



Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

WINDBREAK-SHELTERBELT ESTABLISHMENT AND RENOVATION

DRAFT CODE 380

(ft)

INITIAL REVIEW – Comments and Responses

Drafted technical standard text (as sent for Initial Review) is in black and blue fonts.

National minimum requirements are in black font;

Wisconsin specific criteria is denoted with blue font.

Comments are in red, preceded by comment number (C#).

To find a specific comment number, search for that number using “Ctrl + F”

(Windows) or “Command + F” (Mac).

Responses to comments are in green italics.

General Comments

C27: The draft looks good to me. I don't have anything to add.

RESPONSE: *Thank you for taking the time to review the standard.*

DEFINITION

Establishing, enhancing, or renovating windbreaks, also known as shelterbelts, which are single or multiple rows of trees and/or shrubs in linear or curvilinear configurations.

PURPOSE

Use this practice to accomplish one or more of the following purposes:

- Reduce soil erosion from wind
- Enhance plant productivity and health by protecting plants from wind-related damage
- Manage snow distribution to improve moisture utilization by plants
- Manage snow deposition to reduce obstacles, ponding, and flooding that impacts other resources, animals, structures, and humans

NRCS reviews and periodically updates conservation practice standards. To obtain the current version of this standard, contact your Natural Resources Conservation Service State office or visit the Field Office Technical Guide online by going to the NRCS website at <https://www.nrcs.usda.gov/> and type FOTG in the search field.

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NRCS, WI
September 2022
Initial Review DRAFT

C28: [Propose to amend to:] “Manage snow deposition to reduce obstacles, ponding, flooding, and drifting that impacts other resources, animals, structures, roadways and humans

RESPONSE: *Team will consider adding roadways to the purpose if we can get a waiver to do so; however, roadways are not an NRCS land use,*

- Improve moisture management by reducing transpiration and evaporation losses and improving irrigation efficiency
- Provide shelter from wind, snow, and excessive heat, to protect animals, structures, and humans
- Improve air quality by intercepting airborne particulate matter, chemicals, and odors, and/or by reducing airflow across contaminant or dust sources
- Reduce energy use in heating and cooling buildings, and in relocating snow
- Increase carbon storage in biomass and soils

CONDITIONS WHERE PRACTICE APPLIES

On cropland, pasture, farmstead, associated agricultural land, or designated protected areas (excludes forest land) apply this practice to establish, enhance, or renovate windbreaks where rows of woody plants are desired and suited for the intended purposes.

Apply this practice to any existing windbreaks that are no longer functioning properly for the intended purpose, or where renovation can extend the functional life of a windbreak.

CRITERIA

General Criteria Applicable to All Purposes

Plan, design, install, enhance, and renovate windbreaks to comply with applicable Federal, State, and local laws and regulations. Locate and design windbreak plantings to achieve functionality for their intended purposes within 20 years from the time of establishment.

Design windbreak dimensions and configurations to address site conditions. The protected zone on the leeward side of a windbreak is 10 times the maximum design height (H) of the tallest row of trees or shrubs at age 20. Adjust H estimates based on site productivity. [See the WI Windbreak Guidance Document\(s\) as needed for assistance with designs.](#)

C1: Not sure we can add a reference? “See Windbreak/Shelterbelt Establishment, Wisconsin Job Sheet 380 for diagram of dimensions and configuration example.”

RESPONSE: *Conservation planners are familiar with the framework of where to find guidance documents for available practices. Guidance documents are in the same location as the standard for each practice and applicable Job Sheet information will be in the revised guidance document. A reference to the guidance document was added in this paragraph for further clarification.*

Use species and setback distances that allow for the expected mature windbreak size to mitigate potential negative impacts of shading, visibility along travel routes, snow deposition, or concerns for visual quality. [Design](#) windbreak length to protect the site and allow for “end effect” (turbulence effects at the end of a windbreak) and minor changes in [prevailing](#) wind direction. [Determine prevailing wind direction using wind rose data, averaged for the months when the resource concern exists. Adjust wind rose data as needed to account for effects of local topography on wind direction.](#)

C2: As a user of this document am I supposed to know what “wind rose data” is? Or where to get it? I guess I’m not sure what the knowledge expectation is for audience.

RESPONSE: Information on how to obtain and interpret wind rose data will be in the revised windbreak guidance document.

C3: [Propose to add] “Wind rose data can be found at Iowa Environmental Mesonet as listed in the references.”

RESPONSE: Information on how to obtain and interpret wind rose data will be in the revised windbreak guidance document. Sources might change over time, and the guidance document can be more easily edited than the standard.

Select tree and/or shrub species that are adapted to soils, climate, and other site conditions. Protect trees and shrubs from browsing and damage by wildlife or livestock, if necessary.

C4: [Propose to add] “Use Wisconsin Forestry Technical Note 4, Tree and Shrub Species for Windbreaks as a reference.”

RESPONSE: The windbreak guidance document will have this information and is referenced at the end of this section. The revised guidance document will not have the “Technical Note” nomenclature.

Do not use species that are on Federal or State invasive species or noxious weed lists.

C5: [Specify] “...Wisconsin State Administrative Code, Department of Natural Resources, Chapter NR 40, Invasive Species Identification, Classification and Control invasive species or Wisconsin Legislature: 66.0407 noxious weed lists.”

