

CAPE COD FRESHWATER POND BUFFER GUIDANCE



BEST PRACTICES, PLANTING PLANS, AND RESOURCES

CAPE COD FRESHWATER POND BUFFER GUIDANCE

Prepared By Jenick Studio and
Crawford Land Managment for
the Cape Cod Commission 2024



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Triangle Pond in Sandwich, MA (Photo by Angela Tanner)

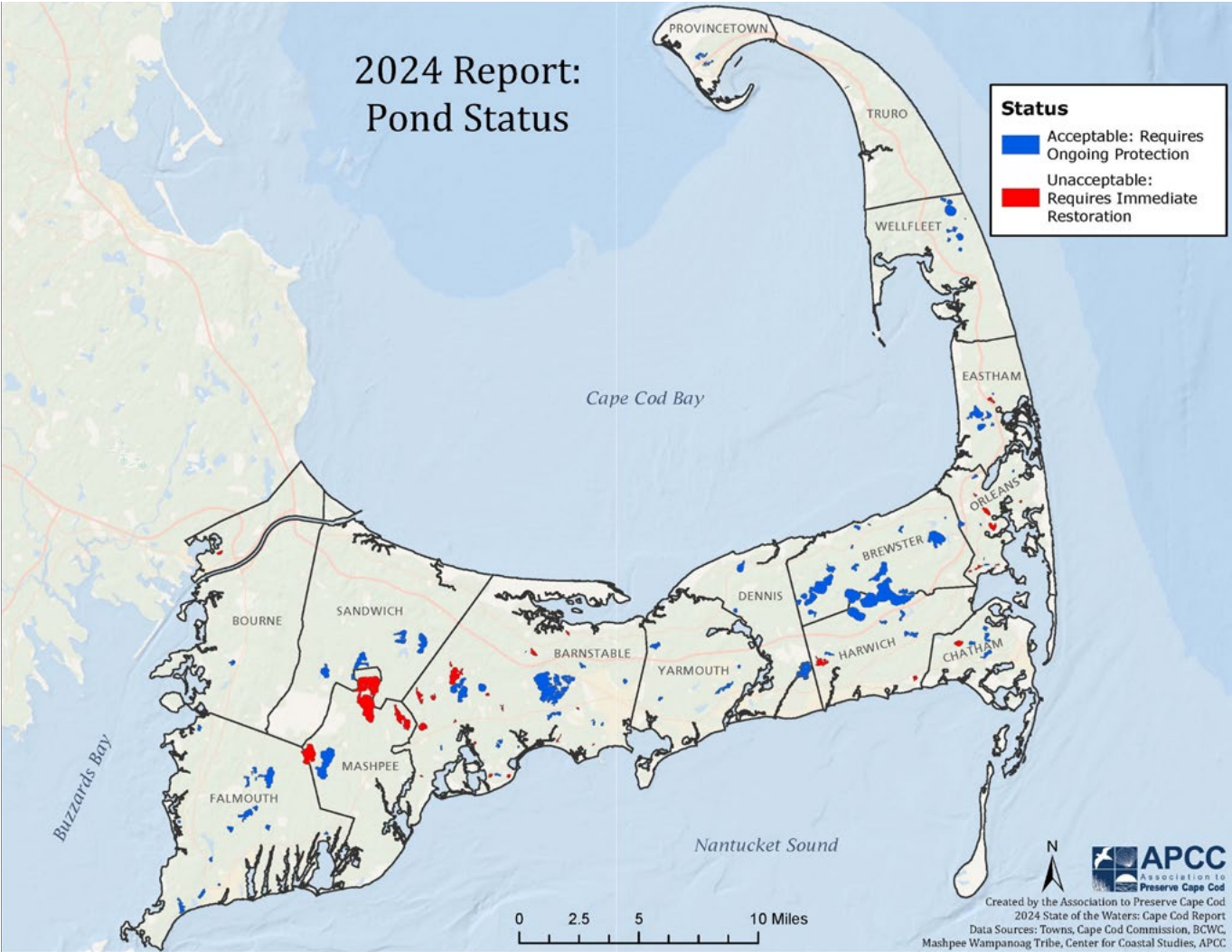
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THE STATE OF OUR FRESHWATER PONDS

The Cape Cod Commission’s 2018 Regional Policy Plan identified the health of Cape Cod’s freshwater ponds and lakes as a key challenge facing the region, calling for an updated and expanded understanding of freshwater resources data, including an update to the 2003 Cape Cod Pond and Lake Atlas. The 2021 Cape Cod Pond and Lake Atlas serves as a resource for updated pond information and provides the basis for the Cape Cod Commission’s Freshwater Initiative, a science-based, information-driven planning process to engage stakeholders and enable action to protect and restore Cape Cod’s freshwater resources. The Freshwater Initiative was informed by a robust stakeholder process that involved working with and engaging stakeholders to develop a framework for identifying and implementing pond management strategies.

One of the strategies identified to help protect and restore pond health is to install or enhance native pond shore buffers. This guidance has been developed to aid in educating residents and homeowners about pond buffers, increase community acceptance and implementation of appropriate pond shore practices, and support local conservation commission review and approval of restorative pond shore projects.



In APCC’s 2024 State of the Waters report, a total of 138 out of 890 freshwater ponds on Cape Cod were graded for pond water quality, and 39 of those were designated as “Unacceptable” meaning 28% of evaluated ponds have unacceptable water quality and are in need of immediate restoration and ongoing protection. This report only captured ponds with enough water quality data for evaluation (only 16% were evaluated), however it provides a general idea of the state of freshwater ponds across Cape Cod.

To learn more about Cape Cod freshwater ponds and their water quality, visit the links below:

Association to Preserve Cape Cod State of the Waters

<https://capecodwaters.org/>

Association to Preserve Cape Cod Freshwater Pond Information

<https://apcc.org/our-work/education/freshwater-ponds/>

Barnstable County Bathing Beach Water Quality Data

<https://www.capecod.gov/departments/health-environment/programs-services/water-and-wastewater/bathing-beach-water-quality/>

ACCORDING TO THE CAPE COD COMMISSION’S BARNSTABLE COUNTY PONDS PROFILE, CAPE COD HAS 890 FRESHWATER PONDS WHICH COVER A TOTAL OF 10,534 ACRES. APPROXIMATELY 4% OF CAPE COD IS COMPRISED OF FRESHWATER PONDS.

CAPE COD COMMISSION 2021 CAPE COD POND AND LAKE ATLAS

<https://capecodcommission.org/our-work/ponds-and-lakes/>

Why are Cape Cod ponds declining in health? Factors Include:

- Septic systems that leach nutrients into groundwater
- Site development and construction activity
- Removal of natural vegetation
- Structures, pavement and extensive lawns within pond buffer areas
- Pollutants from stormwater runoff across roofs, pavement and lawn areas
- Irresponsible landscaping practices that contribute to degrading pond ecosystems including surrounding habitat

Learn more about Cape Cod Commission Freshwater Pond Restoration Projects:

<https://capecodcommission.org/our-work/cape-cod-freshwater-ponds-restoration-projects/>



Upper Left: Grassy Pond at Mass Audubon's Ashumet Holly Wildlife Sanctuary

Upper Right: Painted turtle at Crocker Pond in West Falmouth

Lower Left: Sweet pepperbush in early spring at Long Pond. Long Pond has been the main source of drinking water for residents of Falmouth since the late 1800's and is protected by 750 acres of forest and swampland. *(Photos by Angela Tanner)*

A CALL FOR ACTION

Cape Cod is a special place in which to live and vacation in, thanks partly to idyllic beaches, ponds, lakes, and nature reserves that offer opportunities to swim, sail, kayak, paddle board, hike a nature trail, visit charming shops, museums and restaurants, all without traveling more than a few miles between destinations. Residents and visitors alike are attracted by the sense of place created by a unique combination of ocean, small town feel, and diverse natural areas including inlets and marshes, woodland and shrubland, meadows, rivers and beaches.

Over 200,000 people live on Cape Cod year round, and that population increases seasonally, due to tourism and summer residents. Developed areas are expanding to accommodate more affordable places to live, play, and work, but development comes at the expense of the landscapes and wildlife habitat that make it so special.

As natural areas are replaced with dwellings and commercial buildings, parking areas, expansive lawns and highly manicured garden spaces, habitat loss becomes more prevalent, and local populations of birds, pollinators, amphibians and other wildlife plummet. But it isn't just the flora and fauna that are impacted by loss of vegetation. Vegetated natural areas play a major role in protecting the quality of our water resources, including our numerous freshwater ponds, which are often overlooked in favor of conservation efforts focusing on more conspicuous saltwater habitats.

Pond area visitors are becoming more familiar with "No Contact for People or Animals" advisories posted by local health departments due to either high occurrences of *E. coli* or potentially toxic cyanobacteria blooms. These are having an increasingly negative impact on the recreational and economic benefits of pond ecosystems. Though non-profit organizations and volunteers are ramping up efforts to protect the public by monitoring water quality and raising money for restoration projects, it is not feasible to monitor every pond for water quality.



In addition to the recreational value clean, healthy ponds provide for the Cape Cod outdoor lifestyle, ponds are part of the larger ecosystem, providing essential services that we rely on. Ponds, wetlands, rivers and streams are directly connected to groundwater, Cape Cod's primary source of drinking water. The solution must include a widespread effort to reverse harmful effects of deteriorating pond habitat on Cape Cod by employing best management practices within the pond watersheds, and especially the land surrounding ponds.

Most land near freshwater ponds is privately owned. If you are lucky enough to live near one of Cape Cod's freshwater ponds or wetlands, you can sit outside and hear a symphony of spring peepers, songbirds, shorebirds, coyotes, crickets, cicadas, or owls.

If you own a home near a pond on Cape Cod, you have a unique opportunity to take part in a growing movement to create change within your community and help reverse the effects of the degrading landscape matrix by restoring and protecting vegetated buffers on your own property. Consider your property as part of a connected network that forms a last line of defense for the pond itself. By making responsible choices in how you manage your landscape, you can make an enormous impact on the quality of your freshwater pond.

WHAT IS A VEGETATED BUFFER?

A vegetated buffer is a natural area of vegetation composed of trees, shrubs, and herbaceous plants that provides numerous benefits including uptake of excess nutrients, filtering out pollutants and sediment, reducing erosion, providing wildlife habitat, and helping control stormwater.

On Cape Cod, most fresh waterbodies are surrounded by residential houses with traditional lawns. Activities around ponds, including ongoing development, are leading factors contributing to poor soil and water quality. A fully functioning vegetated buffer contains native plants and contributes to the resilience and ecological health of the adjacent pond and its watershed. Vegetation in a pond buffer slows the velocity of stormwater runoff, which allows suspended particles to fall out and the water to soak into the ground. The roots of the vegetation absorb nutrients and some contaminants, keeping them from entering the pond. The larger and more diverse the buffer, the greater the environmental benefits.



Dense layers of native trees, shrubs, and herbaceous material at the edge of this pond in Harwich separate it from a nearby road and parking area.



Left: Long Pond in Falmouth, the source of the town’s drinking water, is protected by a wide area of conservation land, with most development limited to the water treatment facility.

Right: Jenkins pond in Falmouth is more heavily developed with residential lots.

(Images © 2024 Airbus, provided by Google Earth: 5/9/2023 and 10/10/2023)



A closer view of Jenkins pond shows areas around the pond consist of a combination of some naturalized vegetation as well as dwellings, streets and driveways, patio and deck areas, lawn, and ornamental landscaping. *(Images © 2024 Airbus, provided by Google Earth: 5/9/2023)*

ADVANTAGES OF VEGETATED BUFFERS

EROSION CONTROL

Vegetated buffers help prevent erosion. The deep roots of healthy, dense populations of plants prevent topsoil from eroding and help hold soil particles in place. A diversity of species creates a complex matrix of different types of roots, for maximum erosion control.

STORMWATER CONTROL

Dense populations of plants within a vegetated buffer increase the soil's water holding capacity. The network of foliage and roots slows the velocity of stormwater runoff, allowing water to soak into the ground, rather than run directly into the pond.

BETTER WATER QUALITY

Densely vegetated buffers provide a critical line of defense in filtering excess nutrients and pollutants from stormwater runoff, effectively preventing these contaminants from entering our wetlands and groundwater.

HABITAT AND SPECIES DIVERSITY

Buffer plantings provide nesting sites, food and cover for insects, birds, mammals, reptiles and amphibians. Vegetated areas with a wide range of plant species can support a diversity of wildlife whose presence is an important part of a functioning freshwater ecosystem.

TEMPERATURE CONTROL

Vegetated areas near ponds provide shade and help lower water temperatures, reducing occurrences of harmful algal blooms.

AESTHETICS AND VIEWS

Planted buffers enhance the visual appeal of freshwater ponds by attracting wildlife, adding seasonal interest and color, and preserving the cleanliness and beauty of the water.

A HEALTHY VEGETATED BUFFER HAS:

NO DEVELOPMENT

Ideal buffers are devoid of structures, impervious surfaces, non-biodegradable materials, and other site disturbances.

DENSE LAYERS OF NATIVE PLANTS

- Overstory (canopy trees)
- Understory (small trees and shrubs)
- Groundcovers and herbaceous plants (low shrubs, ferns, perennials, and grasses)

SPECIES DIVERSITY

- A range of native plants that provide flowers, seeds, and fruit at different times to support wildlife throughout all four seasons.
- A mix of evergreen and deciduous plants (deciduous plants lose their leaves in winter; evergreens have green leaves all year round).

NATURAL LITTER

- Fallen leaves and needles act as natural mulch, protecting plant roots and sheltering insects and small animals that over-winter on Cape Cod. They also add valuable nutrients back into the soil.
- Snags, fallen trees, and dead stumps provide wildlife habitat for aquatic and terrestrial wildlife species, as well as insects and fungi which are all part of a healthy freshwater wetland ecosystem.

MAINTENANCE FREE ZONE

Unless under special conditions with a wetland permit:

- No fertilizers or pesticides (pesticides include herbicides, fungicides, and insecticides)
- No removal of trees or other vegetation
- No pruning or removal of limbs



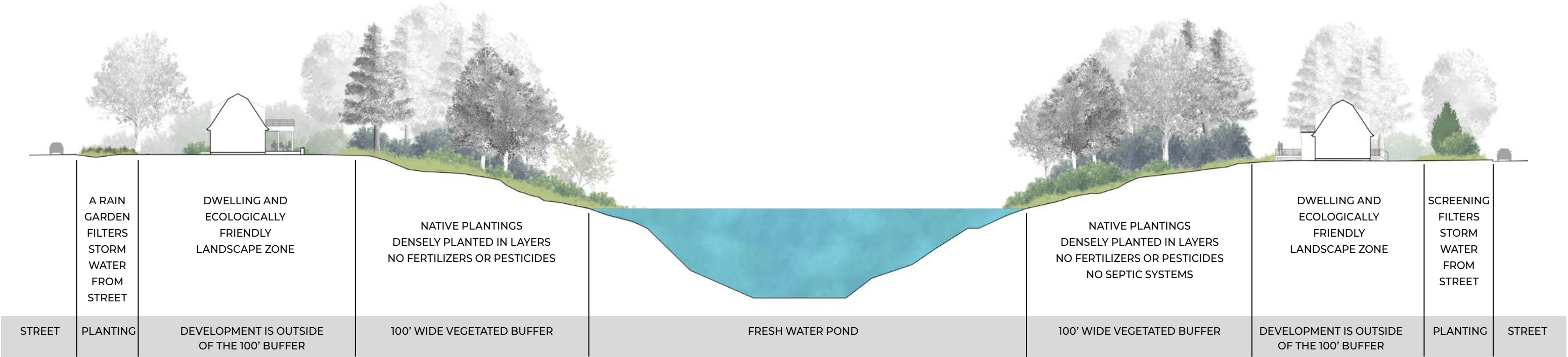
Decaying wood in and near freshwater ponds are part of a healthy ecosystem.
(Photos by Angela Tanner)

ELEMENTS OF A VEGETATED BUFFER

Ideally, all development is kept outside of the buffer, and the entire buffer is filled with dense layers of native vegetation. Development includes buildings, driveways and parking areas, decks, patios, swimming pools and accessory structures, walkways, utilities, drainage structures and septic systems. Turf lawns, vegetable gardens and highly manicured ornamental planting beds that may contain fertilizers and other chemicals should also remain outside of the buffer zone. Fences should not be placed in buffer areas unless they are designed with large enough space for wildlife to be able to move through without getting trapped.

Septic systems and leaching fields should be placed as far away from the pond as possible, ideally 300 feet or more from the pond. Plantings above septic areas should be of herbaceous plant material such as grasses and wildflowers. Woody trees and shrubs should not be planted above or immediately adjacent to septic areas, as their roots can interfere with the system's ability to properly function.

SECTION THROUGH A POND BUFFER



THE WETLANDS PROTECTION ACT

The Massachusetts Wetlands Protection Act (WPA) is part of Massachusetts General Laws (MGL) and protects both inland and coastal water-related resources such as ponds, floodplains, tidal flats, coastal beaches, and more. The WPA is regulated under MGL Chapter 131, Section 40, and was enacted in order to prevent alteration or destruction of the state’s wetlands.

The WPA requires that any work within a wetland resource area or within a certain distance from a wetland resource area must obtain a permit from the state and/or the local conservation commission. Review and approval of such a permit helps ensure that work which adversely impacts a wetland is avoided, minimized, or mitigated and that approved work is done in a responsible manner.



Lady slippers (*Cypripedium acaule*) are wild orchids native to Cape Cod, where they survive only when a special fungus is present in the soil. They are pollinated by bumblebees and often thrive near freshwater ponds. (Photo by Angela Tanner)

THE ROLE OF YOUR LOCAL CONSERVATION COMMISSION

In Massachusetts, individual cities and towns have local conservation commissions that are responsible for protecting the town’s natural resources. Their responsibilities include administrating the WPA and its regulations as well as their own local wetland protection bylaws and regulations. The conservation commission is composed of five to seven voting members. The town may also have a conservation agent or administrator to provide expertise and guidance to the conservation commission.

The conservation commission reviews permit applications at public hearings and makes decisions to approve or deny a project based on whether it complies with state and local regulations. It is the commission’s responsibility to enforce the regulations and permits they issue to ensure their town’s natural resources are protected now and in the future.

Prior to implementing any work close to a wetland, contact your local conservation commission for guidance in case a permit is required. Activities that may require a permit include building and landscape construction, planting projects, tree and vegetation removal or pruning, erosion control systems, or any activity that may disturb existing site conditions. Most municipalities consider land within 100 feet of a freshwater pond a protected zone that is subject to conservation commission jurisdiction. Some towns require even larger protective zones.

Projects that require conservation permitting can appear overwhelming at first, but your local conservation staff are available to answer questions about what type of permit you will need, depending on the location and scale of your project. For large or complicated projects, engineers and environmental consultants can help you streamline the permitting process and develop a plan that will enhance your property for many years to come.

TYPICAL CONSERVATION PERMIT APPLICATIONS:

AR (Administrative Review)
For smaller projects such as removing a dangerous tree, or installing a native pollinator garden, it may be possible to receive permission from your local conservation department by administrative review, in which case the conservation agent or administrator can grant permission for the work without requiring more detailed permit applications.

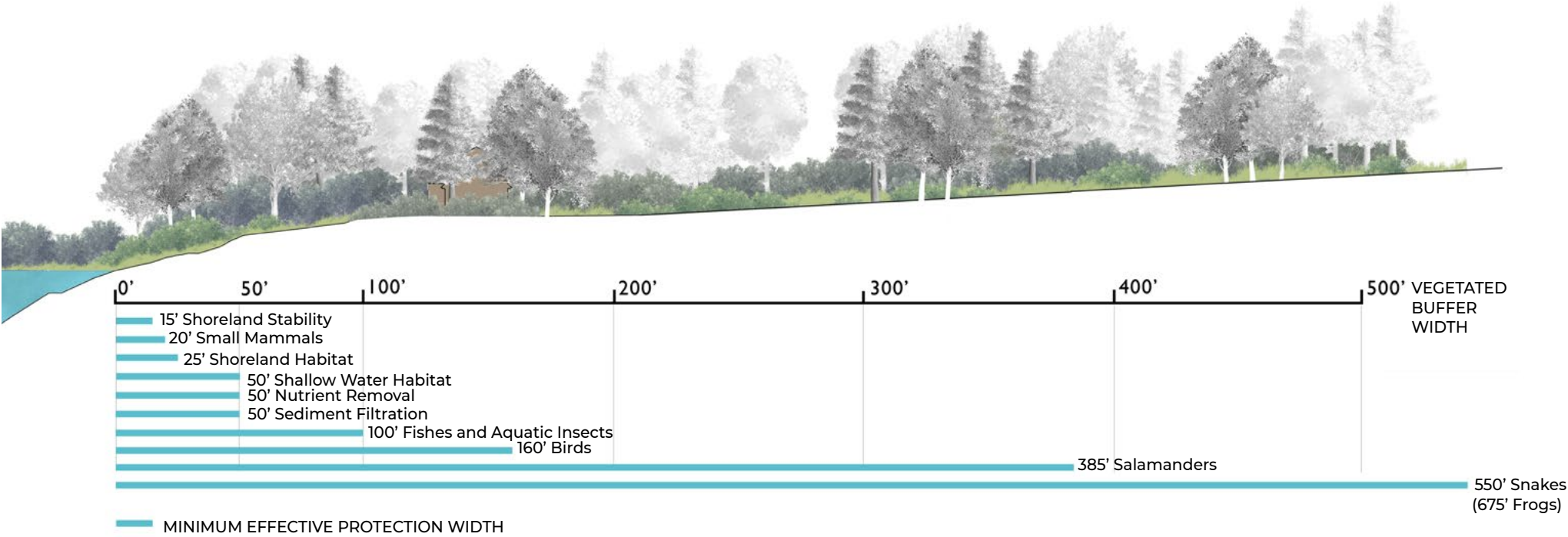
RDA (Determination of Applicability)
Projects that do not require a building permit and are not likely to impact the resource area significantly can sometimes be filed as an RDA, in which case the commission will determine if the project can move forward without a more detailed NOI application.

NOI (Notice of Intent)
This type of application is often required for projects that require a building permit or may cause significant disturbance to the buffer zone, either permanently or temporarily. During the application process, a public hearing is held where the commission reviews and votes on the project. If the project is approved, an Order of Conditions is issued, which is a document that outlines the agreed upon protocol for the permitted work. Most Orders of Conditions are valid for several years and can be extended if necessary. This is especially helpful for projects that involve mitigation or restoration planting, as it takes several years to install and establish the new planting areas.

Chapter 91 License
This type of license is required by the State, in addition to other local permits, for docks or other structures in the waterway.



Pondshore habitats, which connect to our groundwater systems, are protected by the Wetlands Protection Act and should not be disturbed. Creating and restoring vegetated buffers adjacent to these sensitive areas will further preserve their integrity and quality, which will also protect our drinking water. *(Photos by Angela Tanner)*



WIDTHS OF LAKESHORE VEGETATION FOR LAKE PROTECTION

Created from information provided by the Vermont Agency of Natural Resources, this diagram shows the minimum effective vegetated buffer widths in order to provide important functions such as shoreland stability, nutrient removal, and sediment filtration as well as protection for different types of wildlife. Maximum effective buffers for each category range from 250 to 1200 feet, indicating that while the typical 100’ wide buffer protected by the WPA provides minimum effective protection for shoreland stability and habitat, as well as aquatic life, nutrient removal and sediment filtration, it is not wide enough to effectively protect all of the species that depend on fresh waterbodies for habitat. While these standard guideline widths were created for Vermont lakes and ponds, the basic concepts of effective widths of vegetated buffers can be applied to freshwater bodies on Cape Cod.

Source for Minimum Protection Widths: VTANR Lake Wise Program - https://dec.vermont.gov/sites/dec/files/wsm/lakes/Lakewise/docs/lp_shorewidth.pdf

CAPE COD FRESHWATER POND SHORE NATIVE PLANT COMMUNITIES

Many of Cape Cod’s freshwater ponds are a remnant of glacial retreat. Large sections of ice carved depressions that then filled with melting snow and ice are termed “kettle ponds.” Most ponds on Cape Cod are connected to groundwater. Cape Cod’s pond shore plant communities grow in a unique set of conditions: they persist despite seasonal groundwater level fluctuations and drought. Often they remain submerged for years. Some ponds may still retain coastal plain pond shore plant communities—a globally threatened ecosystem with state protected plant species. Species composition within and along freshwater ponds varies greatly within a small area, as conditions change from saturated, hydric soils below the water, to wet/mesic soils along the margins within the high water level, to seasonally dry soils within the upland margins.

Coastal plain pond shore communities provide habitat for many state-listed rare animal and plant species.

The sensitive ecosystems in and immediately along pond shores are protected by the Wetlands Protection Act, and are not generally part of the vegetated buffer restoration planting strategies presented in this book. Any vegetation removal or planting should be done outside of this pond edge transition area, and care should be taken to protect the pond edges from disturbance with appropriate silt fencing and erosion control measures.

Understanding the conditions of these transitional freshwater landscapes and selecting the right plants to support these native plant communities through vegetated buffer systems will help ensure they are healthy, functional, and able to provide the many benefits they are naturally capable of providing under the right conditions.

NATIVE PLANTS AND NATIVE ECOTYPES HAVE ADAPTED OVER TIME TO THE CONDITIONS OF THEIR ECOREGIONS AND ONCE ESTABLISHED, REQUIRE LITTLE MAINTENANCE



Top Row: Wildflower seeds attract goldfinches; Milkweed attracts native bees
Middle Row: Butterflies, ladybugs and grasshoppers add life to a native meadow
Bottom Row: A fox hunts in a Cape Cod wetland; A butterfly on a beech bud
(Photos by Angela Tanner)

WHAT ARE NATIVE PLANTS?

