<https://ag.umass.edu/home-lawn-garden/fact-sheets/fall-planting-for-trees-shrubs>
- UNH Extension – Planting and Mulching Trees Fact Sheet
<https://extension.unh.edu/resource/planting-and-mulching-trees-and-shrubs-fact-sheet>
- EPA Composting at Home
<https://www.epa.gov/recycle/composting-home>
- Introduction to Permeable Concrete Paving
<https://www.mutualmaterials.com/introduction-to-permeable-concrete-paving/>
- Transplanting Plants
<https://www.gardenista.com/posts/how-transplant-plants-what-you-need-know-diy/>
- Introduction to Permeable Concrete Paving
<https://www.mutualmaterials.com/introduction-to-permeable-concrete-paving/>
- Permeable Paving Options for Driveways
<https://www.thespruce.com/permeable-paving-options-for-driveways-1398073>
- How to Control Erosion in Your Yard
<https://lawnlove.com/blog/how-to-control-erosion-in-yard/>
- Fairfax County, Virginia: Stop Erosion – Solving Drainage and Erosion Problems
<https://www.fairfaxcounty.gov/soil-water-conservation/drainage-problem-protect-eroding-land#:~:text=For%20areas%20with%20light%20erosion,are%20check%20dams%20or%20terraces>

Additional Resources

Maintenance Resources:

- EPA IPM Principles
<https://www.epa.gov/safepestcontrol/integrated-pest-management-ipm-principles>
- The Argument for Killing your Lawn
<https://www.boston.com/real-estate/real-estate-news/2020/05/13/why-you-should-kill-your-lawn/>
- Xerces Society
<https://www.xerces.org/>
- Lexington Living Landscapes
<https://www.lexingtonlivinglandscapes.org/resources-for-homeowners/garden-design-pros>
- Woody Invasives - Management
<https://woodyinvasives.org/management/>
- Common Garden Insect Pests
<https://www.ecolandscaping.org/11/developing-healthy-landscapes/ecological-landscaping-101/garden-insect-primer-getting-to-know-common-garden-insect-pest-groups-and-their-associated-signs-of-plant-damage/>
- BBC – Lawn Culture
<https://www.bbc.com/future/article/20220426-should-people-get-rid-of-their-garden-lawns>
- Department of Energy & Environment - Invasive Plant Control Methods
<https://doee.dc.gov/page/invasive-plant-control-methods#:~:text=Herbicides%20are%20among%20the%20most,BGone%E2%84%A2%20and%20Garlon%E2%84%A2>