

## Prepare site for installation

Prior to installing native seed or plants, the site needs to be prepared properly, which involves identifying existing native plants, removing unwanted vegetation, stabilizing erodible areas, and preparing the plant and seed beds. Before making modifications to a site, however, be sure to obtain any required permits and put proper erosion control measures in place. Cardno can assist with your permitting and erosion control needs.

Before installing a native landscape, a site may need to be prepared over one or more growing seasons. The effort required depends on current site conditions, in particular the amount of non-native plants in the seed bank and invasive species on site. Cardno can provide the professional assistance needed to evaluate site preparation needs.

## Identify any existing native vegetation

Some projects may have areas of “remnant” habitat present. Protecting these species onsite or temporarily relocating and using them later as part of the installation can be key to a project’s success. Cataloging which species are present within these areas can also be highly valuable for developing a planting plan, because the remnant will contain species that have adapted to survive at that particular site. These remnants can also serve as seed sources for plant material if preserving local genotype is a goal of the project.

## Remove unwanted vegetation

Be sure to remove any weeds and existing vegetation that could out-compete native species. Besides the usual aggressive invasive species, such as Purple Loosestrife, Reed Canary Grass, and Honeysuckle, some of the more problematic competitors include cool-season grasses, such as Brome, Clover, Tall Fescue, and other turf grasses. If your site has a significant unwanted plant seed bank, it will likely require ongoing control and maintenance, to ensure unwanted vegetation does not become re-established.

Several techniques can be used to remove undesirable vegetation. Hand weeding can be done if a site is small or if there are a limited number of plants to be removed. However, for most sites, either a more aggressive approach or a combination of approaches is typically needed. A trained and licensed native landscape professional should perform these intensive vegetation control activities.

## Effective vegetation removal techniques

### *Herbicide application*

Works for large sites or sites with little or no native vegetation. Selective use of herbicide is especially effective for aggressive non-natives. The number of treatments depends upon site conditions, species present, and the presence of a seed bank within the soil. Repeat applications may be required for persistent perennial weeds.

### *Smothering*

Works for smaller sites when chemical use is not desirable. Landscaping fabric, dense compost, or grass clippings cover existing vegetation and is left in place for a full growing season.

### *Cultivation*

Involves tilling an area regularly from spring to fall, to between four to five inches deep, to destroy weed root systems. Because it can also bring up weed seeds, cultivation needs to occur at regular intervals, between two to three weeks, to ensure undesirable perennials do not re-sprout. This has the highest risk of soil loss from erosion. Plants with deep root systems may need supplemental herbicide application.

### *Prescribed burning*

Can be used to prepare a site, but it is most commonly used to maintain a prairie landscape. See the section on maintenance for more information on prescribed burning.

### *Stabilize erodible areas*

Many native plant installations are located along streambanks, shorelines, and other sloped areas that have a tendency to erode. Before planting occurs on these sites, the surrounding soils need to be stabilized. Structures

such as silt fences, erosion control blankets, straw mulch, and straw bale dams can be installed to control erosion and siltation. As a site becomes stable, seeding with permanent native species helps with optimal long-term erosion control. Cardno provides various bioengineering materials for erosion control.

## Prepare planting and seedbeds

To prepare the soil and create optimal plant conditions, before disturbing any ground:

- > Check for any buried utilities
- > Clear area of debris that would interfere with planting
- > Mow any excess existing vegetation growth
- > Apply broad-spectrum or targeted herbicide, depending on species present
- > De-compact any areas of special concern
  - Lightly de-compact tilled or loose soil with a roller, cultipacker, or similar equipment. If using a no-till seed drill, tilling can usually be omitted.
  - If ground is wet, tilling should not occur until the soil dries enough to break apart when tilled.

## Amend soils

For stormwater applications like rain gardens and bioswales, soil can be amended to create appropriate growing conditions for wetland plants and allow for drainage required to allow these features to function properly. These areas often have the native soil removed and have a combination of compost and sand applied to achieve this objective.

## Follow appropriate timing

**Seed:** The optimal time to install seed is from the fall (September 1) to late spring (June 15). Avoid mid-to-late summer seeding, because of limited soil moisture and rainfall. Native seed mixes can be installed in the fall when temperatures are cooler and rains are more frequent. Many native species require a cold stratification in order to break dormancy. When conditions are right in the spring, the seed will be in place to germinate.

Seeding a wetland in the winter is often easier, because the site is frozen and equipment can more easily access the site. Broadcast the seed when the evening temperatures drop below freezing. Use appropriate erosion control measures, because the seed is not likely to germinate and provide stabilization until the following growing season.

**Live Plants:** Live plants, including plugs, container stock, and bareroot herbaceous plants, are best planted during the growing season, which in the Midwest is between May 1 and October 15. Spring plantings are usually more successful, because the plants have sufficient time to develop a deep-root system to withstand summer droughts. If planting needs to occur in the middle of summer, irrigation is recommended. If plants are installed in late fall (after October 15) after going dormant, care should be taken to anchor plants in loose soil to prevent frost heaving. Wet soils are more prone to frost heaving.