Native plants are species that have naturally evolved within a particular region, ecosystem, and habitat without direct or indirect human involvement. They are adapted to their local climate and soil conditions and provide food and shelter for our native fauna. For the purposes of this guide, a native plant is defined as a species that is indigenous to Cape Cod or to Northeastern America, though recommendations focus mainly on plants native to Cape Cod and Massachusetts as well as plants that are particularly beneficial to wildlife.

Please keep in mind your local conservation commission may follow slightly different guidelines in determining what species are appropriate for your area.

WHAT ARE ECOTYPES?

Plant ecotypes are species populations that have developed within and adapted to an ecological region (ecoregion). Individual ecoregions have growing conditions which may affect plant growth such as geology, landforms, soils, vegetation, climate, land use, wildlife, and hydrology. Some characteristics that vary across specific ecotypes include growth habits, plant height, time of bloom, time of seed, and maturation dates.

Cape Cod is part of the Atlantic coastal pine barrens ecoregion. Pine barrens are a globally rare habitat type comprised of a unique assemblage of plants and animals that thrive on the nutrient-poor soils and variable climate found on Cape Cod. Within the pine barrens ecoregion, there are many and varied habitat types, including pitch pine-oak woodlands, transitional hardwood-pine forests, streams and rivers, ponds and lakes, vernal pools, shrub and forested swamps, estuaries, salt marshes, grasslands, and others. Plants and seeds propagated from local ecotypes are often ideal for restoring vegetated buffers because they require very little maintenance once established. Although local ecotypes are not always readily available in the nursery trade, there is a growing interest in collecting, sharing, and propagating specific ecotype seeds as part of a widespread conservation effort.



Elderberry and sweet pepperbush thrive near freshwater ponds. In late summer, elderberry produces colorful berries for birds, while sweet pepperbush bursts with scented white flowers. *(Photo by Angela Tanner)*



Swamp milkweed, beardtongue and green-headed coneflower bloom in meadow pockets between black cherry and eastern red cedar trees. *(Photo by Angela Tanner)*

WHY CHOOSE NATIVE PLANTS?

ADAPTED TO THEIR REGIONS

Native Cape Cod species have adapted to their unique environment, including cold winters, poor soil conditions, strong winds, salt spray and periods of drought and flooding.

LOW MAINTENANCE

Since our native plants are adapted to this region, as long as they are located in places best suited for their needs, they require less attention than many exotic plants. Once established, native plants require:

- **Little or No Fertilizer and Pesticides**
Decreases the amount of chemicals and nutrients from entering our waterbodies and reduces annual maintenance costs
- **Minimal Maintenance**
Less time and energy spent pruning, mowing, or weeding
- **Little or No Irrigation**
Conserves water, making our fresh water resources more available, as well as reducing water bills

AESTHETICS AND CULTURAL VALUE

Native plants are an integral part of the historic and natural aesthetic of our local landscapes. They provide woodland flowers in spring, wildflower meadows in summer, and brilliant color in fall. The abundance of berries and fruit native plants produce are critical food sources for local and migratory birds.

EROSION AND STORMWATER CONTROL

The deep and complex roots of our native plants are well-designed to co-exist with other native plants to form a dense matrix of root systems that can retain soils, as well as filter and absorb stormwater runoff more efficiently than a monoculture of non-native plants.

CRITICAL TO NATIVE WILDLIFE

Native plants are essential components of local wildlife habitats.

- **Host Plants for Native Pollinators**
While adult pollinators can often feed on non-native flowers, most insects evolved alongside specific plants that feed their larvae. If their host plants are missing from their habitats, the larvae will not survive into adulthood.
- **Support for the Entire Food Web**
By hosting pollinator and insect populations, native plants are an integral part of the native food web. While adult birds can eat seeds and fruit from a variety of plants, most require thousands of insects to feed their young. Small animals that eat native plants, seeds and fruit in turn feed predators like foxes and owls.
- **Shelter for a Variety of Wildlife**
Native plants have co-evolved with the native wildlife over thousands of years, forming symbiotic relationships that support each other. They often co-exist in a rich matrix of different plant types that has the potential to feed and shelter an equally diverse selection of wildlife.

NATIVE PLANTS ARE A CRITICAL SOURCE OF FOOD, COVER, AND NESTING HABITAT FOR LOCAL WILDLIFE. SOME SPECIES DEPEND EXCLUSIVELY ON SPECIFIC PLANTS WITHIN REGIONAL AND LOCAL ECOSYSTEMS FOR SURVIVAL.



Top Row: Bumblebees pollinate jewelweed and sweet pepperbush; A chickadee rests between caterpillar hunting
Second Row: A skipper on liatris; A Monarch caterpillar explores its exclusive host plant (milkweed)
Third Row: Yarrow and sweet pepperbush host pollinators; Turkeys enjoy native seeds, fruits and nuts
Bottom Row: Toads and other amphibians depend on native wetlands; Thistle is a pollinator host plant; Dragonflies are a sign of a healthy wetland ecosystem. Some of these species may spend their entire lives within a freshwater wetland buffer.
(Photos by Angela Tanner)

NEGATIVE IMPACTS OF INVASIVE PLANT SPECIES

COMPETE WITH NATIVE PLANTS

Invasive plants take up soil nutrients, water, and sunlight that would otherwise be available for native plants.

REDUCE SPECIES DIVERSITY

Some non-native plants become invasive because they likely have no natural predators or competitors in their new environments, causing them to rapidly crowd out less competitive species and form monocultures (large areas consisting of mostly one species).

DESTABILIZE SOILS

Monocultures of invasive plants lack the diverse matrix of different types of root systems that exist in native plant communities, causing them to be less effective at holding soil in place.

DEGRADE WATER QUALITY

Invasive plants can obstruct water flow of waterbodies and increase water pollution and erosion by de-stabilizing soils and allowing sediments to move.

ADVERSELY AFFECT SOIL HEALTH

Monocultures of invasive plants can alter habitats by changing soil chemistry and water availability.

FAIL TO SUPPORT WILDLIFE

Invasive plants do not offer the same critical life-stage resources as plants that evolved within the same ecoregion as our local wildlife, causing insect and animal populations to decline in invaded areas.

CAUSE ECONOMIC AND PUBLIC HARM

The effects of invasive plants on landscapes degrade property values and impede recreational and conservation activities, causing economic and ecological harm to the environment and human health.

INVASIVE PLANT SPECIES:

Invasive plants are non-native species that have spread into native or minimally managed plant systems. These plants cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems. The state of Massachusetts prohibits certain plants from sale or propagation based on certain criteria. Those plants are typically referred to as state listed invasive species.

State listed invasive plants we commonly see on Cape Cod:

<i>Elaeagnus umbellata</i>	Autumn olive
<i>Robinia pseudoacacia</i>	Black locust
<i>Cynanchum louiseae</i>	Black swallowwort
<i>Rhamnus cathartica</i>	Common buckthorn
<i>Phragmites australis</i>	Common reed
<i>Cytisus scoparius</i>	Scotch broom
<i>Alliaria petiolata</i>	Garlic mustard
<i>Lonicera japonica</i>	Japanese honeysuckle
<i>Fallopia japonica</i>	Japanese knotweed
<i>Rosa multiflora</i>	Multiflora rose
<i>Acer platanoides</i>	Norway maple
<i>Celastrus orbiculatus</i>	Oriental bittersweet
<i>Elaeagnus angustifolia</i>	Russian olive
<i>Ampelopsis brevipedunculata</i>	Porcelain berry
<i>Ligustrum obtusifolium</i>	Border privet
<i>Ailanthus altissima</i>	Tree of heaven

Recently added to the state invasive plant list:

No sales after 12/31/2025

<i>Pinus thunbergii</i>	Japanese black pine
<i>Mycelis muralis</i>	Wall-lettuce

No sales after 12/31/2028

<i>Pyrus calleryana</i>	Callery pear/Bradford pear
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For the complete list, visit: <https://www.mass.gov/info-details/massachusetts-prohibited-plant-list>



Phragmites australis (Common reed) invades freshwater and brackish wetlands. It forms dense colonies through rhizomes (underground roots), which can form dense mats that prevent native plants from becoming established. Because it grows in the transition zone between wetland and vegetated buffer it is difficult to remove.



Fallopia japonica (Japanese knotweed) has extensive root systems that form monocultures, and it can grow new starts from pieces of broken root mass in the soil. It is extremely difficult to eradicate and requires repeated cutting and/or injection of herbicide for several years to control it. It not only invades natural areas, it also interferes with building foundations and other structures.



A combination of invasive and aggressive native vines has swallowed the wetland buffer plants next to a Cape Cod pond.



This slope along a shoreline is eroding, and the invasive honeysuckle shrubs and vines do not have deep or complex enough root systems to stabilize the edge.



Japanese honeysuckle and bittersweet crowd out native vegetation at the edges of this wetland resource area.



Invasive vegetation is removed by a combination of hand removal and herbicides using a cut and wipe method. Herbicide is applied directly to a recently cut surface of the plant, weakening the roots without requiring them to be removed from the soil. Leaving roots in place during invasive plant removal is important in preserving soil stability and preventing further erosion, especially on slopes. Silt fencing with hay bales is also used to protect the pond.



MANAGING INVASIVE PLANT SPECIES

Invasive Plant Management typically includes a combination of various methods to be effective. Some common management techniques include:

CULTURAL CONTROL

Involves providing education and increasing awareness of the detrimental effects of invasive species and how they can be managed.

PHYSICAL OR MANUAL REMOVAL

Involves activities such as hand-pulling, digging, etc.

MECHANICAL CONTROL

Techniques involve activities such as mowing, girdling, etc.

CHEMICAL CONTROL

Involves the use of herbicides.

BIOLOGICAL CONTROL

Introduces a natural predator that targets only the identified invasive species, while generally causing no harm to native species. Natural predators typically used are insects, nematodes, or mites.

NOT ALL NON-NATIVE PLANTS ARE CONSIDERED INVASIVE. MANY PLANTS IMPORTED FROM OTHER AREAS ARE INCORPORATED INTO CULTIVATED GARDEN AREAS BECAUSE OF AESTHETIC OR CULINARY BENEFITS, AND THEY DO NOT BECOME INVASIVE. HOWEVER, WITHIN VEGETATED POND BUFFERS, NATIVE PLANTS SHOULD BE PRIORITIZED.

SITE EVALUATION

The first step in creating an effective planting plan for your vegetated buffer is to identify your site’s unique opportunities and constraints. This includes evaluating soil conditions, sun and shade exposure, topography, existing vegetation, and nearby development or activities that may affect the health of the buffer.

ANALYZE SOIL CONDITIONS

1. **Are the soils typically very wet, moist or dry?** This will be important to keep in mind when choosing plant species, as some plants have adapted to tolerate very wet soils with anoxic conditions (soils that are wet for longer periods have less oxygen) while other plants have adapted to very dry soils.
2. **Is the soil moisture consistent across the entire site and throughout the year, or does it vary?** For example, the pond edge might be very wet in spring, but summer droughts might lower the water level, and plants in that location will need the ability to tolerate both periodic flooding and drought in order to survive.
3. **What is your soil’s composition and texture?** Soils are composed of sand, clay, and silt, as well as organic matter. Sandy soils will feel gritty in texture and drain quickly. Clay soils will feel sticky when wet and retain moisture. Silty soils will feel like flour when dry, but can add fertility to soils. Too much silt or clay could cause drainage problems, and very sandy soils may not retain nutrients and moisture. Understanding the texture of your soils can help you choose the right plants for your site.

OBSERVE SUN AND SHADE EXPOSURE

1. **What direction does your pond edge face?** In general, a southern facing slope will receive more sunlight than a northern facing slope. Eastern facing slopes will get more sun during the first half of the day, and western facing slopes during the second half.

2. Are there objects creating shade conditions for part of the day? This might include landforms, large trees or buildings. If so, evaluate your site several times throughout the day to determine how many hours of direct sunlight certain areas receive. Full sun plants require six or more hours of direct sunlight. Part sun or part shade plants require three to six hours of direct sunlight, and full shade plants typically need three hours or less.

UNDERSTAND TOPOGRAPHY

1. **Is your site flat, sloping, or a combination of both? Are the slopes steep, or gentle?** Areas with steep slopes can have erosion problems if soils are not well stabilized, and you may see loose sediment washing down the slope. Steep slopes at the edge of the water may also experience scouring, which happens when wave action begins to carve away at the soils.
2. **Do you see evidence of stormwater erosion?** Drainage from nearby roofs, streets, or lawn areas may flow heavily during heavy rain events, causing depressions, runnels, or channels in the soil. If an area is experiencing erosion problems it might be improved by incorporating plants that can stabilize the soils and better absorb stormwater or wave action. Additional measures such as drainage structures or temporary erosion control materials such as bio-degradable blankets may also be effective.

IDENTIFY EXISTING VEGETATION

1. **What species of plants are already growing naturally in your buffer area or on nearby properties?** Those plants already have the characteristics needed to survive your site’s conditions. Consider planting more of those plants, and incorporate species that typically grow in similar conditions or habitats.
2. **Are the plants in your buffer mostly native, or invasive?** If they are mostly invasive, consider removing them before adding any new plantings. If invasive species are not removed or controlled, they

may negatively impact the success of newly planted native species.

STUDY NEARBY FEATURES AND ACTIVITIES

1. **Are there existing paths or easements?** If so, are they for private or public use? If the access is for public use, strategically placed trees or shrubs can provide privacy. The paths should be kept free of dense vegetation. New plants next to paths may need protection (exclusion cages or flagging) to prevent them from being trampled. If the path is on a steep slope and showing signs of erosion, consider incorporating steps or re-aligning the path so that it meanders around plantings, which will help prevent stormwater from running directly down the path.
2. **Are there nearby sources of nutrients or pollutants?** If fertilizers or pesticides are being used near the buffer zone, they could flow into the area, affecting the soil, vegetation and water quality. If storm drains in street areas are not maintained regularly, they may overflow and wash into your buffer area. Consider adding additional plantings in strategic locations outside of the buffer zone to capture and filter potential pollutants. For example, a rain garden (a slight depression filled with plants) next to a street can help slow and filter stormwater before it even reaches the buffer zone.
3. **Are there nearby power lines or other utilities, above or below ground?** These should be documented so that plantings are selected and located carefully so as not to conflict with utilities.
4. **Are there septic tanks or leaching fields within or near the buffer?** In general, they should be located as far from the pond, preferably outside of the buffer zone (if possible). Herbaceous plants such as ferns, grasses, or wilflowers can typically be used above septic areas. Avoid using trees and large woody shrubs near septic areas.

SOIL RESOURCES

Online resources can help identify what soils may be present on your property:




[The Web Soil Survey](#)
(produced by the National Cooperative Soil Survey and operated by The USDA Natural Resources Conservation Service)

Soil tests to determine the chemical composition of your soils can be obtained inexpensively through resources such as:

[Cape Cod Cooperative Extension Horticulture Clinic](#)

[UMass Soil and Nutrient Testing Laboratory](#)

SUN / SHADE ASPECT

-  Full sun:
6+ hours sunlight
-  Part sun/part shade:
3-6 hours of sunlight
-  Full shade:
less than 3 hours of sunlight

LOCATING UTILITIES

Dig Safe is a nonprofit organization that will notify your utility company with details about your project for free, and your utility company will arrange to have their underground lines marked on site.

Visit digsafe.com or dial 811

It is important to note that only lines your utility companies install and maintain are marked. Privately installed utilities such as exterior lighting or irrigation systems are not included in Dig Safe’s service.

BENEFITS OF USING SMALL PLANTS WHEN PLANTING VEGETATED BUFFERS

COST EFFECTIVE

Small plants are often less expensive. This can allow larger areas to be covered with more individual plants for less cost than installing the same number of large plants.

EASIER TO ESTABLISH

Smaller plants often transplant and adapt to new site conditions at a faster rate than larger plants of the same species, as long as they get the proper water and care during the establishment period.

Less chance of roots binding in containers or transplant shock than larger specimens that have been in containers for a long time

LESS SITE DISTURBANCE

Easier to transport across sensitive site conditions

Smaller holes mean less disturbance to surrounding soil. This can be especially beneficial on slopes or in areas partially established with native plantings where soil stability is important.

Easier to plant on steep slopes than plants with large root-balls

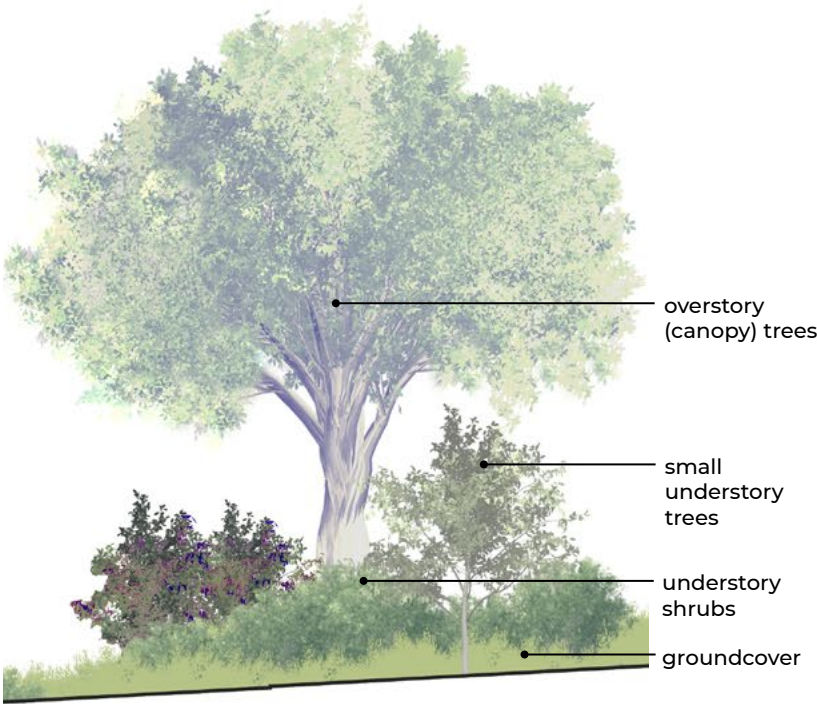


Small plug-sized grasses and sedges are less expensive than larger containers.

IDENTIFY YOUR PRIORITIES AND GOALS:

These may include any of the following:

- Mitigate for a construction project
- Control erosion caused by runoff or bare soils
- Control erosion caused by wave action
- Manage stormwater in problem areas
- Manage invasive plants
- Enhance views of the pond
- Screen views of adjacent structures or activities
- Filter excess nutrients from adjacent properties
- Introduce more seasonal interest
- Provide safer access to the water
- Reserve areas to sit or gather outside
- Replace turf lawn with a more drought tolerant solution
- Provide shade for a patio or deck
- Create lower maintenance planting areas
- Incorporate edible native plants
- Increase species diversity and wildlife habitat
- Introduce habitat for specific wildlife such as monarchbutterflies, osprey, bats, or screech owls



PLANT IN LAYERS

MIMIC NATURAL PLANTING AREAS

The goal of re-vegetating a pond buffer is to restore its natural functions. Consider when you hike around a pond or lake in a nature reserve. Plants are touching each other, as opposed to what you'd see in a typical residential or commercial planting bed with wide expanses of mulch.

PLANT DENSELY

Dense plantings improve soil structure, enhance soil stability, do a better job of filtering out pollutants and excess nutrients before they reach the water, and provide foraging and nesting habitats for wildlife. Native plants growing closely together also discourage invasive weeds from establishing.

PLANT IN LAYERS

Natural plant communities often have a groundcover layer of grasses and other herbaceous material, an understory layer of shrubs and small trees, and an overstory layer that has large canopy trees. Each stratum fills an ecological niche that serves different functions and supports different wildlife species. Incorporating layers into your planting plan will ensure a healthier and more effective buffer.



Natural plant communities have dense layers of plantings including a tree canopy with a small tree and shrub layer, and groundcover such as shade tolerant grasses, ferns, and low-growing shrubs.

DESIGN OBJECTIVES

CONSIDER YOUR BUDGET AND TIMEFRAME:

The scale of your project and density of new plantings is going to depend on affordability, and how quickly you want the area to become established. If you don't have a large budget to start with, there are ways to work small.

- **Plan for Phases:** Many planting plans can be implemented in stages, starting with areas closest to the water and adding more plants over time. Even a five foot wide strip of native plants along the edge of the pond will immediately begin to improve the pond quality.
- **Use Small Plants:** Small plants such as saplings, whips, small trees and shrubs, landscape plugs, or quart sized plants are often less expensive and adapt to site conditions more quickly than larger specimens. Keep in mind all transplants, especially small ones, do not have wide root systems yet and may need consistent soil moisture with a temporary irrigation system until established.
- **Supplement Seeded Restoration Areas:** Add shrubs and perennials to a seeded area to provide more instant seasonal interest and wildlife value while you are waiting for the seeded species to germinate and develop. It can take 2 or 3 years of maintenance for seeded areas to begin to fill in.



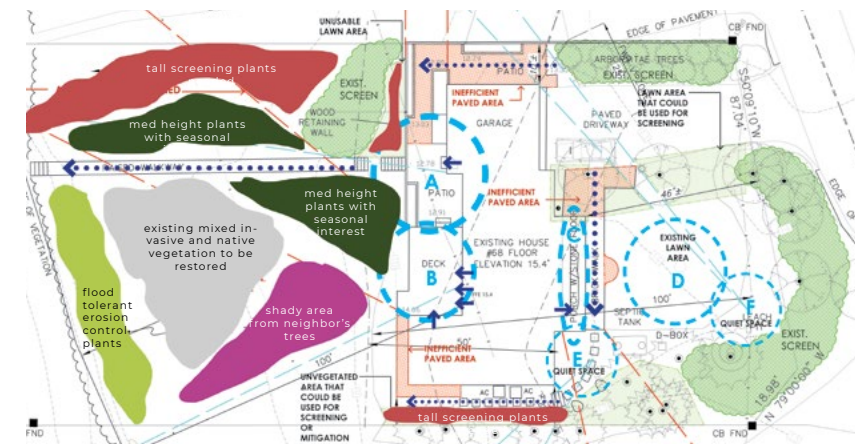
Adding small shrub plantings, grasses and perennials into seeded restoration areas will help add seasonal interest faster than seeding alone.

SELECTING AND LOCATING PLANTS

Now that you have evaluated your site conditions and design objectives, you are better prepared to select plants and design your vegetated pond buffer planting plan. The following are suggested steps to help you choose plants that will be the most effective in achieving your goals and adapting to your site.

CHOOSE THE RIGHT PLANT FOR THE RIGHT PLACE

This means you should select a plant that has the natural characteristics best suited for that location rather than trying to modify site conditions or maintenance practices to accommodate a particular plant. Selecting plants based on their growth habits, soil needs and sunlight needs will reduce or eliminate the need for pruning, irrigation, and soil modification, and will enable successful establishment. For areas near the house and landscape structures, choose plants with root and branching structures that will not interfere with house foundations, roofs, driveways, drainage structures or septic areas. For sloped plantings where you would like to maintain a view, place taller plants at the bottom of the slope, and choose lower growing species near the top.



CREATE A CONCEPT DIAGRAM

To reconcile your site evaluation notes you could create a conceptual diagram. Draw a rough framework of your site or take an aerial photo and highlight areas with similar conditions or specific goals. Add approximate locations of pathways or desired views, screening, and heavily used areas that might impact the buffer area. You might also overlay this diagram with conditions

relevant to planting choices. Color in areas with heavy shade versus frequent sun, or moist soils versus dry. Breaking the plan into smaller pieces can help organize a multitude of factors and narrow down your plant choices.

CREATE PRELIMINARY PLANT LISTS BY AREA

Identify potential species for each area based on plant characteristics. See the appendix at the back of this guide for a list of plants native to Cape Cod, and their associated plant characteristics.

- soil moisture needs (dry, moist/average, wet)
- sun/shade tolerance (full sun, part shade, full shade)
- wind exposure tolerance
- salt air tolerance
- drought tolerance
- flood tolerance
- mature height and width
- growth habits (mounding, spreading, or upright)
- color and bloom time
- seasonal interest (fall foliage, winter features)

CONSIDER GROWTH HABITS

Some species may be aggressive, even if they're native. One example is hay-scented fern (*Dennstaedtia punctilobula*). This plant grows well in dry, shady areas upland of the pond margin, but it spreads underground via rhizomes and can overpower other plants. This species should be placed where it will have room to spread, rather than intermingled with more delicate perennials. Because of its shade tolerance and low moisture needs it works well as a groundcover under trees and larger shrubs. Plants that spread aggressively are useful for quickly stabilizing steep or erosion-prone areas as their extensive root systems develop quickly and help hold soils in place, as long as other layers of plantings can be incorporated for long term soil stability.

Also consider tree forms: some have lower branches that droop and can create dense, shady conditions or impede a view, while others have high canopies that enable large shrubs or small trees to grow under them.

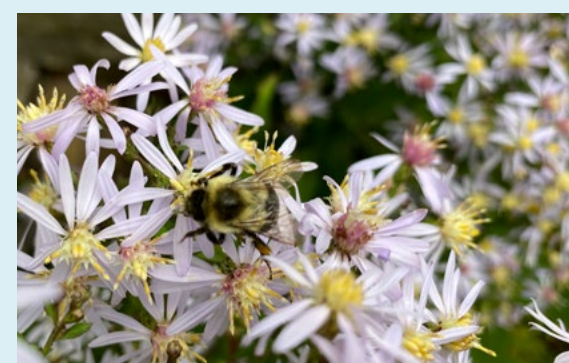
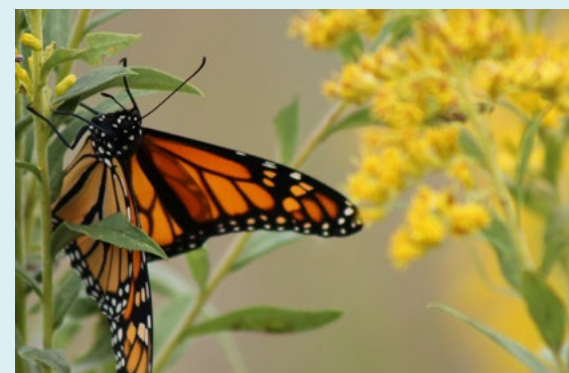
PRIORITIZE ECOLOGICAL QUALITIES WHEN CREATING YOUR PLANT LIST:

- Plants native to Cape Cod
- Plants that are resilient or adaptable to conditions of climate change (such as drought, flooding, and warmer winters)
- Include evergreen plants for winter cover and nesting sites
- Include a variety of plants with different bloom times to support pollinators throughout the year
- Include a variety of plants with different fruit, seed, or nut harvest times to support birds and wildlife all year
- Choose low-maintenance, low growing ground covers rather than turf grass
- Plants that support biodiversity such as keystone and pollinator plants

Keystone Plants are plants that are essential to the life cycle of many species. They are often unique to local food webs in a specific ecoregion. Without keystone plants, that particular ecosystem collapses.

For keystone species by ecoregion visit the **National Wildlife Federation Native Plant Habitats web site:** <https://www.nwf.org/Native-Plant-Habitats>

You can also see keystone species indicated with a key symbol in the native plant list at the end of this book.



Oak, pine, goldenrod and aster are keystone plants that host the larvae of many beneficial insect species that in turn feed birds and other wildlife. Goldenrod and aster provide nectar at a time of year (late fall) when it is desperately needed by native pollinators.
(Photos by Angela Tanner)

LIMIT DISTURBANCE FROM DIGGING

Unless you are working in an area that has been disturbed and compacted by construction activity, do not excavate and re-fill the entire planting area as you may often see on a regular construction site. Instead, dig separate holes for each plant, just large enough to accommodate and cover the root ball. This technique is sometimes called pit-planting, as it allows surrounding soils and vegetation to remain in place, preserving slope stability.

Use small plants on steep slopes. Larger plants have larger root balls, which makes it difficult to completely cover the roots. Small plants will also require less digging and disturbance of existing plantings and soils.

USE TEMPORARY IRRIGATION

New plants, especially smaller plants like plugs and whips (tree starts) do not have a large enough root system to reach available nutrients and water, and can benefit from consistently moist soils. A temporary, above-ground irrigation system is advisable during the establishment period, as long as it is removed when the plants are established and your conservation permit is closed out. Permanent, below grade irrigation systems are not appropriate for buffer zone plantings. Gator bags are another way to ensure new tree and shrub plantings are watered during dry periods.

PROTECT PLANTS FROM WEEDS

Spreading mulch is generally discouraged in conservation areas, however a very thin layer (1-2” just at the top of the root ball), or biodegradable weed guards can help protect new plantings from weed overgrowth while still allowing air and water to reach the soil.

STABILIZE BARE SOILS

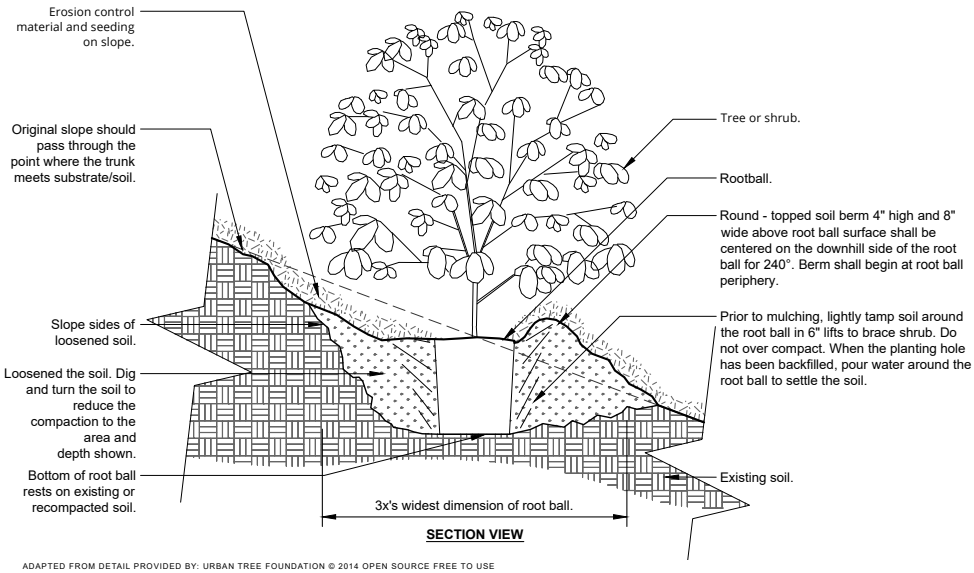
The stabilization of bare soils is important in preventing erosion, discouraging establishment or spread of invasive and/or aggressive weed species, and aiding in the

restoration of healthy landscapes. Some techniques that can be used to stabilize bare soils while establishing new restoration area plantings are:

- **Install a silt fence** or silt socks between the planting area and resource area to prevent disturbed soils from washing into the resource area.
- **Seed bare soils** with erosion control mix typically consisting of grasses, or a combination of native grasses and forbs (wildflowers).
- **Spread chopped straw** or a thin layer of woodchips for flat areas (if permitted by your conservation permit) to keep soils stable while seed is establishing.
- **Install 100% biodegradable erosion control fabric** on steep slopes (typically steeper than 3:1). To protect wildlife and avoid introducing plastic to the environment, do not use fabric with polypropylene weave.
- **Apply a flexible growth medium (FGM)** which is an alternative to blanketing. This is used in combination with a hydroseeded erosion control mix to temporarily hold soils in place until the seeds germinate and develop roots.
- **Install green (living) mulch** instead of, or in addition to, erosion control seeding. Use plugs or small containers of groundcovers that will spread and stabilize bare soils between and under tree and shrub plantings.
- **Incorporate natural soil amendments** such as biochar, Mycorrhizal fungi, or organic forms of compost to improve the germination and establishment of new plantings, especially in areas where soils are highly degraded due to construction activity.

Note: Always check with your local conservation commission to determine which temporary installations and amendments are allowable in your jurisdiction and for your particular site.

INSTALLATION OF VEGETATED BUFFER PLANTINGS



SLOPE PLANTING DETAIL FOR TREES OR SHRUBS

Note: Most vegetated buffer area planting installations should take care to create as little disturbance to soils and existing native vegetation as possible. Planting areas that have been heavily disturbed and compacted by building and site construction activity should employ methods for de-compacting soil or amending depleted soil before planting.



Left: A biodegradable weed guard protects new plants from weeds and makes it easier to find and monitor small plants once erosion control groundcovers begin to fill in.

Right: A temporary above-ground drip system gives trees and shrubs the consistent moisture they need to develop root systems. Spray heads mounted to moveable structures can also be used for grasses and perennials. These systems should be removed once the plantings are established.

ESTABLISHING AND PRESERVING VEGETATED POND BUFFERS

ESTABLISHED BUFFER ZONES ARE NO MAINTENANCE ZONES

Established vegetated pond buffers should remain a maintenance free zone, unless a conservation permit has been granted for specific activities such as invasive plant removal, new plantings, or vista-pruning. Maintenance-free typically includes:

NO CHEMICALS:

Do not apply fertilizers or pesticides (herbicides, fungicides, or insecticides) in vegetated buffer areas.

NO IRRIGATION:

Do not use permanent, buried irrigation systems. Remove temporary above-ground irrigation systems after plantings are established.

NO VEGETATION REMOVAL:

Do not mow, prune, or remove any vegetation including trees, shrubs, and groundcovers. If invasive species are an issue, contact your conservation commission for permission to establish a removal protocol.

NO NEW PLANTINGS:

Once the vegetated area is established, do not disturb the soils with additional digging or planting without permission.

LEAVE NATURAL DEBRIS IN PLACE:

Allow leaf litter, branches, dead stumps and snags (dead trees) to remain in place unless the trees pose a safety risk for people or structures. Decaying wood and organic matter is an important contributor to healthy natural systems including pond habitats, as they replenish nutrients and support beneficial fungi, insects, birds, mammals and aquatic species.

DO NOT DUMP YARD WASTE:

At the same time, this valuable ecosystem is not a dumping ground: do not pile lawn clippings, brush, compost, and other household and yard waste in the buffer area. Those materials can add harmful chemicals or pollutants to the system.



Top: Choosing the right species for the right locations can help create enhanced views of the water below tree canopy and above understory plantings without pruning.

Middle: Once the vegetated buffer is established, pruning of existing vegetation should only be done with conservation commission permission.

Bottom: Allow leaf litter and dead wood to remain, as it is an important part of the vegetated buffer ecosystem.

(Photos by Angela Tanner)

MAINTENANCE DURING ESTABLISHMENT

While vegetated buffers are largely self-sustaining and should mostly remain untouched, monitoring and maintenance during the establishment period can help ensure the new plants adjust to the site conditions and remain healthy over time. During the establishment period, bare soils are vulnerable to water loss, erosion, and weed colonization. Most conservation permits recognize this, and allow 2-3 years for plant establishment, a time-frame that can be extended if appropriate for the project.

TEMPORARY IRRIGATION

A temporary, above-ground irrigation system is advisable for the first few growing seasons, as long as it is removed when the plants have adapted to their new conditions. Newly installed plants do not have fully developed root systems, and may not withstand periods of drought as well as established plantings. (see Installation page for examples of temporary irrigation methods).

PROTECT AGAINST INVASIVE WEEDS

Monitor the planting area periodically for weeds that may be emerging from a disrupted seedbank, roots of invasive species remaining in the soil, or from adjacent properties, so they can be addressed quickly, before they have a chance to colonize. Removing small weed seedlings can usually be done by hand.

Application of herbicides may be useful if there are large populations of invasive plantings present, but in protected wetland areas those chemicals can only be used with permission from the conservation commission, and applied by trained, licensed applicators.

Biodegradable weed guards can be placed at the base of new plants instead of mulch. (see Installation page for example).

MONITORING NEWLY SEEDED AREAS:

Evaluate newly germinating seeded areas to see if some locations need supplemental seeding. Steep slopes especially may require several rounds of seeding, as the seeds can get washed down the slope during rain events.

Mow or cut newly establishing grasses in early spring. Many seed mixes contain both cool season and warm season species in order to ensure soils are covered throughout the growing season. Warm season species are active in summer months, while cool season species are more visible in spring and fall/winter months. A second mow of cool season grasses could be done in June to encourage establishment of warm season grasses if necessary.

MONITOR EXISTING AND NEW PLANTS:

Newly planted specimens typically take several years for their roots to become established, and to start to show significant new growth in branches and foliage. Monitor new plants to make sure they are getting enough water and adjust irrigation if needed.

Trim back grasses around establishing shrubs and perennials, if needed, especially if the plants are small and the seeded grasses are growing more quickly, as they could outcompete the other plants for resources like sun and water. Trimming can be done cautiously, with a string trimmer.

Monitor existing native plants. Prune any shrubs or small trees with damaged or broken limbs that may have occurred during the landscape installation process, and assess the plants for signs of stress or disease.

Monitoring reports describing the status of the plants and health of the restored area may be required by the conservation department to ensure the project meets permit requirements.

NOT IDEAL



WOODCHIPS OR BARK MULCH

This planting area is dominated by woodchips. Not only will the soils dry out more quickly than vegetated areas, it will be susceptible to weeds. Although the shrubs will get bigger, there will always be bare areas below their branches.



MOWED LAWN ON A SLOPE

This steep sloping lawn is mowed on a regular basis. The shallow turf-grass roots offer little erosion control and the lack of foliage fails to filter stormwater runoff from the parking area. This lawn is time consuming to maintain and is too steep to offer recreational benefits.

BETTER OPTIONS



LIVING MULCH / GREEN MULCH

Add groundcovers like groundsel among tree and shrub plantings to reduce mulch applications. Not only do plants look nicer than mulch, they also do a better job of suppressing weeds and retaining soil moisture than commercial mulch.



NATIVE MEADOW ON A SLOPE

Over-seed steeper areas with meadow grasses and wildflowers with deep root systems. The meadow plantings will not need to be mowed as often as turfgrass, will better stabilize the slope, and filter stormwater runoff. Flatter areas can still be mowed for recreational use.



LEAF LITTER AS MULCH

Leave any leaves that fall into planting areas where they are in autumn. They are a natural mulch, adding nutrients back into the soil and providing food and shelter for over-wintering wildlife like moths, butterflies, reptiles, amphibians, and small mammals.



DIVERSE SPECIES ON A SLOPE

Replace the turf grass with a mix of shrubs, grasses and perennials to establish a complex matrix of root systems. A species diverse slope planting will provide better long-term stabilization, wildlife habitat, and more seasonal interest than lawn. The best part? No mowing required.

MAINTAINING ECO-FRIENDLY YARDS NEAR FRESHWATER PONDS

While the goal of this manual is to encourage homeowners to keep developed and highly maintained landscape areas out of the buffer zone and establish dense, native plant buffers instead, there are also things homeowners can do with any remaining manicured areas of the property within or near the buffer zone, to reduce their impact on the pond.

No Chemicals: do not use fertilizers or pesticides (herbicides, fungicides, or insecticides) in or near buffer zones for wetlands. If your landscaper uses chemicals, ask them not to. Many maintenance companies on Cape Cod offer organic land care packages.

Consider Lawn Alternatives: consider replacing as much turf lawn as possible with a more eco-friendly solution that doesn't require irrigation and fertilizer (see Lawn Alternatives page).

Mow High and Recycle Mow Clippings: for any areas that are still maintained with a mower, set the mower blades to 3-4 inches or higher. Mowing grasses high allows the foliage to shade the soil and roots better and conserve soil moisture. It also improves root depth and health, and allows flowering species in pollinator friendly lawns to maintain blooms for the bees and butterflies. Recycling the mowed grass and herbaceous plant clippings back into the mowed areas will return nutrients and water back into the soil.

Irrigation: conservation commissions typically discourage or prohibit permanent irrigation systems within the buffer zone. If you already have an existing irrigation system, or are establishing new plants with a temporary one, set it to water deeply and less frequently, such as two or three times a week, rather than every day. This encourages root systems to grow

deeper and become more drought tolerant, and allows soils to dry slightly between watering which helps prevent root rot, mildew and other plant diseases. Consider replacing your traditional garden plants with drought tolerant species that don't require irrigation.

Use Green or Living Mulch: green mulch is a living groundcover, such as ferns, grasses, sedges, or low growing perennials that are planted in between and under trees, shrubs, and larger perennials. Typically these are plants that can tolerate some shade. Living mulch does a better job of retaining soil moisture, moderating soil temperature and suppressing weeds than bark mulch. Its root systems contribute to soil stability, and erosion control, and it provides benefits for insects and birds.

Leave the Leaves: leave any leaves that fall into planting areas in autumn, and in areas of existing lawn, rake leaves into a compost area such as a vegetable garden rather than disposing of them. If you dislike the way the leaves look, consider mowing them first and spreading the remains into landscape beds. Leaves are a natural (and free) form of mulch, adding valuable nutrients back into the soil and providing shelter for wildlife.

Hold the Fall Cleanups: allow grasses and perennials to remain standing through the winter rather than cutting them back in fall. Their seed heads and foliage provides food and cover for birds and small animals, and their hollow stems provide nesting locations for native bees. The uncut foliage also helps insulate and protect the soil and root systems. The mounding grasses and dried seed heads also provide visual winter interest. If you must cut the vegetation back seasonally, wait until spring when temperatures have warmed.

TRANSFORM YOUR TURF WITH LAWN ALTERNATIVES

Many of Cape Cod’s freshwater pond and lake shores and their buffers have been significantly altered by residential lawn development. Traditional suburban turfgrass lawns, while visually appealing to many, contribute to multiple environmental issues.

As awareness of the harmful effects of traditionally maintained lawns grows, the ecological and economic benefits of alternative solutions are becoming more attractive, and as public interest and demand increases, resources for those lawn alternatives are becoming more readily available. Not only can a lawn alternative reduce the time and cost of maintaining your yard, it can also provide seasonal interest and color, attract wildlife, and better filter contaminants from stormwater runoff.

If you are afraid to take the leap in transforming your lawn into a more eco-friendly zone, start small. First, eliminate your lawn in places where it is difficult to maintain, such as steep slopes, areas with dense tree canopy, or locations along fences, parking areas, and buildings. Remove turf and replace with drought tolerant, native plantings that will not need mowing, irrigation, or fertilizer. Incorporating green mulch (groundcovers) into the planting areas will reduce the need to weed as well.

If you actively use your lawn for recreational purposes, consider a “Cape Cod Lawn” or a pollinator friendly lawn composed of deep rooted fescues and low growing wildflowers that can still be mowed on a regular basis.

Whatever strategy, or combination of strategies you choose, you may find the benefits of eliminating lawn well worth the change.



Hayscented ferns are a better option than lawn for the sloping path edges near this deck.



Areas under and between trees are too shady for lawn and are difficult to mow. Lowbush blueberry and huckleberry are a low maintenance (and tasty) choice.



A pocket meadow is a more pollinator friendly substitute for lawn at a fence and driveway entrance.



This narrow strip between stepping stones and driveway was not useful as lawn space, so it was replaced with native grasses.



This mowed path leads through a meadow of little bluestem, goldenrod, boneset and yarrow. It is often filled with birds and pollinators, making the journey as interesting as the destination. *(Butterfly Photo by Angela Tanner)*



Pollinator lawns offer more support for wildlife than traditionally maintained turfgrass does.

WHY ARE TRADITIONAL LAWNS PROBLEMATIC?

INEFFICIENT USE OF WATER RESOURCES

Turfgrass often requires excessive amounts of water because its shallow root systems are not able to efficiently reach and absorb water deep in the soil. (Cool season turfgrass roots are typically only 2-6 inches deep).

During wetter seasons, when irrigation is not needed as often, many homeowners fail to monitor their irrigation systems, and over-water their lawns, causing excess irrigation water to run into streets and waterbodies.

INABILITY TO MANAGE AND FILTER STORMWATER

Because turfgrass is typically mowed to a height of only a few inches, it lacks the foliage and density of plant matter to slow down, absorb and filter stormwater running across it.

CONTRIBUTE TO POLLUTION OF AIR AND WATER

Turfgrass is often maintained with high amounts of fertilizer and pesticides (including insecticides, fungicides, and herbicides) because its shallow roots are not able to efficiently absorb nutrients or compete with weeds and pests. As excess irrigation and stormwater runs quickly across lawn areas, it carries any fertilizers and pesticides that were applied with it, which ultimately end up in our water resources. Lawn maintenance practices such as gas-powered lawn mowers and leaf blowers contribute to not only greenhouse gases, but poor air quality and noise pollution.

DIMINISH OVERALL BIODIVERSITY

Traditional lawns replace more species diverse native plant communities, and do not provide the vital resources wildlife needs such as pollinator habitat, food, and cover.

IMPACT TO ENVIRONMENTAL HEALTH

Lawncare chemicals carried in runoff can contribute to excessive plant growth, degrade water quality of a pond, and negatively affect the creatures that live in and around the pond.

DID YOU KNOW THAT RESIDENTIAL OUTDOOR WATER USE ACROSS THE UNITED STATES ACCOUNTS FOR NEARLY 8 BILLION GALLONS OF WATER EACH DAY, MAINLY FOR LANDSCAPE IRRIGATION? THE AVERAGE U.S. HOUSEHOLD USES MORE WATER OUTDOORS THAN FOR SHOWERING AND WASHING CLOTHES COMBINED.

BENEFITS OF LAWN ALTERNATIVES

CONSERVE WATER

Species with deep, complex root systems are better able to withstand periods of drought. The need for frequent watering will be eliminated, and depending on the lawn alternative that you choose, the area may not require supplemental water at all.

IMPROVE WATER QUALITY AND PUBLIC HEALTH

Replacing shallow turfgrass root systems with a more complex system of roots and more foliage above the ground will allow stormwater runoff from adjacent properties and streets to slow down as it moves through the area, giving it time to absorb into the ground. This process reduces the amount of chemicals actually reaching freshwater resources.

Using a combination of native species that are adapted to our region eliminates the need for fertilizer and pesticides.

REDUCE POLLUTION OF AIR

Choosing a planting solution that doesn't need to be mowed regularly reduces contribution to greenhouse gases. If implementing a lawn alternative that does require some regular mowing, consider switching to electric equipment, which reduces the pollution gas mowers and leaf blowers contribute.

IMPROVE OVERALL BIODIVERSITY

Replacing lawn with more beneficial species attracts native bees, butterflies, songbirds, reptiles, amphibians, and birds of prey, improving the biodiversity in your neighborhood and bringing more vitality to your landscape.

REDUCE MAINTENANCE COSTS

Reducing or eliminating irrigation on your pond adjacent property by replacing turfgrass lawns with drought tolerant plants reduces water bills, and less mowing means more time to enjoy the enhanced views you've created by adding more seasonal interest and wildlife habitat to your piece of the world.

MEADOW

Meadow plantings include grasses and wildflowers with deep root systems, making them more drought tolerant and reliable than turf grass. Meadows also don't need to be mowed very often, once established, though they benefit from being mowed once a year, or every few years, to help control weedy species.

NO MOW GRASSES AND SEDGES

Several native species of grasses and sedges stay short and don't require regular mowing, but still present the visual effect of an open, grassy area. Examples include Pennsylvania sedge, Appalachian sedge, wood sedge, curly wood sedge, poverty grass, creeping red fescue and chewing fescue.



SPREADING GROUNDCOVERS

Many low-growing plant species spread on their own and don't need to be mowed. These could be planted in areas that aren't being used regularly for recreational activities. Examples are lowbush blueberry, hay-scented fern, bearberry, wild strawberry, golden groundsel, and creeping juniper.

DROUGHT TOLERANT FESCUE LAWN

Recently, drought tolerant fescue lawn mixes have been developed that are comprised of fescues that have deeper root systems and require less irrigation and fertilizer than commonly used turfgrass.

POLLINATOR FRIENDLY LAWN

This typically consists of a grass seed mixed with other perennials that either stay low or can be mowed on a regular basis. Many of those species can actually help improve the soil quality of the lawn grasses, reducing the need for fertilizer.

Examples of pollinator attracting species that could be mixed in with a deep rooted (drought tolerant) fescue lawn option include violets, clover, barren strawberry, bluets, and pussytoes. Some fescue lawn mix providers sell compositions with pollinator friendly plants already in it, in either seed or sod form.

POLLINATOR OR MEADOW POCKETS

If you want to reduce lawn but are not ready to over-haul the entire area, consider replacing some smaller areas of your lawn, such as areas near fences, structures, or parking areas, with pocket-sized meadow gardens composed of drought tolerant grasses, wildflowers and shrubs.

CAPE COD LAWN

A Cape Cod lawn is an informal composition of native species that typically exist or appear on their own in open, mowed areas that are not highly manicured. Cape Cod lawns are usually made up of plants like mosses, sedges, violets, low-bush blueberry, bearberry, wintergreen, and little bluestem.

You can grow a Cape Cod lawn by choosing to stop irrigating or fertilizing your lawn, and let nature take over. You could also encourage these species by planting them in key locations (like edges of walkways and patios) and allowing them to spread on their own.

LAWN ALTERNATIVES



Refer to Appendix B: Plant Lists at the back of this book for species marked with this symbol. They could be part of an alternative lawn solution.



Common yarrow (*Achillea millefolium*) can be mowed as a lawn alternative or incorporated into meadows and pollinator lawns.



Bluets (*Houstonia caerulea*), wild strawberry (*Fragaria virginiana*) and violets can naturalize into lawns and tolerate some foot traffic.

WHAT IS EROSION?

Erosion is the removal and transport of soil by mechanical means such as wind and water.



Residential homes abutting ponds or other bodies of water on Cape Cod often experience erosion, facing impacts such as:

- Loss of residential land.
- Deposits of sediments from surrounding soils into the waterbody can affect water levels, plant growth, and aquatic species habitat composition.
- Introduction of non-native soil to water bodies from foreign construction fill which may be contaminated with materials and chemicals used in the construction process.
- Higher flood risk due to diminishing shorelines.
- Water quality degradation due to fertilizers and pesticides from things like traditional turfgrass lawns (as described in previous pages).



Blanketing slopes with biodegradable erosion control fabric holds soil in place while plant roots are establishing.



This narrow area along a set of raised steps is hydroseeded along with a flexible growth medium that temporarily stabilizes soil until the seed can germinate.



Filter socks help catch sediments in erosion-prone areas before they reach resource areas.



Fiber rolls help stabilize the toe of the slope that may be eroding due to wave action, until vegetation is established.



Check dams are a more permanent solution, but are also typically used in combination with plantings.



Sweet pepperbush (*Clethra alnifolia*) was planted with this check dam because it colonizes readily and is already thriving in other locations on this property.

EROSION CONTROL STRATEGIES

Note: these strategies are temporary, soft solutions, and are used in combination with establishing native plants in order to encourage more permanent, living erosion control systems. The temporary erosion control materials are meant to decompose naturally once plant roots begin to establish, causing no long-term damage to the resource areas. Hard solutions like stone or concrete revetments are only allowed under special circumstances, with permits.