**Dormant Woody Materials:** Bare-root trees and shrubs, live stakes, fascines, and brush layering are all dormant when sold and are best planted during their dormant season (December 1 through April 15). This timing reduces transplant shock and allows the plants to develop a root system when moisture is readily available. Fall availability of bare-root trees and shrubs is weather dependent, and winter weather can eliminate fall harvest opportunities.

## Install seed and plant material

### Seed installation techniques

Cardno's native plant experts recommend using specific techniques to successfully install native seed.

**Broadcasting:** For small (typically two acres or less) or irregularly shaped areas, seed can be planted by hand broadcasting. To aid seed distribution, combine the seed mix with filler materials, such as dry sawdust, sand, or vermiculite. The filler material should be dry so that the seed flows easily through the broadcaster. If not already included in the seed mix, plant a temporary cover crop along with the seed, to stabilize the soil

while the permanent native species germinate and become established, especially in highly-erodible areas. Do not use a heavy amount of cover crop seed, which could smother the native seed and inhibit germination.

Using a hand-crank or tow-behind broadcaster, start with half of the seed and try to cover the entire area with that amount of seed. Take the remaining half of the seed, go to the opposite end of the site and cover it again. This approach helps prevent running out of seed, a common occurrence. After broadcasting is complete, it is important to use a cultipacker or roller over the area to make good seed-to-soil contact. If a roller is not available, tractor tires can be used instead. Do not cover seed more than 1/4-inch deep.

**No-Till Drill:** For larger areas and sites with existing vegetation, use a no-till seed drill, which does not require the soil to be tilled before planting, resulting in minimal soil disturbance. No-till drills plant seed in rows by opening slits in the soil, into which seed is deposited. Several brands of no-till drills are available to plant prairie forbs and grasses. If using a no-till drill, Cardno recommends following the specific manufacturer's recommendations. Because the diversity of seed sizes makes drill calibration a challenge, perform a few test areas first to help prevent running out of seed.

### **If wetland is temporarily dry:**

- > Scarify soil surface through shallow tilling or raking. If tilling adjacent to a wet area, assess the potential for erosion and runoff when disturbing the soil.
- > In lower elevations, where water levels are deeper, sow seed that is packaged wet. Sow dry-packaged seed on the higher elevations; this seed can overlap into wet-seed areas.
- > Press seed firmly into soil using a roller, cultipacker, or similar equipment. Light raking is an acceptable alternative, but be careful not to cover seed more than 1/4-inch deep.
- > Install erosion fabric over areas where water is likely to flow and displace seed.
- > Slowly restore water level or wait for rainfall to bring water level up after seeding. If feasible, use outlet controls to maintain water level depths between 1/2 inch and 6 inches until seed germinates and wetland vegetation is well established.

### **If wetland is permanently wet:**

- > Mix seed with damp clay pellets in a container, such as a five-gallon bucket. Clay pellets should be small (approximately 1/2 inch in diameter) and placed in optimal areas for germination.
- > Sow dry-packaged seed in areas at and above the waterline. If soil moisture conditions permit, press seed firmly into soil using a roller, cultipacker, or similar equipment. Do not cover seed more than 1/4-inch deep.
- > Permanently wet areas can also be seeded by broadcasting when the ground is frozen.
- > Post-planting Protection: Plantings may need to be protected after installation. Use physical barriers such as chicken wire, netting, or twine obstacles to keep out geese, muskrats, deer, and other animals. Various repellants can also be applied directly to the plants, but they often need to be re-applied periodically.

## **Native plant installation**

### **Prior to Installation:**

- > After delivery, remove plants immediately from packaging and set them in a cool, semi-shaded area until you are ready to plant.
- > If the soil around the plant roots is dry, irrigate to keep the roots moist, but not saturated.
- > If watered properly and protected from extreme conditions, such as excessive heat, sun, strong winds, or frost or freezing conditions, plants should be fine in their original pots or plug trays for up to several weeks.
- > On site, it may be helpful to stage plants near the areas where they will be installed, to save time. During the planting process, protect bare-root trees, shrubs, and aquatic plants from heat, sun, and wind, to prevent the roots from drying out.

**Upland Plant Installation:** Install upland plants as you would any landscape materials. Because many native plants have an extensive tap root, take care during installation not to damage the roots.

For large-scale plantings, a gas-powered auger greatly speeds up the planting process. Select an auger bit slightly wider than the diameter of the container being planted, and pre-drill the planting holes at the recommended spacing. A crew can then follow behind and install plants.

**Wetland Plant Installation:** In many wetland situations, the plant installation process is the same as for an upland area, but the process may be slower due to softer soils and the slower speed of planting. When planting in submerged areas, the most difficult aspect of installation is getting the plants to stay in place. If possible, use a pump or water control structure to lower the water level during installation and let the water level rise slowly.