- Use 100% biodegradable blankets made of natural materials on slopes 3:1 or greater, fastened with wooden (not plastic) stakes. Seed and supplement the blanketed area with small plantings that will spread and stabilize the slope.
- Apply flexible growth medium along with hydroseed as an alternative to blanketing on slopes, as it temporarily holds soils in place while creating hospitable conditions for seeds to germinate.
- Consider installing fiber rolls at the toe of the slope to prevent erosion or slow runoff.
- Implement live staking with species like willow or dogwood on steep and eroding slopes. This involves burying fresh cuttings of plants that develop strong root systems and colonize along steeply sloped wetland edges.
- Install silt fencing during construction to prevent runoff of sediment into waterways and protected areas.
- Install filter socks in areas where erosion is causing runnels or channels.
- Install check dams in areas that are experiencing particularly heavy levels of erosion like pathways.
- Cover soil stockpiles during construction so that they don't wash into resource areas.

Note: Always check with your local conservation commission to determine which erosion control materials and installations are allowable for your particular site.

EXAMPLE ONE:



Year one: existing invasive plant material is removed, and the area is seeded. Areas that are disturbed from re-grading and new deck construction are blanketed and filter socks installed. Some of the shrubs have been planted through the erosion control fabric.



Years two and three: the area is filling in well with shrubs and meadow plantings, but patchy areas persist where invasive grasses are re-appearing and being removed.

Year three: this area is filling in well, though some areas of the site are still adjusting, so the conservation permit is extended in order to help install some additional shrub and wildflower plantings.

EXAMPLE TWO:



A mitigation planting area during the first growing season.

A mitigation planting area after one growing season without erosion control seeding.

A mitigation / restoration planting area after one growing season with erosion control seeding.

EXAMPLE THREE:



Invasive plant removal at the beginning of year one.

After a growing season, seeded areas are beginning to fill in, though new shrub and perennial material have not been installed.

After two more growing seasons, new shrubs and supplemental wildflower plantings are establishing.

SETTING REALISTIC EXPECTATIONS

Establishing native plant communities in disturbed or degraded areas does not happen overnight. It typically takes 3 years or more, depending on the site conditions, for these areas to become stabilized and thrive on their own. During that time, those areas need to be monitored and managed to ensure the plants are germinating and establishing healthy root systems and foliage, getting enough water, and invasive weeds are kept under control. Erosion control materials need to be maintained so they don't end up getting washed or blown into resource areas.

YEAR ONE: INVASIVE PLANT REMOVAL

During the initial stages of the project, the area is typically cleared of invasive species, if vegetation removal is part of the permitted project. If it isn't, it is helpful to get permission to at least cut invasive plant growth back if it is present. For instance, if neighboring properties have invasive plant material, maintaining a three to four foot wide area clear of woody vegetation at the property line will help keep the invasive plants from growing into newly establishing planting areas.

Once invasive vegetation is cleared, the area is stabilized with erosion control material if needed, and seeded with erosion control mix. The area is monitored for new weeds.

YEAR ONE OR TWO: INITIAL PLANTING

Depending on when invasive plant populations are under control, planting may happen the first or second year. Trees, shrubs and any supplemental grass and perennials are planted. The area will continue to be monitored for invasive weed growth. Temporary irrigation systems are typically installed at this point, and additional seeding might be applied especially on slopes.

This is the stage where the area is visually at its worst. It is still lacking substantial vegetation, new plantings are barely showing signs of growth because they are putting their energy into their root systems, and

annual weeds and small sprouts of invasive plants seem to be out of control.

YEAR TWO MONITORING AND MAINTENANCE

After a full season of growth, seeded areas should be showing signs of germination and growth. Depending on the seed mix used, you may see some species more than others. Most seed mixes will include a mix of cool and warm season grasses, and they may also contain a cover crop like partridge pea or annual ryegrass, which can help stabilize soils quickly but are not particularly attractive on their own. Some grasses and wildflowers take a full season to germinate and won't appear the first year. At this stage, new plants are showing signs of new foliage and stem growth but there are still large bare areas. Supplemental seeding might be beneficial at this stage.

YEAR THREE MONITORING AND MAINTENANCE

After two to three full seasons of growth, depending on what time of year the initial planting was installed, seeded areas are filling in and new tree, shrub and supplemental perennial materials are filling in as well. There may still be certain types of weeds and patchy bare areas, but the new plants should be adapting. At this point, the conservation commission may extend the permit if it looks like the area still needs some maintenance, or if the area seems stable, the permit may be closed out.

ONGOING MONITORING

Even in native planting areas that have adapted well, it is possible for invasive plantings to appear from neighboring properties, birds, or other mechanisms. Monitoring the area regularly for signs of invasive plant colonies is a good idea, though you will need to obtain conservation permission to do further treatments or removals.

COMMON TERMS ON LANDSCAPE PLANS SUBMITTED FOR CONSERVATION COMMISSION REVIEW OR DISCUSSED DURING PUBLIC HEARINGS

No disturbance zone: an area of the buffer in which new development is prohibited. The widths and restrictions for a no-disturbance zone vary depending on the town or the specific resource areas near a site, but it is often the first 50 or 75 feet from the resource area.

Mitigation planting: an area of native planting that may be required by a town’s bylaws in order to permit certain development within a buffer zone. This is often in exchange for an increase in impervious surfaces, which are surfaces in which water cannot flow through, such as a patio, driveway, or roof. Mitigation plantings are typically placed in areas lacking tree or shrub vegetation (such as bare soil, mulch, or lawn). They are also located as close to the resource area as possible.

Naturalized area: may refer to parts of a site that are fully vegetated, and not regularly maintained, but allowed to grow naturally. Naturalized areas may or may not be comprised of native plantings. Some naturalized areas contain non-native or invasive plants that have adapted to the site and established colonies.

Restoration planting: refers to an area that is restored to a native plant community by removing pavement, lawn, or non-native plantings and replacing them with native trees, shrubs, and groundcovers. Restoration planting can sometimes count as mitigation

for site development, depending on the town’s bylaws, but it can also be done voluntarily in order to improve the overall conditions of the site. Even though it is an improvement to the ecology of the site, permission from the conservation department is always required for restoration work within a buffer zone.

Ornamental or landscape planting: areas of more traditional plantings that are maintained as garden beds rather than naturalized areas. These beds often have a mix of native and non-native plantings, but most conservation commissions encourage the use of native plantings even in landscape beds, if they fall within the pond buffer zone.

Traditional lawn: area of turfgrass, or an area that is regularly mowed. Lawn areas are highly discouraged and most towns will not permit existing naturalized vegetation in a buffer zone to be replaced with lawn.

Cultivar: a variation of a plant species cultivated by selective cross-breeding. For example, the name *Acer palmatum* ‘Bloodgood’ refers to a cultivar of a Japanese maple tree called ‘Bloodgood’. Conservation commissions do not typically allow the use of cultivars in vegetated buffer areas.

Nativar: a cultivar of a native plant, such as *Acer rubrum* ‘October Glory’, in which case October glory is the cultivated variant of a red maple tree. Although red maple trees

are native to Cape Cod, nativars cannot be used as mitigation plants and the guidelines on using nativars in other areas of the buffer zone vary from town to town.











Vista pruning or vista corridor: it is usually possible to obtain permission from the conservation commission to selectively prune or remove plants in order to create a view of the pond if no views currently exist. The created view is often called a view or vista corridor. Most towns limit the amount of pruning and removal that can be done in order to protect the overall integrity of the buffer. Permits are required to prune or remove vegetation, even for views, but most allow homeowners to maintain a vista corridor on a long-term basis.

Monitoring reports: if mitigation or restoration plantings are part of an approved plan, the conservation commission may request regular monitoring reports describing the status of the plants and the health of the restored area in order to ensure the project meets requirements established during permitting.

Please Note: *These descriptions are general, and for planning purposes only. The exact terms may be defined differently by your town’s conservation department.*

APPENDIX A:
DESIGNING AND PRESERVING VEGETATED BUFFERS
EXAMPLE PLANTING STRATEGIES

LEGEND

	EXISTING EDGE OF LAWN TO BE REMOVED
	EXISTING TREE TO BE REMOVED
	50' BUFFER ZONE DELINEATION (TYPICALLY A NO-DISTURB ZONE)
	100' BUFFER ZONE DELINEATION
	EXISTING CANOPY TREE (OVERSTORY VEGETATION TO REMAIN)
	EXISTING SHRUBS OR GROUNDCOVER (UNDERSTORY VEGETATION TO REMAIN)
	LOCATION OF SECTION CUT-LINE
	NORTH ARROW
	GRAPHIC SCALE (TYPICALLY 1" = 20'-0" IN THIS APPENDIX)
	SIGHT LINES FOR PLANNED VIEWS OF POND Area where a view is possible either above understory vegetation and/or below tree canopy. This is not a proposed "vista pruning" area. Views are achieved by keeping in mind mature heights of each species and placing new plantings in appropriate locations, rather than by pruning.

PLANTING WITHIN FRESHWATER POND BUFFER ZONES

Although an ideal wetland buffer zone would remain fully vegetated and completely free of development, it is not always possible. Many property owners want to have views of the pond, or access to the water for recreational purposes via pathways, steps, boardwalks and/or docks.

It is also common to find homes that were built before the Wetlands Protection Act, and those homes and their associated landscape development fall at least partially within the buffer zone. Furthermore, many parcels are too small to keep structures and site features completely out of the buffer zone and still meet other property restrictions such as zoning setbacks. In those situations, it is often necessary for homeowners and the local conservation commission to come to an agreement on how best to handle site development activities while protecting the wetland resources as best as possible.

It is important to have a site plan that shows the existing site conditions, the resource areas, and any proposed construction activity including building additions, site features, removal of trees or vegetation, and new plantings. This plan is submitted to the conservation department along with the permit application and is discussed during the public hearing.

The following pages present 11 concept plans and 1 sample permitting plan showing different planting strategies for residences within buffers for freshwater ponds. Most scenarios assume there is already development such as buildings, site features, and lawn within or adjacent to the buffer zone, which is a typical condition of pond shore properties on Cape Cod. Some of the plans address potential mitigation areas, while most represent options for homeowners who would simply like to improve site conditions by controlling stormwater and erosion, create wildlife habitat, or introduce more seasonal interest to their buffer.

These plans are meant to reinforce some of the concepts discussed earlier in this book, and are not intended to be templates for conservation permitting plans. The bylaws and permitting requirements for wetland protection vary for each town. Those requirements can also change over time as the composition of commission members and staff changes. Contact your town’s conservation department or commission for additional guidance.

CONCEPT #1






Existing Site Conditions:

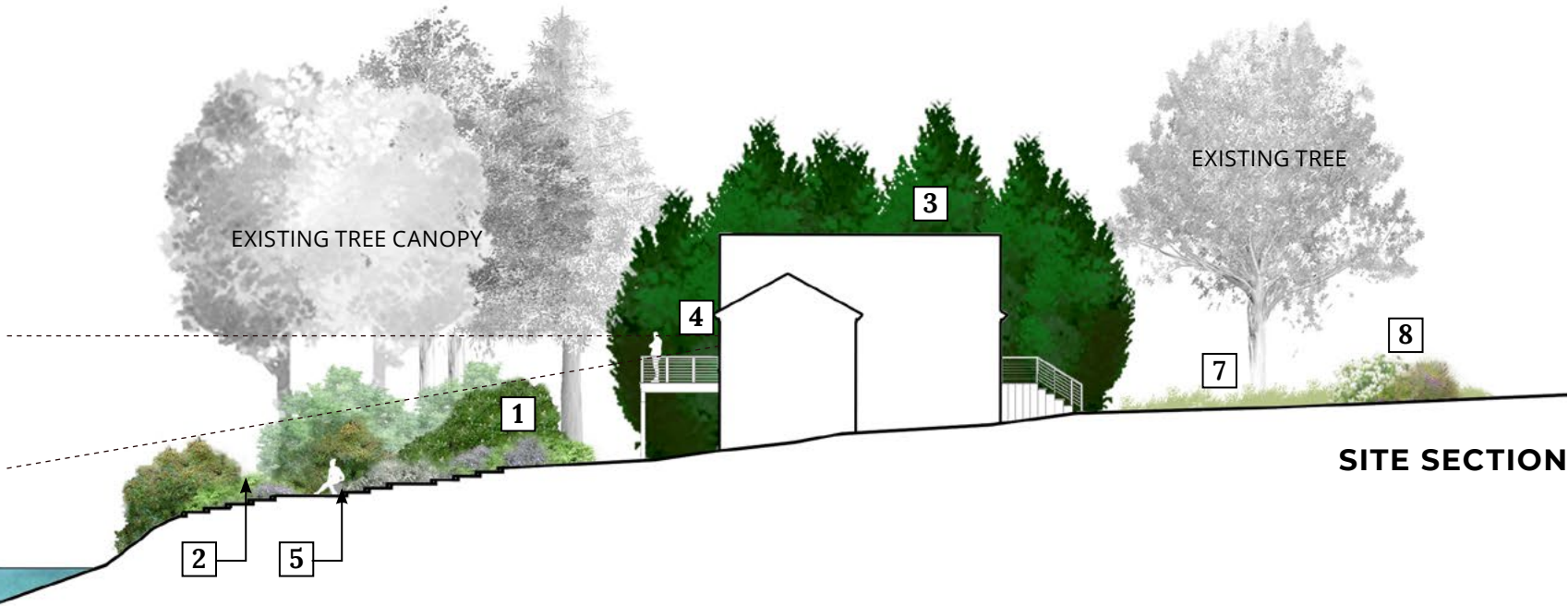
- Dwelling is completely in the buffer zone.
- A healthy tree canopy creates shade conditions.
- Understory consists of patchy groundcovers with no significant shrub material and an area of turf lawn.
- Soils are moist but well-drained with organic matter.

Site Goals:

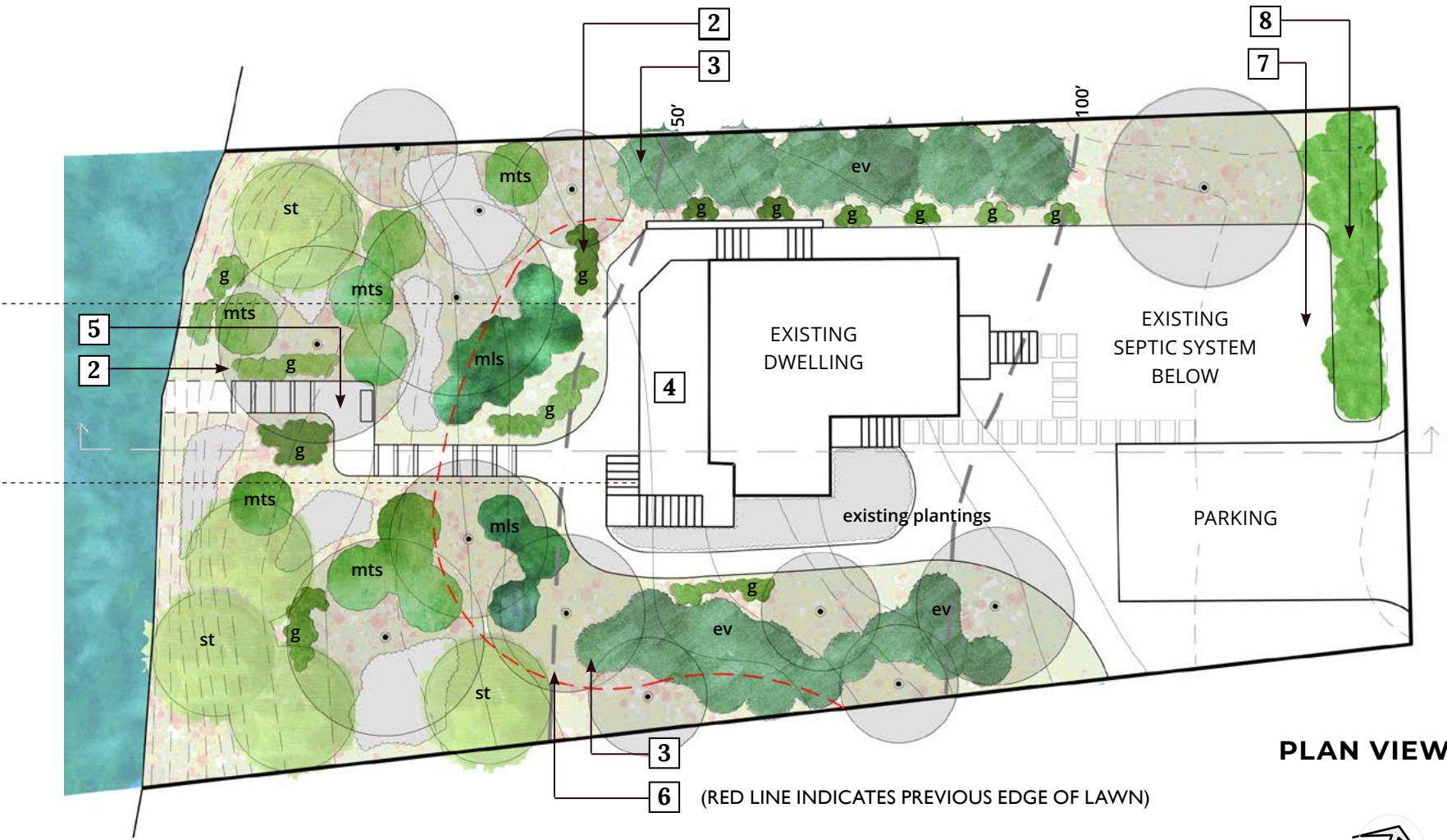
1. Re-establish understory layers by planting shrubs to help control erosion and provide seasonal interest. Focus on areas where existing groundcovers are sparse.
2. Supplement bare soil areas with additional groundcovers.
3. Provide shade-tolerant evergreen plantings next to the house to provide privacy between neighbors.
4. Preserve a distant view from main floor/deck level.
5. Provide steps to the water and a small bench area that works with existing vegetation and topography.
6. Remove turf lawn from the back yard area.
7. Maintain open play space in the front yard (consider using lawn alternatives such as a “no mow” fescue or native groundcovers).
8. Provide a small planting strip between the street and front yard as a first line of defense for stormwater runoff.

Suggested Plants:

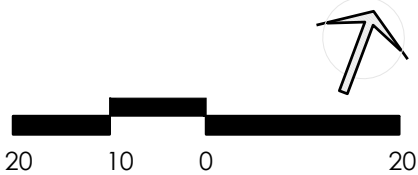
	Small trees (15-25' ht) <i>Amelanchier canadensis</i> (Shadblow serviceberry) <i>Ostrya virginiana</i> (Hop hornbeam) <i>Alnus serrulata</i> (Smooth alder)
	Evergreen screening (trees or shrubs) <i>Ilex opaca</i> (American holly) <i>Ilex glabra</i> (Inkberry) <i>Juniperus virginiana</i> (Easter red cedar)
	Medium-tall shrubs (6-10' ht) <i>Clethra alnifolia</i> (Summersweet / Sweet pepperbush) <i>Cornus amomum / Racemosa</i> (Silky / Gray dogwood) <i>Ilex verticillata</i> (Winterberry)
	Medium-low shrubs (4-6' ht) <i>Gaylussacia frondosa</i> (Huckleberry) <i>Myrica gale</i> (Sweet gale) <i>Rosa palustris</i> (Swamp rose)
	Groundcover / Green mulch (less than 3' ht) <i>Carex blanda</i> (Wood sedge) <i>Onoclea sensibilis</i> (Sensitive fern) <i>Eurybia macrophylla</i> (Big-leaved aster)

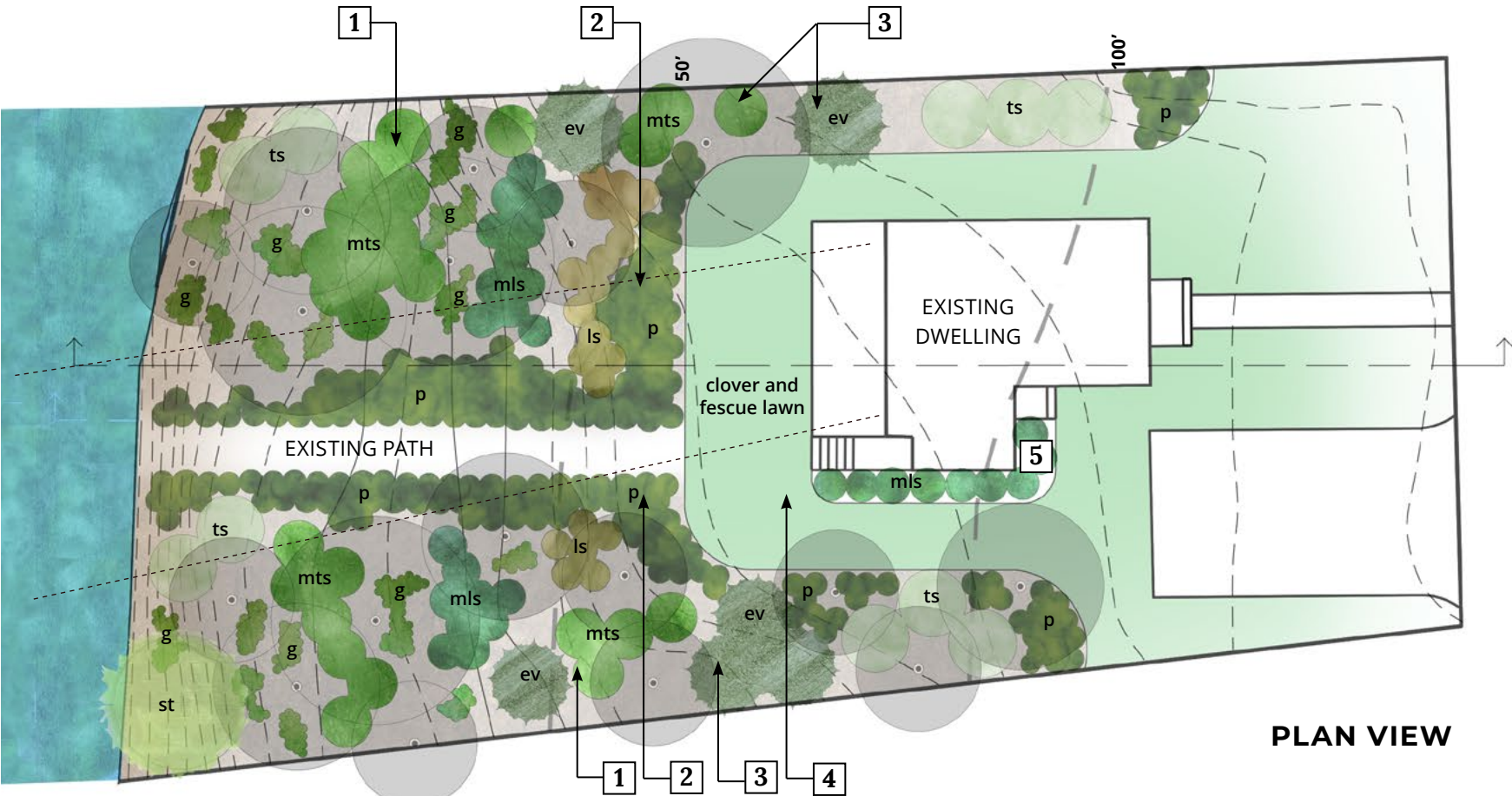
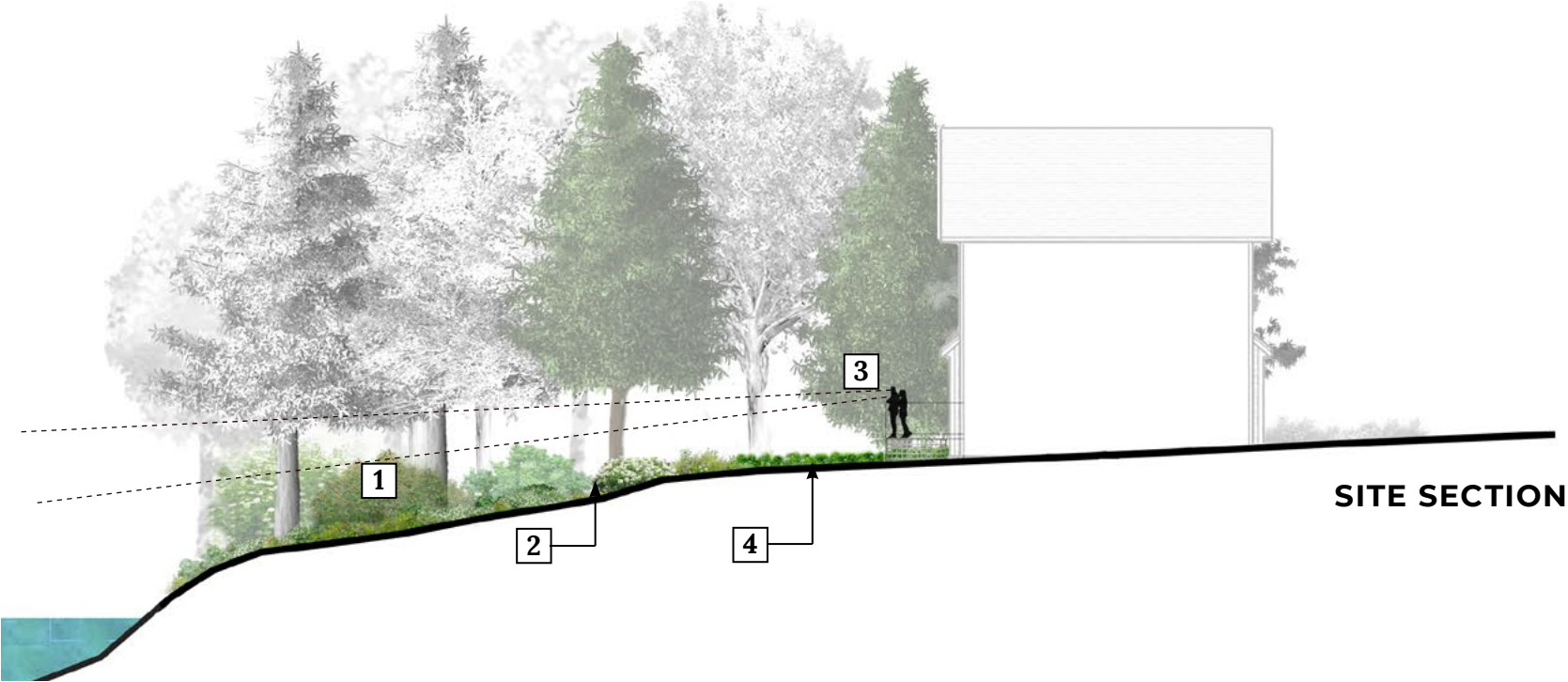


SITE SECTION



PLAN VIEW





CONCEPT #2





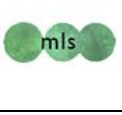

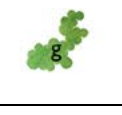

Existing Site Conditions:

- Dwelling is partially in the buffer zone.
- A healthy tree canopy creates shade conditions.
- Understory consists of little or no vegetation.
- Soils are dry and rocky.
- There is an existing turf lawn area in the buffer zone.

Site Goals:

1. Re-establish understory layer by planting shrubs and groundcovers under the tree canopy to help control erosion.
2. Preserve a view from lower porch level by planting low growing shrubs and perennials at edges of the lawn and path.
3. Provide privacy screening for the porch and back yard area.
4. Convert existing lawn into a drought tolerant clover/fescue mix.
5. Replace foundation plantings with native plants that are more drought tolerant.

Suggested Plants:

	Small trees (15-25' ht) <i>Cornus alternifolia</i> / <i>Florida</i> (Pagoda / Flowering dogwood) <i>Hamamelis virginiana</i> (Witch hazel)
	Evergreen screening trees <i>Juniperus virginiana</i> (Eastern red cedar) <i>Pinus rigida</i> (Pitch pine)
	Tall shrubs (10-16' ht) <i>Vaccinium corymbosum</i> (Highbush blueberry) <i>Viburnum dentatum</i> (Arrowwood viburnum)
	Medium-tall shrubs (6-10' ht) <i>Aronia arbutifolia</i> (Red chokeberry) <i>Corylus cornuta</i> (Beaked hazelnut)
	Medium-low shrubs (4-6' ht) <i>Aronia melanocarpa</i> (Black chokeberry) <i>Rosa virginiana</i> (Virginia rose)
	Low shrubs (2-4' ht) <i>Comptonia peregrina</i> (Sweet fern) <i>Kalmia angustifolia</i> (Sheep laurel)
	Groundcover / Green mulch (less than 3' ht) <i>Carex albicans</i> (White tinged sedge) <i>Dennstaedtia punctilobula</i> (Hayscented fern)
	Perennial grasses or wildflowers <i>Deschampsia flexuosa</i> (Wavy hairgrass) <i>Eupatorium hyssopifolium</i> (Hyssop-leaved boneset)

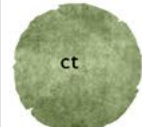







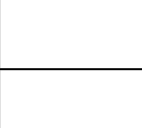
CONCEPT #3

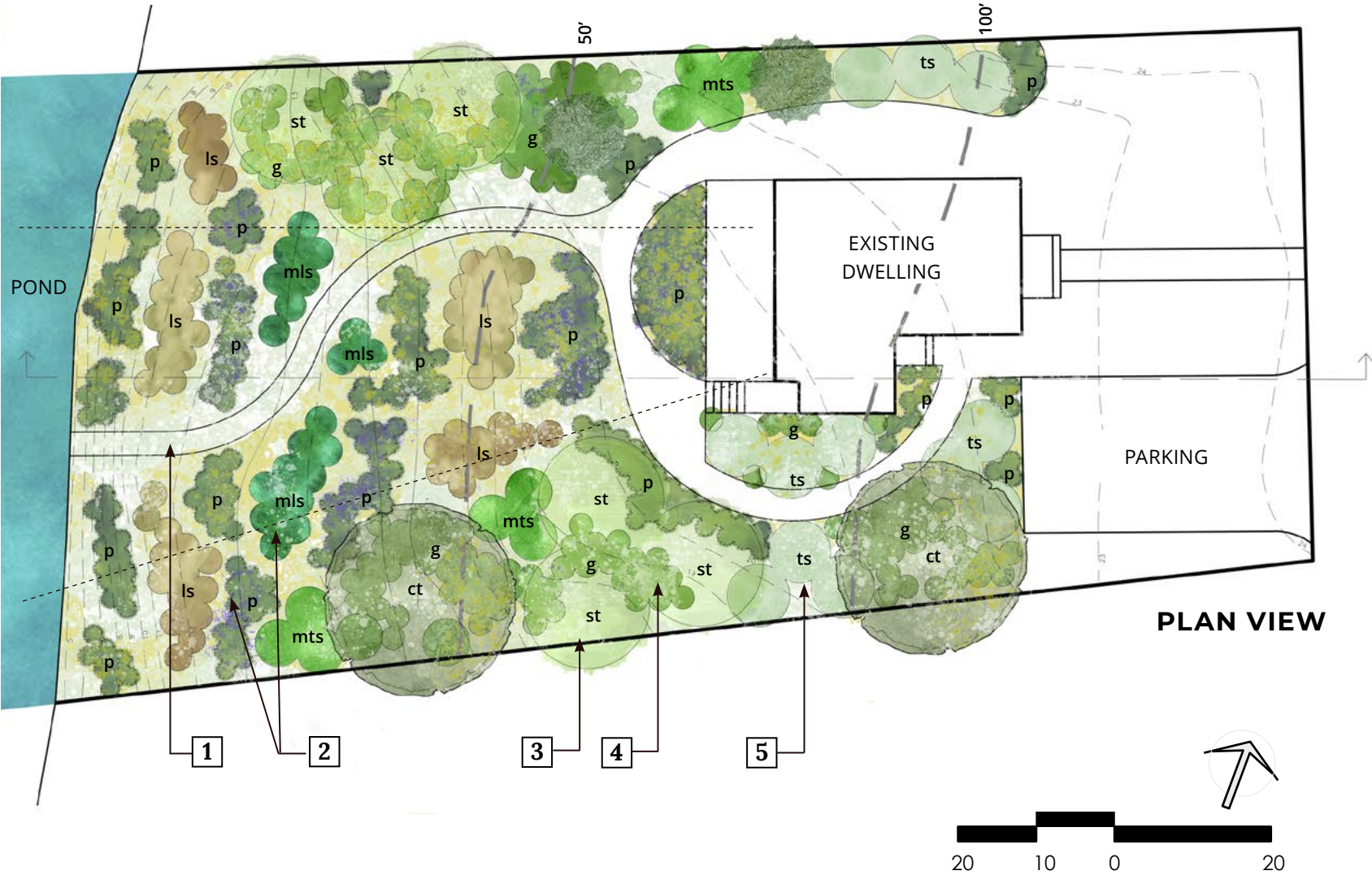
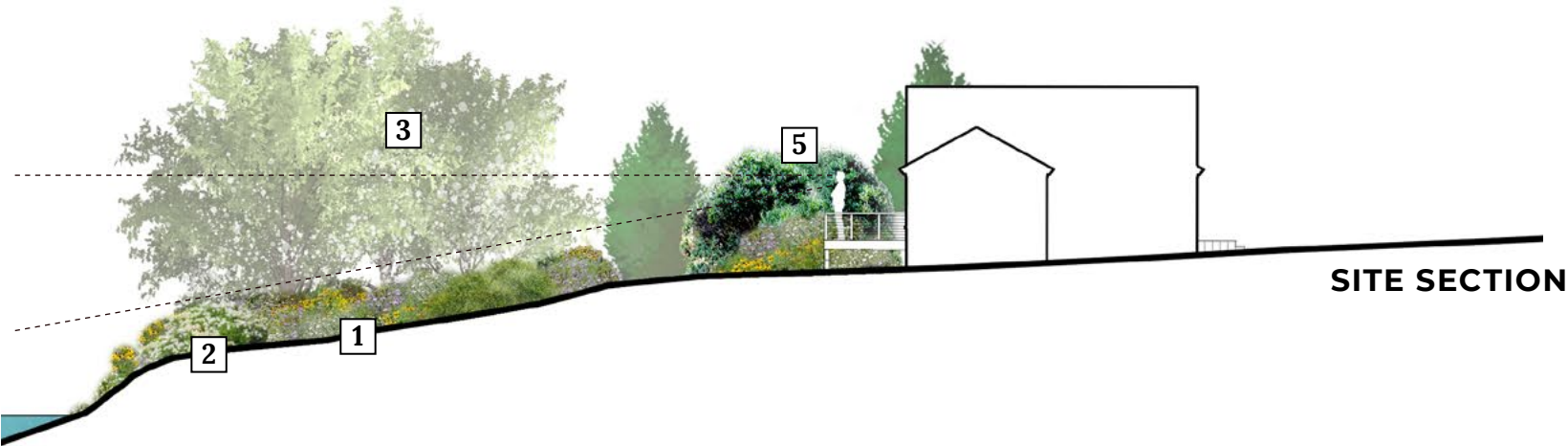
Existing Site Conditions:

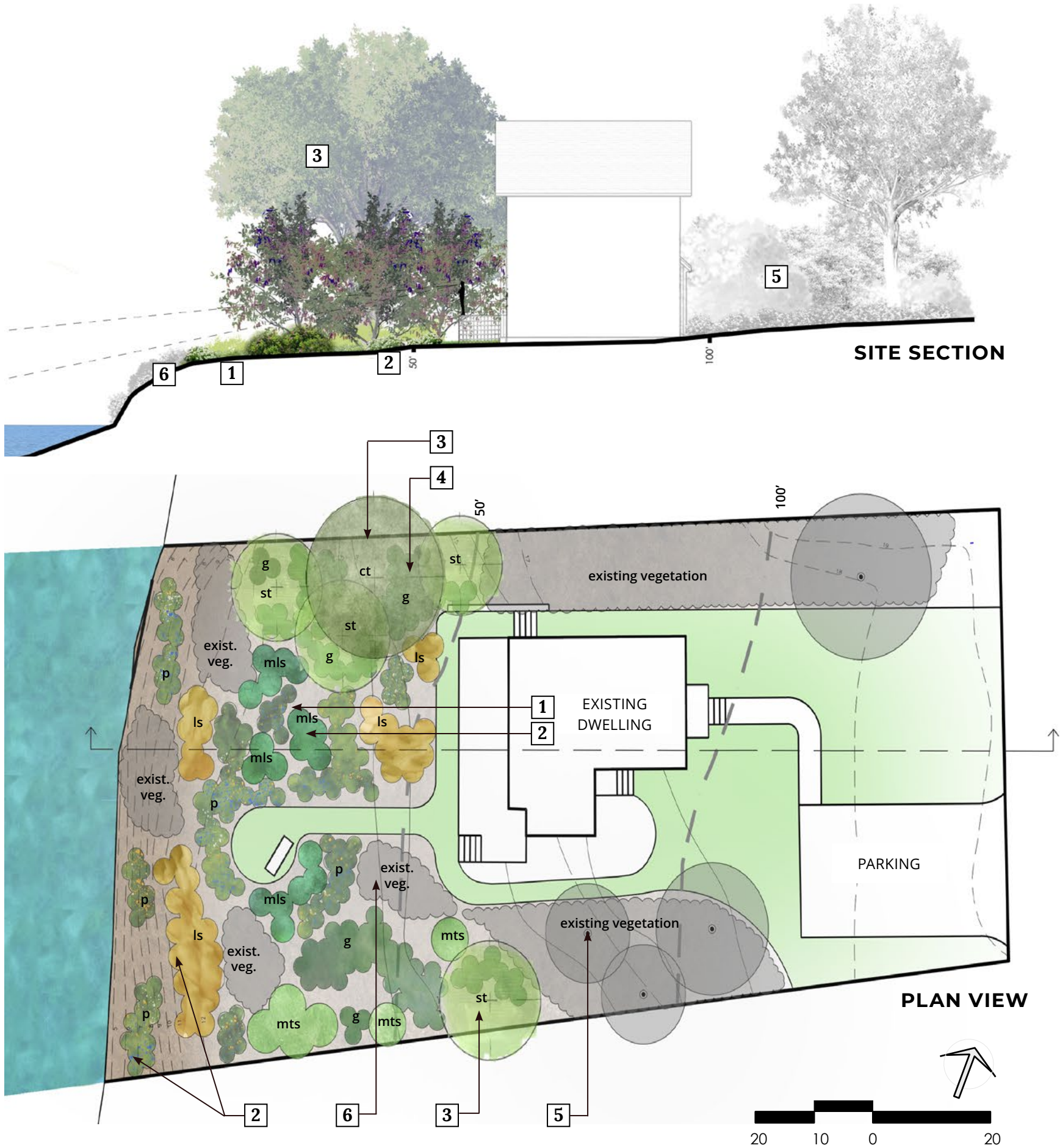
- Dwelling is partially in the buffer zone.
- Buffer zone consists of mostly lawn with no trees or shrubs.
- Site slopes consistently from street to water, and stormwater runoff washes directly into the pond.
- Soils are average to moist and well drained.

Site Goals:

1. Remove lawn in the back yard. Blanket and seed bare soils with meadow species to stabilize soils and filter runoff.
2. Because the seeded meadow species take several years to establish, they will not provide much erosion control or visual interest in the short-term. For more instant impact, add clusters of container plantings including low shrubs and perennials.
3. Plant deciduous trees to screen upper story windows and provide wildlife habitat and additional erosion control.
4. Ensure areas below trees are planted with groundcovers that can adapt from sun to shade conditions as trees become established and eventually provide more shade.
5. Plant fast growing shrubs where immediate screening at lower levels is desired.

Suggested Plants:			
	Canopy trees <i>Acer rubrum</i> (Red maple) <i>Nyssa sylvatica</i> (Tupelo) <i>Quercus alba</i> (White oak)		Evergreen trees/shrubs <i>Ilex opaca</i> (American holly) <i>Kalmia latifolia</i> (Mountain laurel)
	Small trees (15-25' ht) <i>Alnus incana</i> (Alder) <i>Amelanchier laevis</i> (Smooth serviceberry)		Tall shrubs (10-16' ht) <i>Corylus americana</i> (Hazelnut) <i>Prunus maritima</i> (Beachplum)
	Medium-tall shrubs (6-10' ht) <i>Sambucus canadensis</i> (American elder) <i>Viburnum cassinoides</i> (Wild raisin)		Medium-low shrubs (4-6' ht) <i>Rosa carolina</i> (Carolina rose) <i>Spiraea alba / Tomentosa</i> (Meadowsweet / Steeple bush)
	Low shrubs (2-4' ht) <i>Comptonia peregrina</i> (Sweetfern) <i>Myrica gale</i> (Sweet gale) <i>Vaccinium angustifolium</i> (Low-bush blueberry)		Perennial grasses and wildflowers <i>Asclepias incarnata</i> (Swamp milkweed) <i>Chelone glabra</i> (Turtlehead) <i>Iris versicolor</i> (Blue flag) <i>Panicum virgatum</i> (Switchgrass) <i>Sorghastrum nutans</i> (Indian grass) <i>Symphotrichum novae-angliae</i> (New England aster) <i>Vernonia noveboracensis</i> (New York iron-weed)
	Groundcover / Green mulch (less than 3' ht) <i>Packera aurea</i> (Groundsel) <i>Parathelypteris noveboracensis</i> (New York fern) <i>Carex crinata</i> (Fringed sedge) <i>Onoclea sensibilis</i> (Sensitive fern)		





CONCEPT #4

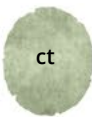






Existing Site Conditions:

- Dwelling is entirely in the buffer zone.
- The 0-50' zone is lacking trees, and consists of a few shrub colonies, and sparse patches of lawn. Lawn areas tend to die back in summer.
- Existing vegetation provides decent screening at property edges.
- Soils are dry and sandy.

Site Goals:

1. Remove lawn in the back yard. Stabilize sloping areas with biodegradable erosion control blankets and seed bare soils with meadow species that are adapted to dry soils.
2. Because the seeded meadow species take several years to establish, they will not provide much erosion control or visual interest in the short-term. For more instant impact, add clusters of container plantings including low shrubs and perennials.
3. Plant deciduous trees to provide wildlife habitat and additional erosion control.
4. Ensure areas below trees are planted with groundcovers that can adapt from sun to shade conditions as trees become established and eventually provide more shade.
5. Preserve existing vegetation at property edges for privacy screening.
6. Protect healthy native shrub colonies within naturalized areas.

Suggested Plants:

	Canopy tree (deciduous) <i>Prunus serotina</i> (Black cherry) <i>Quercus coccinea</i> (Scarlet oak)
	Small trees (15-25' ht) <i>Cornus alternifolia</i> / <i>florida</i> (Pagoda / Flowering dogwood) <i>Hamamelis virginiana</i> (Witch hazel)
	Medium-tall shrubs (6-10' ht) <i>Aronia arbutifolia</i> (Red chokeberry) <i>Corylus cornuta</i> (Beaked hazelnut)
	Medium-low shrubs (4-6' ht) <i>Aronia melanocarpa</i> (Black chokeberry) <i>Rosa virginiana</i> (Virginia rose)
	Low shrubs (2-4' ht) <i>Comptonia peregrina</i> (Sweet fern) <i>Kalmia angustifolia</i> (Sheep laurel)
	Groundcover / Green mulch (less than 3' ht) <i>Carex albicans</i> (White tinged sedge) <i>Dennstaedtia punctilobula</i> (Hayscented fern)
	Perennial grasses or wildflowers <i>Deschampsia flexuosa</i> (Wavy hairgrass) <i>Eupatorium hyssopifolium</i> (Hyssop-leaved boneset)








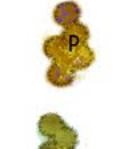
CONCEPT #5

Existing Site Conditions:

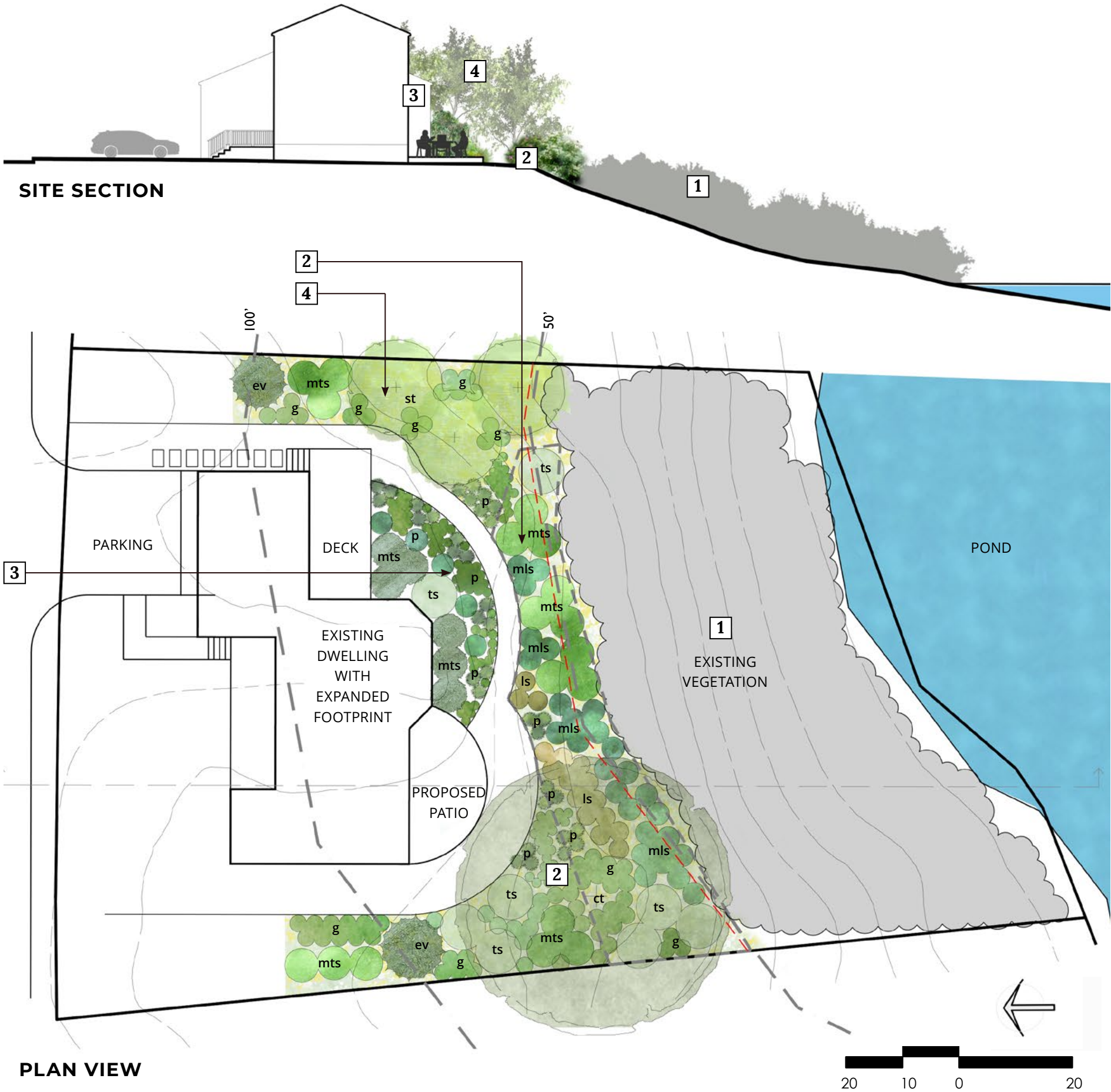
- Dwelling is partially in the buffer zone. A planned house and deck addition will require mitigation plantings.
- There are existing healthy shrub colonies, but invasive trees are crowding out native vegetation and contributing to soil erosion.
- There is existing lawn in the back yard, but it is on a slope which makes it unsuitable for most activities.
- Soils are average to moist and well drained.

Site Goals:

1. Remove invasive trees and re-plant native trees in locations that will not block views from the new deck.
2. Provide mitigation for the house addition by replacing lawn with a mix of native shrubs and grasses/wildflowers.
3. Stabilize any bare soil areas with an erosion control seed mix.
4. Supplement non-vegetated areas with shrubs and perennials to stabilize the slope and provide more seasonal interest.
5. Provide access to the existing beach by adding in-grade steps that work around the existing vegetation and topography.
6. Preserve existing native / non-invasive vegetation

Suggested Plants:			
	Canopy trees <i>Betula lenta</i> (Sweet birch) <i>Carya glabra</i> (Hickory) <i>Quercus coccinea</i> (Scarlet oak)		Evergreen trees <i>Juniperus virginiana</i> (Eastern red cedar) <i>Ilex opaca</i> (American holly) <i>Pinus strobus</i> (White pine)
	Tall shrubs (10-16' ht) <i>Cephalanthus occidentalis</i> (Buttonbush) <i>Rhus glabra</i> (Smooth sumac)		Med-tall shrubs (6-10' ht) <i>Kalmia latifolia</i> (Mountain laurel) <i>Aronia arbutifolia</i> (Red chokeberry)
	Med-low shrubs (4-6' ht) <i>Aronia melanocarpa</i> (Black chokeberry) <i>Rosa virginiana</i> (Virginia rose)		Low shrubs (2-4' ht) <i>Comptonia peregrina</i> (Sweetfern) <i>Galussacia bigeloviana</i> / <i>Baccata</i> (Huckleberry)
	Groundcover / Green mulch (less than 3' ht) <i>Athyrium</i> (Lady fern) <i>Carex crinita</i> (Fringed sedge) <i>Carex stricta</i> (Tussock sedge) <i>Carex vulpinoidea</i> (Fox sedge) <i>Deschampsia flexuosa</i> (Wavy hairgrass) <i>Packera aurea</i> (Groundsel)		Perennial grasses and wildflowers <i>Asclepias syriaca</i> (Milkweed) <i>Danthonia spicata</i> (Poverty grass) <i>Eupatorium perfoliatum</i> (Boneset) <i>Schizachyrium scoparium</i> (Little bluestem) <i>Solidago sp.</i> (Goldenrod) <i>Symphytotrichum laeve</i> (Smooth aster)


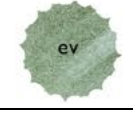


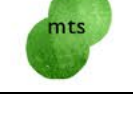
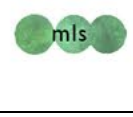
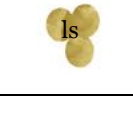
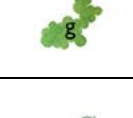
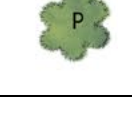




CONCEPT #6

- Existing Site Conditions:**
- Dwelling is partially in the buffer zone.
 - A new patio and expanded house footprint is planned.
 - The 0-50' zone is fully vegetated with native shrubs.
 - The only vegetation in the 50'-100' zone is turf lawn.
 - Soils are mostly dry.
- Site Goals:**
1. Preserve the existing healthy native shrub buffer.
 2. Provide mitigation for the house addition by replacing lawn with a mix of native trees, shrubs and perennials.
 3. Enhance the new patio by adding native foundation plantings that will attract songbirds and pollinators.
 4. Plant small trees to provide privacy for the new patio.