If planting below the water line or in areas submerged due to water fluctuations, planting holes often immediately refill with water, causing soil and plants to float to the surface after planting. In these instances, after installing the plant under the soil surface, use stones, small wood stakes, steel turf staples, or similar mechanical means to anchor the plant in place. Take care not to crush or puncture the plant or root with any anchoring techniques. If the plants have leafy stems or foliage, ensure foliage will stand above the water level after installation.

Bare-root aquatic or emergent species like Lilies, Pickerel Weed, and Common Arrowhead are supplied in the early spring in bare-root format with little to no foliage. When planting bare-root plants, submerge the entire root to the appropriate depth and anchor it below the soil surface. A technique to use with bare-root tubers is to put them in a small, weighted, biodegradable mesh sack and submerge them at an appropriate depth. The sack will keep the tuber from floating to the surface, and by the time the plants have rooted into the soil, the sack will have biodegraded. Other techniques can be used to anchor plants, such as using small piles of gravel to weight down the plants, or planters. Contact Cardno for additional advice on wetland plant installation.

## Tips for bare-root tree and shrub installation

- > After delivery, remove plants immediately from box and store upright to prevent mold growth.
- > Keep roots moist until plants are installed. They may be held in buckets or containers of water on site; however, if plant material will not be installed for a week or longer, do not keep in standing water.
- > Keep plants in a cold, dark place to prevent them from breaking dormancy until ready to plant. Bare-root trees and shrubs can be stored this way for several days, but check frequently for signs of mold and to make sure they are adequately watered.

## Tips for bare-root aquatic and emergent species installation:

- > Because they do not remain viable for long after harvesting, schedule shipment to arrive as close to planting date as possible.
- > Take plants out of the packaging, place upright in a container, and keep in fresh water until planting (similar to fresh-cut flowers).
- > Plant roots must remain submerged at all times until just before planting, even when staging at the planting site.
- > Change water every few days if unable to plant immediately.

## Monitor and maintain site

To help ensure success, projects need a maintenance and management plan that is flexible and supports site development goals. While native plants tend to germinate and develop at a slower rate than ornamental perennials or turf grass, regular maintenance during the establishment period greatly improves project success. Regular maintenance and monitoring controls invasive species, ensures optimal moisture levels are present, and identifies other necessary management actions.

## The maintenance of a native landscape can include many different actions:

- > Regular site inspection and monitoring
- > Mowing
- > Selective herbicide application
- > Overseeding and supplemental planting
- > Water control and temporary irrigation
- > Prescribed burning

Selection of maintenance methods partly depends upon timing, but other factors such as aesthetic goals, project size, and budget also help determine what techniques will work best. For example, for small areas or sites where chemical applications cannot be performed, target species may be removed by hand.

## Regular site inspection and monitoring

During the first 6 to 12 months of a seeding project, it may be difficult to differentiate between the germinated native seed and undesirable weeds. Although some wildflower and grass species will be recognizable within the first year, it may take two to four years before the native plant community is sufficiently established to be recognized by most people. During this establishment period, address any invasive species that subsequently appear on site, to prevent them from becoming a larger problem later on. Cardno inspects project areas throughout each growing season to gauge native plant density and composition, and manage undesirable weeds.

## Mowing

During the establishment period, native plants concentrate their energy toward expanding their root systems. Mowing can suppress non-native annual plants without negatively affecting natives. Mowing also thins out the canopy, allowing more light to reach new seedlings.

Because most weed competition comes from fast-growing annuals, mowing needs to occur to keep these species from re-seeding. Cardno recommends mowing to between 8 and 10 inches high. During the first growing season, our team performs one to three mowing events, depending on the height and growth of the vegetation. If weed pressure is high, more mowing events may be needed.

## Selective herbicide application

Many perennial weed species are best controlled through chemical applications. Cardno's trained herbicide application staff uses caution when applying these chemicals, to minimize collateral damage to desirable plant species. Cardno staff has the qualifications to ensure chemical selection, rates, and application methods are legal and appropriate.

## Overseeding and supplemental planting

Most native species grow slowly from seed, making it difficult to assess the development of a recently seeded site. Supplemental plantings are often used to increase diversity or to introduce conservative species to an established planting. Cardno can determine the need for overseeding or supplemental planting, typically by the second growing season following installation.

## Water control and temporary irrigation

In periods of drought, small native areas will benefit from irrigation, especially during the first growing season. Typically, one inch of water per week is sufficient to encourage proper germination and growth. Weed pressure will increase with supplemental watering, which may then require more frequent mowing or herbicide application.

## Prescribed burning

Controlled burns can be important to long-term prairie maintenance. Burning simulates historical processes that once maintained prairies. It greatly reduces the number of woody species and enhances the health of herbaceous species. It also clears thatch, making way for new growth in the spring. The black, burned surface absorbs and retains heat, giving natives an early start in the spring. Cardno has a team of personnel trained in fire management techniques.