Suggested Plants:

	Canopy tree <i>Prunus serotina</i> (Black cherry) <i>Quercus rubra</i> (Red oak) <i>Tila americana</i> (American basswood)
	Evergreen trees <i>Ilex opaca</i> (American holly) <i>Juniperus communis</i> (Pasture juniper)
	Small trees (15-25' ht) <i>Amelanchier arborea</i> (Downy serviceberry) <i>Cornus alternifolia</i> (Pagoda dogwood) <i>Crataegus</i> (Hawthorn)
	Tall shrubs (10-16' ht) <i>Hamamelis virginiana</i> (Witch hazel) <i>Morella pensylvanica</i> (Northern bayberry)
	Medium-tall shrubs (6-10' ht) <i>Corylus cornuta</i> (Beaked hazelnut) <i>Viburnum acerifolium</i> (Maple leaved arrowwood)
	Medium-low shrubs (4-6' ht) <i>Aronia melanocarpa</i> (Black chokeberry) <i>Prunus susquehanae</i> (Sand-cherry) <i>Kalmia angustifolia</i> (Sheep laurel)
	Low shrubs (2-4' ht) <i>Ceanothus americanus</i> (New Jersey tea) <i>Comptonia peregrina</i> (Sweetfern)
	Groundcover / Green mulch (less than 3' ht) <i>Carex pennsylvanica</i> (Pennsylvania sedge) <i>Gaultheria procumbens</i> (Wintergreen)
	Perennial wildflowers <i>Asclepias tuberosa</i> (Orange butterfly milkweed) <i>Eurybia spectabilis</i> (Showy aster) <i>Lupinus perennis</i> (Perennial lupine)

CONCEPT #7

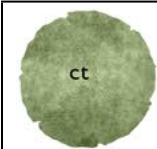
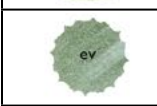

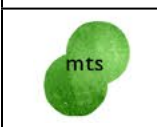
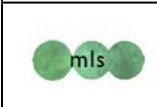
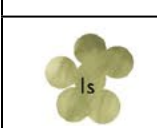
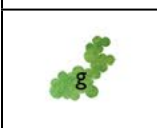

Existing Site Conditions:

- Building addition/proposed hardscape is partially in the buffer zone
- Some of the site features healthy native woodlands
- There is an expansive lawn that extends all the way from the dwelling to the pond edge
- Soils are dry

Site Goals:

1. Provide a variety of native tree and shrub species as mitigation plantings for the building and landscape features, in a location that best protects the resource area.
2. Plant lower shrub species in the area where a desired view from the new patio will be maintained
3. Reduce need for fertilizer and improve the drought tolerance and wildlife benefits for the existing lawn by incorporating low maintenance, pollinator attracting groundcovers into the existing turf-grass

Suggested Plants:

	Canopy tree <i>Acer rubrum</i> (Red maple) <i>Quercus rubra</i> (Red oak) <i>Tilia americana</i> (American basswood)
	Evergreen shrubs <i>Ilex glabra</i> (Inkberry)
	Tall shrubs (10-16' ht) <i>Morella pensylvanica</i> (Northern bayberry) <i>Prunus maritima</i> (Beach plum) <i>Vaccinium corymbosum</i> (Highbush blueberry)
	Medium-tall shrubs (6-10' ht) <i>Corylus cornuta</i> (Beaked hazelnut) <i>Aronia arbutifolia</i> (Red chokeberry)
	Medium-low shrubs (4-6' ht) <i>Aronia melanocarpa</i> (Black chokeberry) <i>Rosa carolina/virginiana</i> (Carolina/Virgina rose)
	Low shrubs (2-4' ht) <i>Ceanothus americanus</i> (New Jersey tea) <i>Gaylussacia species</i> (Huckleberry)
	Groundcover / Green mulch (less than 3' ht) <i>Carex pensylvanica</i> (Pennsylvania sedge) <i>Dennstaedtia punctilobula</i> (Hayscented fern)
	Pollinator lawn species <i>Achillea millefolium</i> (Common yarrow) <i>Antennaria neglecta</i> (Pussytoes) <i>Eragrostis spectabilis</i> (Purple lovegrass) <i>Houstonia caerulea</i> (Bluets); <i>Viola</i> (Wild violets) <i>Waldsteinia fragarioides</i> (Barren strawberry)











CONCEPT #8

- Existing Site Conditions:**
- Dwelling is outside of the buffer zone and existing septic area is as far from the resource area as possible.
 - Some of the site features healthy native woodlands.
 - There is an expansive lawn that is too steep to be used for recreation.
 - Soils in the lawn areas are not well drained and range from wet to dry depending on weather conditions.
- Site Goals:**
1. Replace lawn as possible in sloping areas with seeded meadow
 2. Reserve some lawn-like space in flatter areas.
 3. Plant layers of shrubs between woodland and meadow to provide a transitional edge condition, add seasonal interest and wildlife benefits.
 4. Install plugs or containers of grasses and wildflowers in clusters to provide color while the meadow is being established.
 5. Change the existing direct path from patio to dock to a curving route to help prevent erosion along the pathway.

Suggested Plants:

	Small trees or tall shrubs (10-25' ht) <i>Amelanchier canadensis/arboria</i> (Serviceberry) <i>Hamamelis virginia</i> (Witch hazel) <i>Ilex verticillata</i> (Winterberry) <i>Lindera benzoin</i> (Spicebush) <i>Rhus typhina</i> (Staghorn sumac) <i>Salix discolor</i> (Pussy willow)
	Medium tall or medium low shrubs (4-10' ht) <i>Aronia arbutifolia</i> (Red chokeberry) <i>Clethra alnifolia</i> (Summersweet) <i>Kalmia latifolia</i> (Mountain laurel) <i>Rhododendron viscosum</i> (Swamp azalea)
	Low shrubs (2-4' ht) <i>Comptonia peregrina</i> (Sweet fern) <i>Rosa palustris</i> (Swamp rose)
 	Perennial grasses or wildflowers <i>Aster novae-angliae</i> (New England aster) <i>Asclepias syriaca</i> (Common milkweed) <i>Carex vulpinoida</i> (Fox sedge) <i>Monarda didyma</i> (Beebalm) <i>Solidago sempervirens</i> (Seaside goldenrod) <i>Symphotrichum lateriflorum</i> (Calico aster) <i>Rudbeckia hirta</i> (Black eyed susan) <i>Vernonia noveboracensis</i> (New York ironweed)
	Meadow seed mix <i>Dichanthelium (Panicum) clandestinum</i> (Deertongue) <i>Festuca rubra</i> (Red fescue) <i>Panicum virgatum</i> (Switchgrass) <i>Schizachyrium scoparium</i> (Little bluestem)


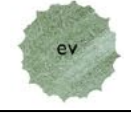
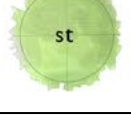
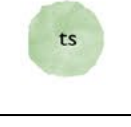
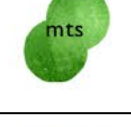


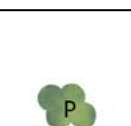
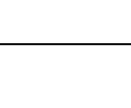
CONCEPT #9

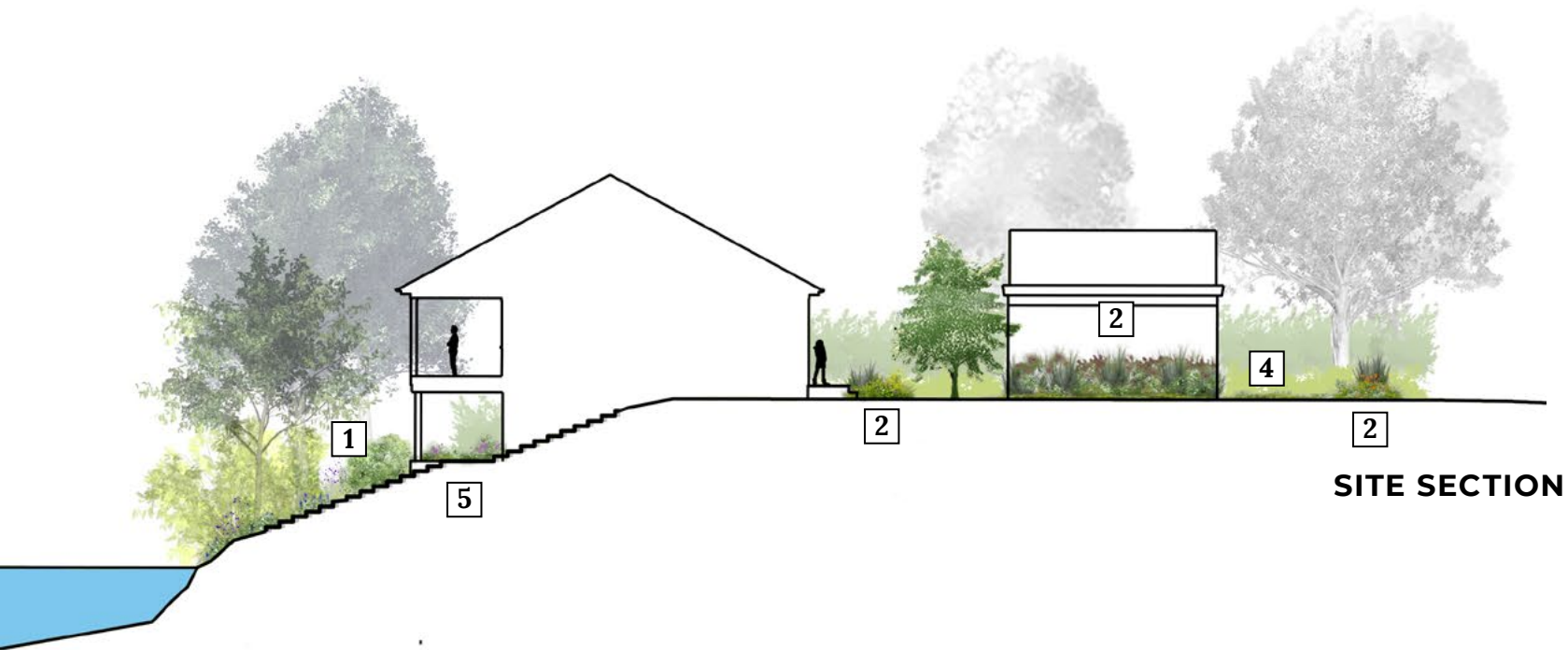
Existing Site Conditions:

- The dwelling is entirely within the buffer zone.
- The existing vegetation is entirely non-native/invasive with the exception of oak trees in the front yard.
- The slope to the pond is de-graded/eroding.

Site Goals:

1. Remove invasive species and stabilize the slope with dense planting.
2. Enhance the property with planned garden spaces.
3. Attract wildlife with both keystone and specialist plants (see plant list).
4. Replace front lawn above the septic area with a pollinator friendly lawn.
5. Connect downspouts to drywells to prevent erosion from roof runoff.

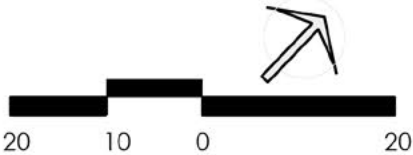
	Canopy trees <i>Acer rubrum</i> (Red maple) <i>Betula alleghaniensis</i> (Yellow birch) <i>Betula papyrifera</i> (Paper birch)
	Evergreen screening trees <i>Ilex opaca</i> (American holly) <i>Pinus strobus</i> (White pine)
	Small trees (15-25' ht) <i>Amelanchier canadensis</i> (Serviceberry) <i>Cornus alternifolia</i> (Pagoda dogwood) <i>Salix discolor</i> (Pussy willow)
	Tall shrubs (10-16' ht) <i>Cephalanthus occidentalis</i> (Buttonbush) <i>Cornus amomum</i> (Silky dogwood) <i>Corylus americana</i> (Hazelnut)
	Medium-tall shrubs (6-10' ht) <i>Clethra alnifolia</i> (Summersweet) <i>Ilex glabra</i> (Inkberry holly) <i>Vaccinium corymbosum</i> (Highbush blueberry)
	Medium-low shrubs (4-6' ht) <i>Aronia melanocarpa</i> (Black chokeberry)
	Low shrubs (2-4' ht) <i>Gaylussacia baccata</i> (Black huckleberry) <i>Rosa carolina</i> (Carolina rose)
	Groundcovers / Green mulch (less than 3' ht) <i>Carex blanda</i> (Wood sedge) <i>Fragaria virginiana</i> (Wild strawberry); <i>Onoclea sensibilis</i> (Sensitive fern); <i>Vaccinium angustifolium</i> (Lowbush blueberry)
	Perennial grasses or wildflowers <i>Asclepias tuberosa/incarnata</i> (Orange/Swamp milkweed) <i>Chelone glabra</i> (White turtlehead); <i>Lupinus perennis</i> (Wild lupine) <i>Solidago caesia/nemoralis</i> (Blue stemmed/Gray goldenrod) <i>Symphotrichum cordifolium</i> (Blue wood aster)



SITE SECTION



PLAN VIEW





CONCEPT #10

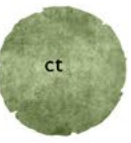

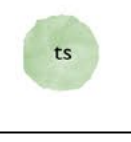
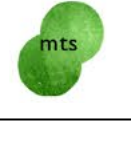
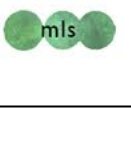
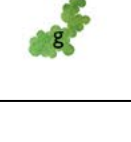
Existing Site Conditions:

- The dwelling is outside of the buffer zone.
- Existing diseased/declining trees were recently removed and exposed vegetation has died.
- Runoff from the front yard is washing down the degraded slope.
- There is a public access path along the pond.
- Soils are average to dry.

Site Goals:

1. Replace recently removed trees with native trees.
2. Preserve existing trees and groundcovers.
3. Help re-stabilize the slope with a minimal budget by seeding the slope with a mix of grasses and groundcovers, and installing several clusters of quick-spreading, colonizing shrubs and groundcovers.
4. Screen public access path from patio with tall shrubs at the bottom of the slope.
5. Use medium or low shrubs and woody groundcovers at the top of the slope to maintain views from the patio and upper deck areas.

Suggested Plants:

	Canopy trees <i>Nyssa sylvatica</i> (Tupelo) <i>Pinus rigida</i> (Pitch pine) <i>Quercus velutina</i> (Black oak)
	Small trees (15-25' ht) <i>Amelanchier laevis</i> (Smooth serviceberry) <i>Cornus florida</i> (Flowering dogwood) <i>Ostrya virginiana</i> (Hop hornbeam)
	Tall shrubs (10-16' ht) <i>Morella</i> (<i>Myrica</i>) <i>Pensylvanica</i> (Bayberry) <i>Rhus glabra</i> (Smooth sumac) <i>Viburnum dentatum</i> (Arrowwood viburnum)
	Medium-tall shrubs (6-10' ht) <i>Clethra alnifolia</i> (Summersweet) <i>Ilex verticillata</i> (Winterberry) <i>Salix humilis</i> (Upland willow)
	Medium-low shrubs (4-6' ht) <i>Aronia melanocarpa</i> (Black chokeberry) <i>Comptonia peregrina</i> (Sweetfern) <i>Kalmia angustifolia</i> (Sheep laurel)
	Groundcovers / Green mulch (less than 3' ht) <i>Arctostaphylos uva-ursi</i> (Bearberry) <i>Dennstaedtia punctilobula</i> (Hayscented fern) <i>Vaccinium angustifolium</i> (Lowbush blueberry)

CONCEPT #11

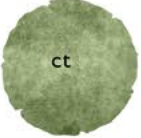






Existing Site Conditions:

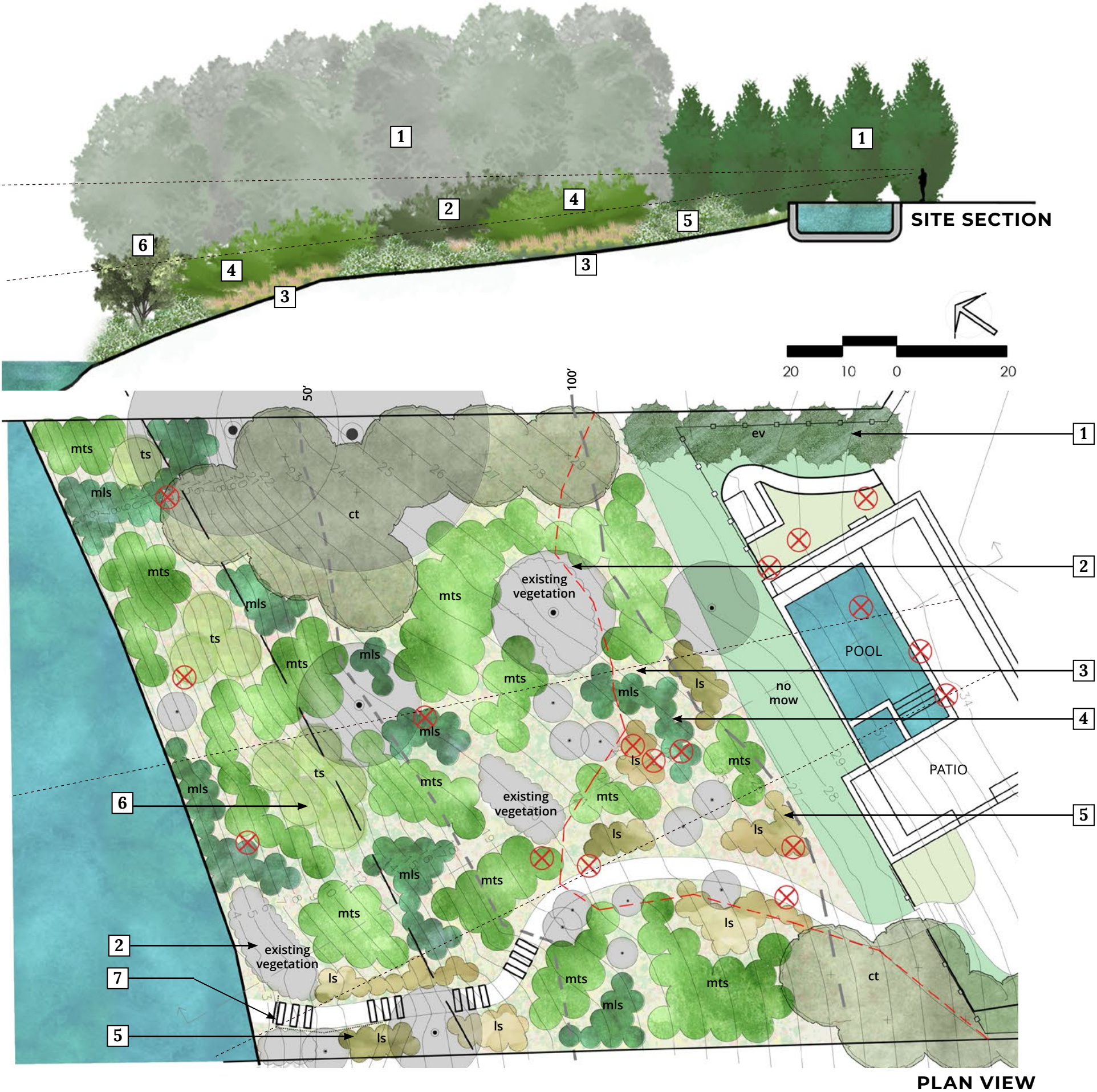
- The dwelling is outside of the buffer zone.
- Some large trees were removed after storm damage.
- Remaining vegetation is sparse and soils are exposed.
- Soil conditions range from moist to dry/sandy in various locations.

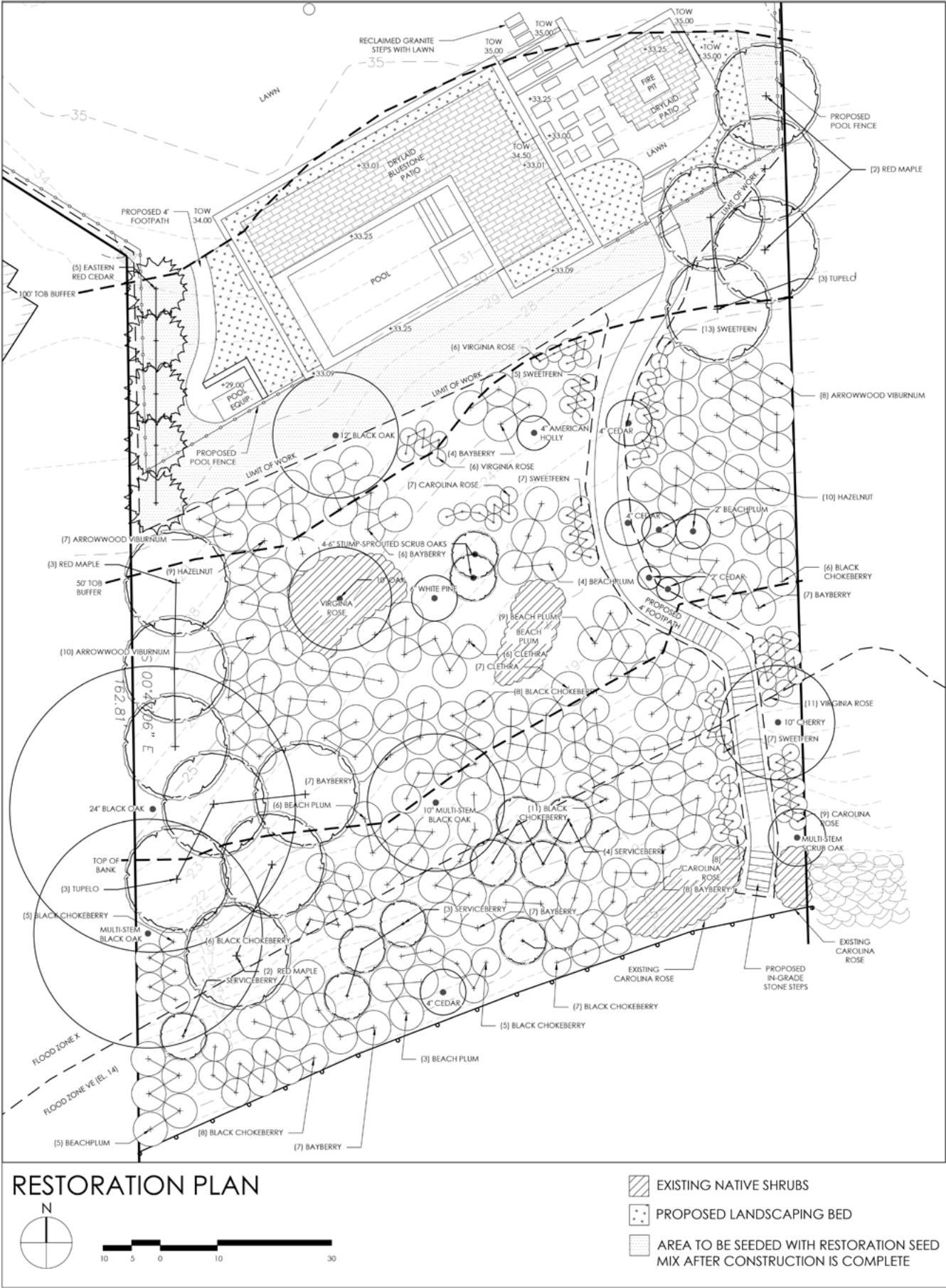
Site Goals:

1. Replace damaged trees and provide privacy by clustering native trees at property edges.
2. Preserve remaining healthy native trees and shrubs.
3. Quickly stabilize bare soils with biodegradable erosion control fabric or flexible growth medium and seed mix.
4. Plant colonizing native shrubs that will spread quickly and retain dry soils once roots are established.
5. Use low-growing species along paths and edges.
6. Use taller species near the bottom of the slope.
7. Provide access to the water via a footpath and in-grade steps.

Suggested Plants:

	Canopy trees <i>Acer rubrum</i> (Red maple) <i>Nyssa sylvatica</i> (Tupelo) <i>Prunus serotina</i> (Black cherry)
	Small trees (15-25' ht) <i>Alnus serrulata</i> (Smooth alder) <i>Amelanchier canadensis</i> (Serviceberry)
	Evergreen screening trees <i>Ilex opaca</i> (American holly) <i>Juniperus virginiana</i> (Eastern red cedar) <i>Pinus strobus</i> (White pine)
	Tall shrubs (10-16' ht) <i>Corylus americana</i> (American hazelnut) <i>Morella (Myrica) pensylvanica</i> (Bayberry) <i>Prunus maritima</i> (Beach plum) <i>Viburnum dentatum</i> (Arrowwood viburnum)
	Medium-tall shrubs (6-10' ht) <i>Clethra alnifolia</i> (Summersweet) <i>Aronia arbutifolia</i> (Red chokeberry) <i>Corylus cornuta</i> (Beaked hazelnut)
	Medium-low shrubs (4-6' ht) <i>Aronia melanocarpa</i> (Black chokeberry) <i>Rosa carolina</i> (Carolina rose) <i>Rosa virginiana</i> (Virginia rose)
	Low shrubs (2-4' ht) <i>Ceanothus americanus</i> (New Jersey tea) <i>Comptonia peregrina</i> (Sweetfern) <i>Kalmia angustifolia</i> (Sheep laurel)





Restoration Seed Mix:
Little Bluestem (*Schizachyrium scoparium*), Hard Fescue, 'Jetty' (*Festuca ovina* var. *duriuscula*), Blue Fescue, 'Azure' (*Festuca ovina* var. *glauca*), Sheep Fescue (*Festuca ovina*, Variety Not Stated)

PLANT SCHEDULE			
SCIENTIFIC NAME	COMMON NAME	QTY.	SIZE
TREES & SHRUBS			
<i>Acer rubrum</i>	Red maple	7	#25 or 3"
<i>Amelanchier canadensis</i>	Serviceberry	9	6-7' B&B
<i>Aronia melanocarpa</i>	Black chokeberry	56	#3-#5
<i>Clethra alnifolia</i>	Clethra	13	#3-#5
<i>Comptonia peregrina</i>	Sweetfern	32	#2
<i>Corylus americana</i>	Hazelnut	19	#2-#3
<i>Juniperus virginiana</i>	Eastern red cedar	5	7-8' B&B
<i>Morella pensylvanica</i>	Bayberry	46	#3-#5
<i>Nyssa sylvatica</i>	Tupelo	6	#25 or 3"
<i>Prunus maritima</i>	Beach plum	27	#3-#5
<i>Rosa carolina</i>	Carolina rose	24	#2 - #3
<i>Rosa virginiana</i>	Virginia rose	24	#2-#3
<i>Viburnum dentatum</i>	Arrowwood viburnum	25	#3-#5

- RESTORATION NOTES:**
- INITIAL INVASIVE MANAGEMENT (Winter/Early Spring)**
1. Treat and remove all approved vegetation using an appropriate herbicide (Glyphosate-based or Triclopyr-based) using a cut and wipe method.
 2. Vegetation to be flush cut leaving the roots in place to maintain soil stability.
 3. Seed any exposed soils resulting from invasive / non-native vegetation removal with restoration seed mix to establish a native vegetative groundcover.
 4. Cover seeded area with bio-degradable erosion control blankets or a layer of sterilized chopped straw to increase seed / soil contact, improve germination, and decrease erosion potential.
 5. Rejuvenate any native shrub species uncovered in restoration area, if needed, with regenerative pruning techniques to encourage new, dense growth.
 6. Monitor project area and, if necessary, perform an early spring maintenance treatment to suppress winter annual weeds.

- MANAGEMENT (SPRING/SUMMER - 3 SEASONS MIN.)**
1. Monitor restoration area and perform maintenance cut and wipe or selective foliar treatments or hand weed invasive, non-native, aggressive species that have germinated from existing seed bank, or re-sprouted from roots after removal. Site will be monitored and maintained throughout the year for both cool season and warm season invasive, non-native, and aggressive species.
 2. Mow/cut cool season grasses in June to encourage establishment of warm-season grasses, if necessary.

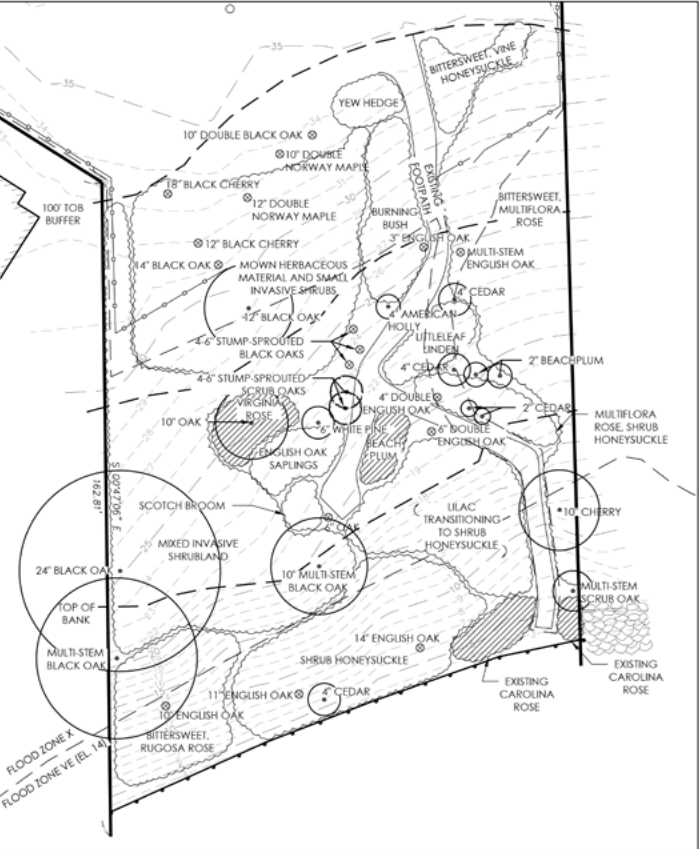
- RESTORATION PLANTING**
1. Plantings to be installed when invasive species have reached 80% eradication. Typically this is one full growing season after the initial removal is complete.

- ONGOING MAINTENANCE**
1. Property will remain under active management to eradicate invasive and aggressive species through hand weeding and/or cut and wipe herbicide treatments as necessary.

- APPLICATOR & OVERSIGHT NOTES**
1. Herbicide application will only be completed by Massachusetts state-licensed and insured pesticide applicators knowledgeable with invasive, non-native, and native plant identification, both in-leaf and bare-twig.
 2. All restoration work is overseen by a Certified Ecological Restoration Practitioner (CERP).

- ANNUAL MONITORING REPORTS:**
- Submit annual monitoring reports by October 31st of each year, for three years to the Conservation Commission. Annual monitoring reports should include:

1. Representative project area photographs
2. Project activities completed to-date
3. Anticipated activities to be completed during the next year
4. Assessment of invasive species management progress
5. Assessment of restoration planting establishment
6. Recommendations for any changes in land management techniques necessary to ensure the success of the project
7. Any unexpected or arbitrary changes to the project area



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NO.	DATE	REVISION	BY:

SURVEYOR:
CapeSurv
23 West Bay Road Unit G
Osterville, MA 02655

LANDSCAPE DESIGNER:
Kiviti Moisture Landscape Design
15 High Street
Medfield, MA 02052

SCALE: 1" = 10'

DATE: 0

MITIGATION PLAN

1 of 1












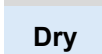












APPENDIX B:

DESIGNING AND PRESERVING VEGETATED BUFFERS

PLANT LISTS AND ADDITIONAL RESOURCES

PLANT LIST LEGEND

SYMBOL	CHARACTERISTIC	SYMBOL	CHARACTERISTIC
	Keystone Species		Fall Leaf Color
CC	Native to Cape Cod		Evergreen (or mostly evergreen)
MA	Native to Massachusetts		Samaras (Winged Seeds)
NE	Native to the Northeastern US		Berry or Fruit Color
x 	Tolerates full sun (6+ hrs)		Produces Nuts
x 	Tolerates part shade (3-6 hrs sun)		Produces Catkins
x 	Tolerates full shade (< 3 hrs sun)		Produces Pinecones
x 	Tolerates dry soils or drought		Attracts and hosts beneficial insects including caterpillars, ladybugs, and more
x 	Tolerates average or moist soils		Supports pollinators including native bees, butterflies and moths
x 	Tolerates wet soils		Attracts birds
 Bloom	Flower Color and Bloom Time		Attracts hummingbirds
Warm season	Grasses that emerge and grow in warmer parts of the season (summer)		Potential lawn alternative plant
Cool season	Grasses that emerge and grow in cooler parts of the season (spring/fall)		Resists deer browse*
			Resists rabbit browse*

*Browse resistant does not mean completely deer or rabbit proof. While some plants are toxic to deer and rabbits, some are unpalatable due to texture, flavor, or scent.

PLANTS NATIVE TO CAPE COD AND THE NORTHEASTERN US

For vegetated buffers near freshwater ponds, where the preservation of functioning wetland systems (including wildlife habitat) is the main objective, priority should be placed on plants native to Cape Cod. This means the plants have evolved naturally over time alongside other plants and wildlife species in our area, and they play a critical role within our local ecosystems including freshwater wetlands and ponds.

However, there are also plants that are native to Massachusetts and the Northeastern United States that can provide additional wildlife value and other functional and aesthetic benefits, and some of those plants are listed in this appendix, though they are noted as plants native to Massachusetts (MA) or the Northeast (NE) rather than Cape Cod (CC).

Always check with your local conservation commission before planting anything in a freshwater pond buffer zone, even if the plants are on this list, as different towns have different conservation bylaws and definitions. Some jurisdictions may allow plants native to the northeast to be included in certain places such as foundation plantings or areas that are not immediately adjacent to the resource area.

TREES NATIVE TO CAPE COD



Pussy willow



Flowering dogwood



Alder



Hickory



Maple



Serviceberry



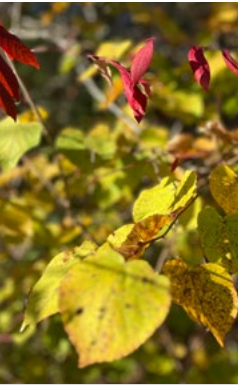
Tupelo / Black gum



Quaking aspen



Birch



Oak



Sassafras



American beech



American holly












































































































































Eastern red cedar

















































































































































Pitch pine



White pine

Trees Native to Cape Cod																	
Native	Key	Scientific name	Common name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom		Seasonal Interest / Wildlife Benefits			
CC		<i>Acer rubrum</i>	Red maple	60-90'	30-40'	x	x		x	x	some		early spring				
CC		<i>Acer saccharinum</i>	Silver maple	50-80'	35-70'	x	x			x	x		early spring				
CC		<i>Acer saccharum</i>	Sugar maple	40-80'	30-60'	x	x	x		x			early spring				
CC		<i>Alnus incana</i>	Speckled alder	15-25'	10-20'	x	x			x	x		early spring				
CC		<i>Amelanchier arborea</i>	Downy serviceberry	20'	15'	x	x		x				early spring				
CC		<i>Amelanchier canadensis</i>	Shadbush	20'	12'	x	x		x	x			early spring				
CC		<i>Amelanchier laevis</i>	Smooth serviceberry	15-30'	8-18'	x	x		x	x			early spring				
CC		<i>Betula alleghaniensis</i>	Yellow birch	60-75'	60-75'	x	x			x			spring				
CC		<i>Betula lenta</i>	Sweet / Black birch	50-70'	30-40"	x	x			x			spring				
CC		<i>Betula papyrifera</i>	Paper birch	50-70'	20-50'	x	x			x	x		spring				
CC		<i>Betula populifolia marsh.</i>	Gray birch	20-40'	10-20'	x	x			x	x		spring				
CC		<i>Carya glabra</i>	Pignut hickory	50-80'	25-40'	x	x			x			spring				
CC		<i>Carya tomentosa</i>	Mockernut hickory	60-80'	40-60'	x	x			x			spring				
CC		<i>Chamaecyparis thyoides</i>	Atlantic white cedar	20-60'	30-40'	x	x				x		spring				
CC		<i>Carpinus caroliniana</i>	American hornbeam	30-35'	20-30'		x	x		x			spring				
CC		<i>Cornus alternifolia</i>	Pagoda dogwood	15-20'	20'		x	x	x	x			spring				
CC		<i>Cornus florida</i>	Flowering dogwood	15-30'	20-30'	x	x	x	x	x			late spring				
CC		<i>Fagus grandifolia</i>	American beech	50-80'	40-80	x	x			x			spring				
CC		<i>Fraxinus americana</i>	White ash	60-80'	60-80'	x	x			x			spring				
CC		<i>Ilex opaca</i>	American holly	20-30'	15-20'	x	x			x			spring				
CC		<i>Juniperus virginiana</i>	Eastern red cedar	30-60'	10-25'	x			x	x			spring				
CC		<i>Nyssa sylvatica</i>	Tupelo / Black gum	30-50'	20-30'	x	x	some	x	x	x		late spring				
CC		<i>Ostrya virginiana</i>	Hop hornbeam / Ironwood	25'-35'	20'-30'	x	x	x		x			spring				
CC		<i>Pinus rigida</i>	Pitch pine	40-60'	30-50'	x	x		x	x			spring				
CC		<i>Pinus strobus</i>	White pine	60-80'	30-40'	x	x			x			spring				

Trees Native to Cape Cod														
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom	Seasonal Interest / Wildlife Benefits	
CC		<i>Populus grandidentata</i>	Big-toothed aspen	50-75'	20-40'	x			x	x			spring	    
CC		<i>Populus tremuloides</i>	Trembling aspen	40-50'	20-30'	x	x			x	x		spring	  
CC		<i>Platanus occidentalis</i>	American sycamore	100+	40-90'	x	x	some		x	x		spring	   
CC		<i>Prunus serotina</i>	Black cherry	50-80	30-60'	x	x		x	x			spring	    
CC		<i>Prunus virginiana</i>	Choke-cherry	20-30'	15-20'	x	x		x	x			spring	    
CC		<i>Quercus alba</i>	White oak	60-80'	50-80'	x			x	x			spring	    
CC		<i>Quercus bicolor</i>	Swamp white oak	60-80'	50-80'	x	x				x		spring	    
CC		<i>Quercus coccinea</i>	Scarlet oak	50-70'	40-50'	x			x	x			spring	    
CC		<i>Quercus rubra</i>	Northern red oak	60-80	60'	x	x		x	x			spring	    
CC		<i>Quercus stellata</i>	Post oak	35-50'	35-50'	x			x	x			spring	    
CC		<i>Quercus velutina</i>	Black oak	50-60'	50-60'	x			x	x			spring	    
CC		<i>Salix nigra</i>	Black willow	30-60'	30-60'	x	x		x	x			spring	    
CC		<i>Sassafras albidum</i>	Sassafras	30-60'	25-40'	x	x		x	x			spring	    
CC		<i>Tilia americana</i>	American basswood	50-80'	30-50'	x	x		x	x			spring	    
CC		<i>Tsuga canadensis</i>	Eastern hemlock	40-70'	30-40'		x	x		x			spring	   

Trees Native to the Northeast														
Native	Key	Scientific name	Common name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom	Seasonal Interest / Wildlife Benefits	
MA		<i>Betula nigra</i>	River birch	40-70'	35-60'	x	x			x	x		spring	    
MA		<i>Celtis occidentalis</i>	Hackberry	30'	35'	x	x		x	x				    
MA		<i>Crataegus crus-galli</i>	Cockspur hawthorn	15-30'	20-35'	x	x		x	x			spring	    
MA		<i>Fraxinus pennsylvanica</i>	Green ash	50-70'	35-50'	x	x	x		x	x		late spring	    
MA		<i>Liriodendron tulipifera</i>	Tulip poplar	60-90'	30-50'	x	x			x			late spring	    
NE		<i>Picea laxa</i>	White spruce	40-60'	15-20'	x	x		x	x				  
MA		<i>Picea mariana</i>	Black spruce	40'-70'	20'	x	x	x		x	x		late spring	  

WOODY SHRUBS NATIVE TO CAPE COD



Sweet pepperbush

Black chokeberry

Sweetfern

Virginia rose



Beachplum

Buttonbush

Blueberry

Swamp azalea

High tide bush



Bayberry

Maple leaf viburnum

Hobble bush viburnum

Arrowwood viburnum



Mountain laurel

Red chokeberry

Sheep laurel






































































































































Winged sumac

























































































































Staghorn sumac






Winterberry



































Inkberry

Photo Credits: Buttonbush and Arrowwood viburnum flowers: Wikimedia Commons Public Domain; All other photos by Angela Tanner, Lauren Taylor, Andreana Sideris and Crawford Land Management

Woody Shrubs Native to Cape Cod														
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom	Seasonal Interest / Wildlife Benefits	
CC		<i>Alnus serrulata</i>	Smooth alder	10-20'	8-15'	x	x			x	x		spring	    
CC		<i>Aronia arbutifolia</i>	Red chokeberry	5-10'	3-6'	x	x	some	x	x	x		late spring	   
CC		<i>Aronia melanocarpa</i>	Black chokeberry	3-6'	3-6'	x	x		x	x	x		late spring	   
CC		<i>Baccharis halimifolia</i>	Groundsel bush	5-12'	5-10'	x	x	some	x	x	x		fall	none  
CC		<i>Ceanothus americanus</i>	New Jersey tea	2-3'	3'	x	x		x	x			mid-summer	   
CC		<i>Cephalanthus occidentalis</i>	Buttonbush	15'	6-8'	x	x	x		x	x		mid-summer	   
CC		<i>Clethra alnifolia</i>	Sweet pepperbush	8-16'	4-6'	x	x			x	x		mid-summer	  
CC		<i>Comptonia peregrina</i>	Sweet fern	2-4'	4-8'	x	x		x	x				   
CC		<i>Cornus (Swida) amomum</i>	Silky dogwood	6-12'	6-12'	x	x			x	x		late spring	   
CC		<i>Cornus (Swida) racemosa</i>	Gray dogwood	6-15'	6-15'	x	x	x	x	x			late spring	   
CC		<i>Corylus americana</i>	American hazelnut	8-16'	8-13'	x	x	x		x			early spring	   
CC		<i>Corylus cornuta</i>	Beaked hazelnut	4-8'	4-8'	x	x		x	x			early spring	   
CC		<i>Gaylussacia frondosa</i>	Blue huckleberry	3-6'	3-5'	x	x			x	x		spring	    
CC		<i>Gaylussacia baccata</i>	Black huckleberry	21-3'	2-3'	x	x	x	x	x			spring	    
CC		<i>Gaylussacia bigeloviana</i>	Dwarf huckleberry	1-3'	3-4'	x	x		x	x			spring	    
CC		<i>Hamamelis virginiana</i>	Witch hazel	15-20'	15-20'	x	x	x	x	x			fall	  
CC		<i>Ilex glabra</i>	Inkberry	5-8'	5-8'	x	x	x		x	x		late spring	    
CC		<i>Iva frutescens</i>	High tide bush	4-8'	4-8'	x				x	x		fall	none  
CC		<i>Ilex verticillata</i>	Winterberry	6-10'	4-10'	x	x			x	x		spring	    
CC		<i>Juniperus communis</i>	Pasture juniper	5-10'	10-15'	x	x		x	x			spring	  
CC		<i>Kalmia angustifolia</i>	Sheep laurel	1-3'	3-6'	x	x		x	x	x		early summer	   
CC		<i>Kalmia latifolia</i>	Mountain laurel	4-10'	4-8'	x	x	x		x	x		early summer	  
CC		<i>Lindera benzoin</i>	Spicebush	6-12'	6-12'	x	x	x		x			early spring	    
CC		<i>Lyonia ligustrina</i>	Maleberry	6-12'	6-12'	x	x			x	x		late spring	  
CC		<i>Myrica pensylvanica</i>	Northern bayberry	10-12'	6-8'	x	x		x	x			late spring	    
CC		<i>Myrica gale</i>	Sweet gale	2-4'	3-5'	x	x	x		x	x		late spring	none 

Woody Shrubs Native to Cape Cod														
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom	Seasonal Interest / Wildlife Benefits	
CC		<i>Prunus maritima</i>	Beach plum	8-12'	8-12'	x	x		x	x		 late spring	 	 
CC		<i>Prunus susquehanae</i>	Sand-cherry	2-6'	2-6'	x			x			 late spring	  	 
CC		<i>Rhododendron viscosum</i>	Swamp azalea	3-12'	3-12'		x	x		x	x	 early summer		
CC		<i>Rhus copallinum</i>	Shining / winged sumac	7-15'	10-20'	x	x			x		 summer	  	 
CC		<i>Rhus glabra</i>	Smooth sumac	9-15'	9-15'	x	x	x	x	x		 summer	  	 
CC		<i>Rhus typhina / hirta</i>	Staghorn sumac	15-25'	15-25'	x	x		x	x		 summer	  	 
CC		<i>Rosa carolina</i>	Pasture rose	3-5'	5-10'	x				x		 summer	  	 
CC		<i>Rosa palustris</i>	Swamp rose	3-6'	3-6'	x	x	x		x	x	 summer	 	 
CC		<i>Rosa virginiana</i>	Virginia rose	4'- 6'	4- 6'	x	x			x		 summer	 	 
CC		<i>Salix bebbiana</i>	Long-beaked willow	15-18'	15-18'	x	x			x		 early spring	 	 
CC		<i>Salix discolor</i>	Pussy willow	6'-15'	4'-12'	x	x			x	x	 early spring	 	 
CC		<i>Salix humilis</i>	Upland willow	6-10'	6-10'	x			x	x	x	 early spring	 	 
CC		<i>Salix occidentalis</i>	Dwarf prairie willow	1-3'	1-3'	x				x		 early spring		 
CC		<i>Sambucus canadensis</i>	American elderberry	5-12'	5-12'	x	x					 early summer	 	 
CC		<i>Spiraea alba</i>	Narrow-leaved meadowsweet	3-4'	3-4'	x	x			x		 summer	 	 
CC		<i>Spiraea tomentosa</i>	Steeple-bush	2-4'	3-5'	x				x	x	 late summer		
CC		<i>Vaccinium corymbosum</i>	Highbush blueberry	12'	12'	x	x		x	x	x	 spring	  	 
CC		<i>Vaccinium fuscatum</i>	Black highbush blueberry	5-10'	3-10'	x	x			x	x	 spring	  	 
CC		<i>Viburnum acerifolium</i>	Maple-leaved arrowwood	4-6'	2-4'	x	x	x	x	x		 late spring	  	 
CC		<i>Viburnum cassanoides</i>	Witherod viburnum	6-10'	12-May	x	x			x	x	 late spring	 	 
CC		<i>Viburnum dentatum</i>	Arrowwood viburnum	6-12'	6-10'	x	x	x	x	x		 late spring	  	 

Woody Shrubs Native to the Northeast														
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom	Seasonal Interest / Wildlife Benefits	
MA		<i>Rubus odoratus</i>	Flowering raspberry	3-6'	6'-12'	x	x			x		 summer	 	 

Woody Shrub / Groundcovers													
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom	Seasonal Interest / Wildlife Benefits
CC		<i>Arctostaphylos uva-ursi</i>	Bearberry, Kinnikinnick	6"	36-72"	x	x		x	x		 late spring	     
CC		<i>Gaultheria procumbens</i>	Wintergreen	1-4"	6-12"		x	x	x	x		 early summer	   
CC		<i>Vaccinium angustifolium</i>	Lowbush blueberry	6-24"	24"	x	x			x		 late spring	    
CC		<i>Vaccinium macrocarpon</i>	Large cranberry	4-6"	12-72"	x			x	x		 late spring	    
CC		<i>Vaccinium pallidum</i>	Hillside blueberry	12-24"	24-36"	x	x		x	x		 late spring	     



Cranberry



Bearberry



Lowbush blueberry



Sensitive fern



Hayscented fern



Cinnamon fern



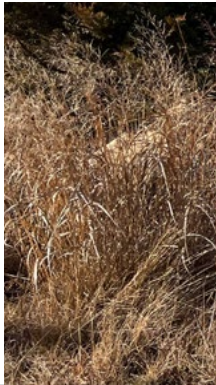
Christmas fern



Fern, Starflower, Canada mayflower



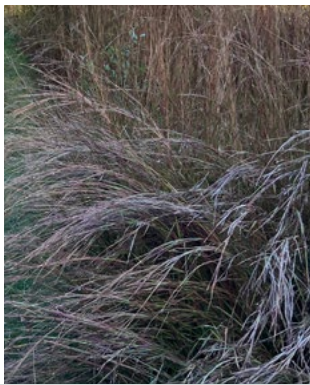
Switchgrass



Tufted / wavy hairgrass



Little bluestem



Purple lovegrass



Wood sedge


















































































































































White-tinged sedge











































Pennsylvania sedge

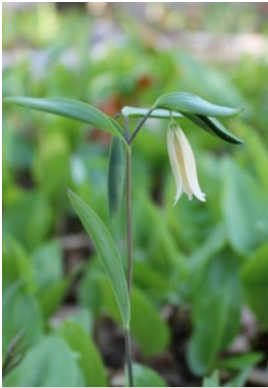
Photo Credits: Bearberry, Lowbush Blueberry and Pennsylvania sedge: Wikimedia Commons Public Domain Images; All other photos by Angela Tanner, Lauren Taylor, Andreana Sideris and Crawford Land Management

Grasses & Sedges Native to Cape Cod														
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Season	Wildlife Benefits	Browse Resistant
CC		<i>Agrostis perennans</i>	Upland bentgrass	8-30"		x	x		x	x		Cool Season	 	
CC		<i>Andropogon gerardii</i>	Big bluestem	60-72"	24-36"	x	x			x		Warm Season	   	 
CC		<i>Andropogon glomeratus</i>	Bunched broom-sedge	36-72"	24-36"	x				x	x	Warm Season	   	 
CC		<i>Andropogon virginicus</i>	Broom-sedge	24-48"	12-24"	x	x		x	x	x	Warm Season	   	 
CC		<i>Anthoxanthum nitens</i>	Vanilla sweetgrass	24"		x	x			x	x	Cool Season	 	
CC		<i>Aristida purpurascens</i>	Arrow-feather threeawn	18-24"	12-24"		x		x	x		Warm Season	   	
CC		<i>Carex albicans</i>	White tinged sedge	15-20"	15-20"		x	x	x	x		Cool Season	    	 
CC		<i>Carex appalachica</i>	Appalachian sedge	6-12"	12-18"		x	x	x	x		Cool Season	    	
CC		<i>Carex bebbii</i>	Bebb's broom sedge	36"	18-24"	x				x		Cool Season	   	
CC		<i>Carex blanda</i>	Wood sedge	12"	24-36"	x	x	x	x	x	x	Cool Season	   	 
CC		<i>Carex brevior</i>	Short fescue-sedge	24"	6-10"	x	x	x	x	x	x	Cool Season	 	
CC		<i>Carex crinita</i>	Fringed sedge	12-26"	12-24"	x	x	x		x	x	Cool Season	  	
CC		<i>Carex lurida</i>	Sallow sedge	18-36"	12-24"	x	x			x	x	Cool Season	  	 
CC		<i>Carex pensylvanica</i>	Pennsylvania sedge	6-12"	6-12"	x	x	x	x	x	x	Cool Season	    	 
CC		<i>Carex rosea</i>	Curly wood sedge	12"	12-18"		x	x	x	x		Cool Season	  	
CC		<i>Carex stipata</i>	Wrinkle sheath sedge	36"	12"	x	x	x		x	x	Cool Season	  	
CC		<i>Carex stricta</i>	Tussock sedge	12-36"	12-24"	x	x			x	x	Cool Season	   	
CC		<i>Carex vulpinoidea</i>	Fox sedge	12-36"	6-24"	x	x		x	x	x	Cool Season	  	
CC		<i>Danthonia spicata</i>	Poverty-grass	12"	12"	x	x		x	x		Cool Season	  	 
CC		<i>Deschampsia flexuosa</i>	Common hairgrass	24-36"	12-24"		x	x	x	x		Cool Season	  	 
CC		<i>Dichanthelium clandestinum</i>	Deer-tongue	36-48"	24-36"	x	x	x	x	x	x	Cool Season	    	
CC		<i>Elymus virginicus</i>	Virginia wild rye	24-60"	12-24"	x	x			x		Cool Season	  	
CC		<i>Eragrostis spectabilis</i>	Purple lovegrass	12-24"	10-16"	x	x		x			Warm Season	   	 
CC		<i>Festuca rubra</i>	Coastal red fescue	12-36"		x	x		x			Cool Season	   	
CC		<i>Festuca subverticillata</i>	Nodding fescue	24"-48"			x	x	x	x		Cool Season	  	

Grasses & Sedges Native to Cape Cod														
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Season	Wildlife Benefits	Browse Resistant
CC		<i>Juncus tenuis</i>	Path rush	6-24"	6-24"	x	x			x	x	Cool Season	 	 
CC		<i>Panicum virgatum</i>	Switchgrass	36-72"	24-36"	x	x			x		Warm Season	   	 
CC		<i>Poa palustris</i>	Fowl bluegrass	12-48"		x	x	x		x	x	Cool Season	 	
CC		<i>Schizachyrium scoparium</i>	Little bluestem	36"	24-36"	x	x		x	x		Warm Season	   	 
CC		<i>Sorghastrum nutans</i>	Indian grass	36-72"	24-36"	x	x		x	x		Warm Season	  	

Ferns Native to Cape Cod														
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet		Wildlife Benefits	Browse Resistant
CC		<i>Athyrium angustum</i>	Northern lady fern	1-2'	12-18"		x	x		x	x			
CC		<i>Athyrium asplenoides</i>	Southern lady fern	2-3'	2-3'		x	x		x			 	
CC		<i>Dennstaedtia punctilobula</i>	Hay scented fern	1-2'	3-4'	x	x		x	x			 	
CC		<i>Dryopteris cristata</i>	Crested wood fern	1-3'	2-6'	x	x	x		x	x			
CC		<i>Dryopteris intermedia</i>	Intermediate wood fern	18"-3'	2-3'		x	x		x	x			
CC		<i>Dryopteris marginalis</i>	Marginal wood fern	18"-3'	2-3'		x	x		x			 	
CC		<i>Onoclea sensibilis</i>	Sensitive fern	1-3'	1-3'	x	x	x		x	x		 	
CC		<i>Osmunda claytoniana</i>	Interrupted fern	1-3'	1-3'	x	x	x		x			 	
CC		<i>Osmunda regalis (spectabilis)</i>	Royal fern	2-5'	2-3'	x	x			x			 	
CC		<i>Osmundastrum cinnamomeum</i>	Cinnamon fern	2-6'	2-4'	x	x	x		x			 	
CC		<i>Parathelypteris noveboracensis</i>	New York fern	1-2'	1-2'		x	x		x			 	
CC		<i>Phegopteris connectilis</i>	Long beech fern	8-18"	12-36"		x	x		x				
CC		<i>Polypodium virginianum</i>	Rock polypody	6-12"	6-12"		x	x		x				
CC		<i>Polystichum acrostichoides</i>	Christmas fern	12-24"	12-24"		x	x	x	x			   	 

PERENNIALS AND ANNUAL WILDFLOWERS NATIVE TO CAPE COD



Wild oats



Wild columbine



Golden groundsel



Bluets



Perennial lupine



Beardtongue



Spiderwort



Wild garlic



Doll's eyes



Marsh pea



Common milkweed



Orange butterfly milkweed



Swamp milkweed



Milkweed in fall



Evening primrose



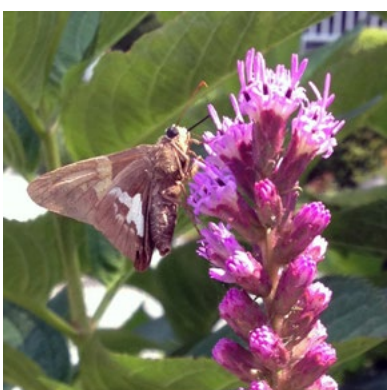
Cardinal flower



Whorled loosestrife



Marsh mallow



Liatris



Lesser snakeroot



Joe pye weed



Blue vervain



Boneset



Orange jewelweed



White turtlehead






















































































































New England aster




























































































































































































































Showy aster


























































































































Goldenrod

Perennials & Biennials (Wildflowers) Native to Cape Cod														
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom	Wildlife Benefits	Browse Resistant
CC		<i>Achillea millefolium</i>	Common yarrow	12-36"	24-36"	x			x	x			summer   	 
CC		<i>Actaea pachypoda / rubra</i>	Doll's Eyes / Baneberry	12-36"	24-36"	x	x			x	x		early summer  	 
CC		<i>Ageratina aromatica</i>	Lesser snakeroot	24-36"	12-36"	x	x		x	x			late summer 	 
CC		<i>Allium canadense</i>	Wild garlic	12-24"	8-12"	x			x	x			early summer  	 
CC		<i>Anaphalis margaritacea</i>	Pearly everlasting	12-36"	12-24"	x	x		x	x			late summer  	 
CC		<i>Anemone virginiana</i>	Thimbleweed	24-36"	12-24"	x	x	x	x	x			summer 	 
CC		<i>Antennaria neglecta</i>	Pussytoes	6-12"	6-12"	x	x		x	x			late spring   	 
CC		<i>Antennaria plantaginifolia</i>	Plantain-leaved pussytoes	4-6"	12-24"	x	x			x			late spring   	 
CC		<i>Aquilegia canadensis</i>	Wild columbine	24-36"	12-18"	x	x		x	x			Spring   	 
CC		<i>Aralia nudicaulis</i>	Wild sarsaparilla	12-24"	12-24"	x	x		x	x			late spring   	
CC		<i>Arisaema triphyllum</i>	Jack in the pulpit	12-30"	6-12"		x	x		x	x		late spring   	 
CC		<i>Asclepias amplexicaulis</i>	Clasping milkweed	12-30"	24-36"	x	x		x	x			early summer   	
CC		<i>Asclepias exaltata</i>	Poke-milkweed	36-60"	12-24"		x	x		x			summer   	
CC		<i>Asclepias incarnata (pulchra)</i>	Downy swamp milkweed	24-48"	12-24"	x	x				x		early summer   	
CC		<i>Asclepias purpurascens</i>	Purple milkweed	24-36"	12-36"	x	x			x			early summer   	
CC		<i>Asclepias syriaca</i>	Common milkweed	24-48"	12-18"	x			x	x			summer   	
CC		<i>Asclepias tuberosa</i>	Orange milkweed	12-24"	12-18"	x	x		x	x			summer   	
CC		<i>Asclepias verticillata</i>	Whorled milkweed	12-30"	12-24"	x	x			x			late summer   	
CC		<i>Baptisia tinctoria</i>	Yellow false indigo	24-36"	24-36"	x	x		x	x			early summer  	
CC		<i>Chamaecrista fasciculata</i>	Partridge pea	24-36"	24-36"	x	x		x	x			summer   	
CC		<i>Chelone glabra</i>	White turtlehead	36-48"	12-24"	x	x			x	x		late summer   	 
CC		<i>Cirsium discolor / pumilum</i>	Field / Pasture thistles	36-72"	12-24"	x	x		x	x			late summer  	
CC		<i>Coreopsis rosea</i>	Pink tickseed	12-24"	24-36"	x	x			x			summer  	 
CC		<i>Desmodium canadense</i>	Showy tick trefoil	24-36"	12-24"	x	x		x	x	x		summer  	
CC		<i>Epigaea repens</i>	Trailing arbutus	2-4"	6-18"		x		x	x			spring   	

Perennials & Biennials (Wildflowers) Native to Cape Cod																		
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom		Wildlife Benefits				Browse Resistant
CC		<i>Erigeron pulchellus</i>	Robin's plantain	12-24"	12-24"	x	x		x	x			late spring					
CC		<i>Eupatorium hyssopifolium</i>	Hyssop-leaved boneset	12-36"	12-24"	x	x		x	x			late summer					 
CC		<i>Eupatorium perfoliatum</i>	Boneset	4-6'	36-48"	x	x			x	x		late summer					 
CC		<i>Eupatorium pilosum</i>	Rough boneset	24-36"	24-36"	x	x			x	x		late summer					 
CC		<i>Eupatorium pubescens</i>	Hairy boneset	24-36"	12-24"	x	x		x	x			late summer					 
CC		<i>Eurybia divaricata</i>	White wood aster	12-36"	12-36"		x	x		x			fall					
CC		<i>Eurybia macrophylla</i>	Big leaved aster	12-36"	12-24"		x	x		x			fall					
CC		<i>Eurybia spectabilis</i>	Showy aster	12-24"	12"-18"	x	x		x	x			fall					
CC		<i>Euthamia graminifolia</i>	Grass leaf goldenrod	36-48"	36-48"	x	x		x	x	x		late summer					
CC		<i>Eutrochium dubium</i>	Atlantic joe pye weed	36-48"	24-48"	x				x	x		late summer					 
CC		<i>Eutrochium fistulosum</i>	Hollow-stem joe pye weed	48-84"	36-48"	x	x			x	x		late summer					 
CC		<i>Fragaria virginiana</i>	Wild strawberry	4-8"	12-24"	x	x		x	x			spring					 
CC		<i>Geranium maculatum</i>	Wild geranium	18-24"	12-18"	x	x			x			late Spring					 
CC		<i>Grindelia squarrosa</i>	Curlycup gumweed	12-36"	12-24"	x			x	x			all summer					 
CC		<i>Helianthus divaricatus</i>	Woodland sunflower	48-72"	24-36"		x	x	x	x			late summer					
CC		<i>Helianthus strumosus</i>	Harsh sunflower	36"	12-24"	x	x		x	x			summer/fall					 
CC		<i>Hibiscus moscheutos</i>	Marsh mallow	60-96"	24-48"	x	x		x				summer					
CC		<i>Hieracium venosum</i>	Rattlesnake weed	12-24"	12-24"		x	x	x				summer					
CC		<i>Houstonia caerulea</i>	Bluets	3-6"	6-8"	x				x			summer					
CC		<i>Hypericum majus</i>	Canada St. John's-wort	18-28"	12-18"	x	x			x	x		late summer					 
CC		<i>Hypericum punctatum</i>	Dotted St. John's-wort	12-24"	12-24"	x	x		x	x			late summer					 
CC		<i>Impatiens capensis</i>	Orange jewelweed	36-60"	24-36"		x	x		x			late summer					
CC		<i>Ionactis linariifolia</i>	Stiff aster	12-24"	12"	x	x		x	x			summer					
CC		<i>Iris prismatica</i>	Slender blue flag	12-30"	12-30"	x	x			x	x		early summer					 

Perennials & Biennials (Wildflowers) Native to Cape Cod														
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom	Wildlife Benefits	Browse Resistant
CC		<i>Iris versicolor</i>	Northern blue flag	24-36"	24-30"	x	x			x	x		early summer	   
CC		<i>Lathyrus palustris</i>	Marsh pea	12-48"	12-36"	x	x			x	x		early summer	
CC		<i>Liatris scariosa / novae-angliae</i>	New England blazing star	12-42"	10-14"	x	x		x	x			late summer	  
CC		<i>Lilium philadelphicum</i>	Wood-lily	24"	12"	x	x		x	x			early summer	 
CC		<i>Lilium superbum</i>	Turk's cap lily	48-84"	6-12"	x	x			x	x		late summer	 
CC		<i>Lobelia cardinalis</i>	Cardinal flower	48-72"	12-24"	x	x			x			late summer	   
CC		<i>Lobelia spicata</i>	Pale spiked lobelia	12-24"	12-24"	x	x		x	x			summer	   
CC		<i>Lupinus perennis</i>	Perennial lupine	24"	12-24"	x	x		x	x			early summer	  
CC		<i>Lysimachia borealis</i>	Starflower	4-8"	8-12"		x	x		x			late spring	
CC		<i>Lysimachia quadrifolia</i>	Whorled loosestrife	12-36"	12-24"	x	x		x	x			summer	
CC		<i>Maianthemum canadense</i>	Canada mayflower	5-8"	5-8"		x	x		x			spring	 
CC		<i>Maianthemum racemosum</i>	False solomon's seal	12-36"	36-48"	x	x	x	x	x			spring	  
CC		<i>Maianthemum stellatum</i>	Starry solomon's seal	12-24"	24"	x	x	x	x	x			late spring	  
CC		<i>Oenothera biennis</i>	Evening primrose	36-72"	24-36"	x	x		x	x			summer	 
CC		<i>Packera aurea</i>	Golden groundsel	12-24"	6-24"	x	x			x			spring	    
CC		<i>Penstemon pallidus</i>	Eastern beardtongue	12-18"	12-18"	x	x		x	x			early Summer	  
CC		<i>Polygonatum pubescens</i>	Solomon's seal	8-16"	8-14"		x	x		x			late spring	    
CC		<i>Pycnanthemum tenuifolium</i>	Slender mountain mint	24-48"	24-36"	x	x		x	x			summer	   
CC		<i>Pycnanthemum virginianum</i>	Virginia mountain mint	24-36"	12-18"	x	x			x	x		late summer	  
CC		<i>Pycnanthemum incanum</i>	Hoary mountain mint	24-36"	36-48"	x	x		x	x			early summer	   
CC		<i>Pycnanthemum muticum</i>	Toothed mountain mint	12-36"	12-36"	x	x			x			late summer	   
CC		<i>Sisyrinchium angustifolium</i>	Stout blue-eyed grass	18-24"	6-12"	x	x		x	x			early summer	 
CC		<i>Sisyrinchium atlanticum</i>	Eastern blue-eyed grass	6-18"	6-8"	x				x	x		early summer	  
CC		<i>Sisyrinchium montanum</i>	Meadow blue-eyed grass	5-20"	4-6"	x				x			late spring	 

Perennials & Biennials (Wildflowers) Native to Cape Cod																	
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom		Wildlife Benefits			Browse Resistant
CC		<i>Solidago altissima</i>	Tall goldenrod	48-72"	48-72"	x	x		x	x			fall				
CC		<i>Solidago bicolor</i>	Silverrod	12-36"	12"	x	x		x	x			fall				
CC		<i>Solidago caesia</i>	Bluestem-goldenrod	24-36"	12-24"	x	x		x	x	x		fall				
CC		<i>Solidago canadensis</i>	Canada goldenrod	36-72"	24-36"	x	x		x	x			fall				
CC		<i>Solidago juncea</i>	Early goldenrod	36-48"	24-36"	x	x		x	x			late summer				
CC		<i>Solidago nemoralis</i>	Gray goldenrod	6-30"	6-30"	x			x				fall				
CC		<i>Solidago odora</i>	Sweet goldenrod	24-48"	12-24"	x	x		x	x			fall				
CC		<i>Solidago puberula</i>	Downy goldenrod	24-36"	12-24"	x	x		x	x			fall				
CC		<i>Solidago rugosa</i>	Rough goldenrod	36-72"	24-36"	x				x	x		fall				
CC		<i>Solidago sempervirens</i>	Seaside goldenrod	36-72"	24-36"	x			x	x	x		fall				
CC		<i>Solidago uliginosa</i>	Swamp goldenrod	24-72"	24-48"	x	x			x	x		fall				
CC		<i>Symphyotrichum cordifolium</i>	Blue wood aster	12-48"	18-24"		x	x		x			fall				
CC		<i>Symphyotrichum ericoides</i>	Heath aster	12-36"	12-18"	x	x		x				fall				
CC		<i>Symphyotrichum laeve</i>	Smooth aster	36-48"	24-36"	x	x		x	x			fall				
CC		<i>Symphyotrichum lateriflorum</i>	Calico aster	24-36"	24-36"	x	x	x	x	x			fall				
CC		<i>Symphyotrichum novae-angliae</i>	New England aster	48-72"	24-36"	x	x			x			fall				
CC		<i>Symphyotrichum novi-belgii</i>	New York aster	48-60"	12-24"	x	x			x			fall				
CC		<i>Symphyotrichum patens</i>	Clasping aster	24-36"	18-30"	x	x		x	x			fall				
CC		<i>Symphyotrichum pilosum</i>	Pringle's aster	24-48"	24-48"	x			x	x			fall				
CC		<i>Symplocarpus foetidus</i>	Skunk cabbage	24-36"	24-36"		x	x		x	x		spring				
CC		<i>Tradescantia ohiensis</i>	Ohio spiderwort	24-36"	24-36"	x	x		x	x	x		early summer				
CC		<i>Uvularia sessilifolia</i>	Wild oats	8-12"	12-24"		x	x	x	x			spring				
CC		<i>Verbena hastata</i>	Blue vervain	24-36"	18-30"	x	x			x	x		summer				

Perennials & Biennials (Wildflowers) Native to the Northeast														
Native	Key	Scientific Name	Common Name	Height	Width	Sun	Part	Shade	Dry	Avg	Wet	Bloom	Wildlife Benefits	Browse Resistant
MA		<i>Aralia racemosa</i>	Spikenard	36-60"	36-60"		x	x		x			summer	
NE		<i>Chrysopsis mariana</i>	Maryland golden-aster	12-30"	12-24"	x	x		x	x			fall	
NE		<i>Echinacea pallida</i>	Coneflower	36-48"	12-24"	x	x		x	x			summer	
NE		<i>Euphorbia corollata</i>	Flowering spurge	24-36"	12-24"	x	x		x	x			summer	
NE		<i>Geum fragarioides</i>	Barren strawberry	48-60"	6-12"	x	x			x			spring	
MA		<i>Helenium autumnale</i>	Sneezeweed	12-36"	12-24"	x				x	x		late summer	
NE		<i>Heliopsis helianthoides</i>	False sunflower	36-60"	12-36"	x	x			x			all summer	
MA		<i>Lobelia siphilitica</i>	Great blue lobelia	48-60"	12-24"	x	x	x		x	x		late summer	
NE		<i>Monarda didyma</i>	Wild beebalm	24-36"	24-36"	x	x			x	x		summer	
MA		<i>Monarda fistulosa</i>	Wild bergamot	36-48"	24-36"	x	x		x	x			late summer	
MA		<i>Monarda punctata</i>	Spotted beebalm	12-24"	12"	x	x		x				all summer	
NE		<i>Parthenium integrifolium</i>	Wild quinine	24-48"	12-24"	x			x	x			summer	
NE		<i>Ratibida pinnata</i>	Mexican hat	36-60"	18-24"	x	x		x	x			summer	
NE		<i>Rudbeckia hirta</i>	Black eyed susan	24-36"	12-24"	x	x		x	x	x		summer	
MA		<i>Rudbeckia laciniata</i>	Green-headed coneflower	60-96"	24-36"	x	x	x		x			late summer	
MA		<i>Senna hebecarpa</i>	Wild Senna	48-60"	36-48"	x	x		x	x	x		summer	
NE		<i>Silphium perfoliatum</i>	Rosinweed	60-96"	12-36"	x			x	x			summer	
MA		<i>Vernonia noveboracensis</i>	New York ironweed	60-96"	36-48"	x	x			x	x		late summer	

PLANT SOURCES AND NURSERIES

The following is a list of nurseries, garden centers, and online retailers that carry native plants. This list is not exhaustive and is meant to get you started on your native plant search. It does not focus on nurseries that are exclusively wholesale, as those suppliers mainly work with organizations who are purchasing large quantities of plants on a regular basis. Retail suppliers are more likely to be able to assist homeowners with plant selection and allow plants to be purchased in small quantities. Check with your local land trust as they may also have occasional native plant sales.

If your favorite plant retailer doesn't carry the plant species you are looking for, be sure to let them know what you would like to see. Most plant suppliers only grow what they think people will buy. As the desire for native plants in residential landscapes is increasing across Cape Cod and the United States, more and more nurseries are expanding their resources and inventories to help meet the growing demand.

CAPE COD NURSERIES AND GARDEN CENTERS

- Agway of Chatham (Chatham, MA)
- Agway of Dennis (Dennis, MA)
- Agway of Orleans (Orleans, MA)
- Bayberry Gardens (Truro, MA)
- Cape Abilities Farm (Dennis, MA)
- Cape Coastal Nursery (Dennis, MA)
- Crocker Nurseries (Brewster, MA)
- Hyannis Country Garden (Hyannis, MA)
- Mahoney's Garden Center (East Falmouth, MA)
- Mahoney's Garden Center (Osterville, MA)
- Ponderosa Garden Center (Eastham, MA)
- Scenic Roots (East Sandwich, MA)
- Soares Flower Garden Nursery (East Falmouth, MA)
- Solidago Native Plants (Sandwich, MA)
- The Farm (Orleans, MA)

CAPE COD PLANT SALES (ON AN OCCASIONAL BASIS)

- Association to Preserve Cape Cod APCC Native Plant Sale
www.apcc.org
- Master Gardener Assoc. of Cape Cod Annual Plant Sale
www.mastergardenerscc.org

MASSACHUSETTS NURSERIES AND GARDEN CENTERS

- Bigelow Nurseries (Northboro, MA)
- Blue Stem Natives (Norwell, MA)
- Butterfly Effect Farm (Westport, MA)
- Helia Native Nursery (West Stockbridge, MA)
- Kings Tree Farm & Nursery (Boxford, MA)
- Lady Fern Farm (Worcester, MA)
- Native Plant Trust: Garden in the Woods (Framingham, MA)
- Native Plant Trust: Nasami Farm (Whately, MA)
- Natural Companions (Harvard, MA)
- New England Wetland Plants (South Hadley, MA)
- Oakhaven Sanctuary (North Reading, MA)
- Polly Hill Arboretum (West Tisbury, MA)
- Sudbury Nurseries (West Gill, MA)
- Sylvan Nursery (Westport, MA)
- Tree Talk Natives (Rochester, MA)
- Weston Nurseries (Hopkinton, MA)

MASSACHUSETTS PLANT SALES (ON AN OCCASIONAL BASIS)

- Garden in the Woods Plant Sale (Native Plant Trust)
- www.nativeplanttrust.org/visit/garden-woods
- Grow Native Massachusetts Native plant sale - www.grownativemass.org
- Resilient Roots plant sale - www.resroots.org

ONLINE RESOURCES FOR SEEDS / SMALL CONTAINERS

- American Meadows - www.americanmeadows.com
- American Native Plants - www.americannativeplants.com
- Ernst Conservation Seed - www.ernstseed.com
- Fedco Seeds - www.fedcoseeds.com
- Izel Native Plants - www.izelplants.com
- Kind Earth Growers - www.kindearthgrowers.com
- Northeast Pollinator Plants - www.northeastpollinator.com
- Northeast Seed Collective - www.northeastseedcollective.com
- Prairie Nursery - www.prairienursery.com
- Prairie Moon Nursery - www.prairiemoon.com
- Wild Seed Project - www.wildseedproject.net

PAGE REFERENCES

Page 4: The State of our Freshwater Ponds

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RESOURCES FOR DESIGNING AND MAINTAINING ECOLOGICALLY FRIENDLY LANDSCAPES

NONPROFIT ORGANIZATIONS:

ECOLOGICAL LANDSCAPE ALLIANCE (ELA) <https://www.ecolandscaping.org>

HOMEGROWN NATIONAL PARK <https://homegrownnationalpark.org>

POLLINATOR PATHWAY <https://www.pollinator-pathway.org>

XERCES SOCIETY <https://www.xerces.org>

GUIDELINES / GUIDEBOOKS

GUIDELINES FOR CAPE-FRIENDLY LANDSCAPES for clean water, healthy yards, and our local ecology by Association to Preserve Cape Cod 2023 https://apcc.org/wp-content/uploads/2023/08/FINALGuidelines_Website_PP_-PDF-compressed.pdf

A GUIDE TO HEALTHY LAKES USING LAKESHORE LANDSCAPING Design Templates and easy-to-use planting plans by The Federation of Vermont Lakes and Ponds (FOVLAP) https://dec.vermont.gov/sites/dec/files/wsm/lakes/Lakewise/docs/lp_VTlakescape.pdf

THE LAKE BOOK A Handbook for Lake Protection by Maine Lakes and FB Enivronmental Associates <https://www.lakes.me/lakebook>

THE MASSACHUSETTS BUFFER MANUAL Using Vegetated Buffers to Protect our Lakes and Rivers Prepared by the Berkshire Regional Planning Commission for The Massachusetts Department of Environmental Protection 2003 <https://www.mass.gov/files/documents/2016/08/wv/bufin2.pdf>

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