RESPONSE: This is specified in the References section.

Space individual plants based on the growing area needed by each species, with accommodation for maintenance equipment and for the desired configuration of the stems, branches, and canopy to achieve windbreak purposes. Do not plant trees or shrubs where they will interfere with above or belowground structures, utilities, irrigation or moisture management systems, or desired drains. To determine how far to end a windbreak from an intersection, use the Design Intersection Sight Distance table from the Federal Highway Administration.. Confirm sight distance with the local roadway authority.

C7: What is meant by “uncontrolled” intersection? And why only uncontrolled?

RESPONSE: We will make a change to clarify the language.

C8: Can we reference a table number?

RESPONSE: Leaving this more general gives room for future guidance document edits where table numbers may change.

C6: [Suggest rewording previous sentence to] “To determine how far to end a windbreak from an uncontrolled intersection, use the Design Intersection Sight Distance table from the Federal Highway Administration, found in the Windbreak Guidance Document.”

RESPONSE: Thank you for this suggestion, we will make this change.

C9: I’m not sure where the “Windbreak Guidance Document” can be found?

RESPONSE: Conservation planners are familiar with the framework of where to find

110 *guidance documents for available practices. Guidance documents are in the same*
 111 *location as the standard for each practice.*

112 Permit the periodic removal of some products, such as high value trees, medicinal herbs, nuts, fruits, etc.,
 113 provided the loss of vegetation or harvesting disturbance does not compromise the conservation purpose.

114 Use [Wisconsin Windbreak Guidance Document\(s\)](#) and the following NRCS Conservation Practice
 115 Standards (CPSs) as needed to establish windbreaks:

- 116 • Tree/Shrub Site Preparation ([CPS 490](#)) for preparing the site prior to plant establishment
- 117 • Tree/Shrub Establishment ([CPS 612](#)) when establishing trees and/or shrubs
- 118 • Irrigation System, Microirrigation ([CPS 441](#)) for supplemental water

119 **Additional Criteria to Reduce [Soil Erosion](#) and Protect Growing Plants**

- 120 • Determine the appropriate interval between windbreaks using current soil erosion prediction
 121 technology to minimize wind erosion.

122 **C10:** This leads me to ask where can I find erosion prediction technology? Or will the
 123 reader know?

124 ***RESPONSE:** NRCS will train conservation planners in the appropriate software.*
 125 *Specific programs may change over time so are not specified in the standard.*
 126 *Guidance document will include the specific resource.*

- 127 • Interval widths must not exceed that permitted by the soil loss tolerance (T) or other planned soil
 128 loss objective.
- 129 • Account for the effects of other practices used in the conservation management system when
 130 calculating interval widths.
- 131 • Design windbreaks with adequate height to protect the desired area. The protected zone is 10H on
 132 the leeward side and 2H on the windward side.
- 133 • [Design windbreak density to be 40 to 60 percent during the time of year soil erosion is most likely](#)
 134 [to occur, taking into account times of year that deciduous trees will not have full leaf cover if they](#)
 135 [are part of the design.](#)

136 **C11:** It feels like this should say ...40 to 60 percent of (something). This sentence
 137 seems like it has two unrelated concepts in it, but I'm not sure that's the intention. One,
 138 windbreak density and, two, time of year to expect soil erosion. Basically, I think you
 139 need some wordsmithing here, but I'm not sure what it is.

140 ***RESPONSE:** Text edited for clarity. The guidance document will include photos*
 141 *depicting density.*

- 142 • Orient a windbreak perpendicular to the wind direction(s) that causes the resource concern or as
 143 nearly perpendicular as practical.
- 144 • [For protection of growing plants](#), select species for planting that are taller than the height of the
 145 crop [during the period of vulnerability](#).

146 **Additional Criteria to Manage Snow Deposition**

147 Orient the windbreak as close to perpendicular to the prevailing snow-bearing wind as practical. Locate
 148 [and design](#) windbreaks so that snow deposition will not pose a health or safety problem, management
 149 constraint, or obstruct human, animal, or vehicular traffic. [The windward edge of the windbreak should be](#)

150 a minimum of 5H from any area where snow deposition may be a potential health or safety problem.
 151 Windbreak density during expected snow-producing months must be at least 50 percent.

152 **C29:** [Suggest rewording previous sentence to] "...40-50 percent"

153 **RESPONSE:** *The Team is not able to make national direction less restrictive.*

154 Where it is desirable for wind to blow snow off road surfaces and limit ice formation, design windbreaks
 155 using greater setback distances and allow for maximum mature windbreak height as well as 20-year
 156 height.

157 To reduce hazard of black ice and snow drift, the windward row will be a minimum of 175 feet and a
 158 maximum of 300 feet from the fogline (white line) or edge of the road if there is no fogline. Increase this
 159 distance as necessary to prevent winter shade on the roadway at the mature tree height.

160 **C12:** "Traveled way" and "fogline" sound like DOT language, I recommend "pavement" and
 161 "white line".

162 **RESPONSE:** *Clarifying language is added.*

163 **C13:** A graphic would go a long way to visualize this.

164 **RESPONSE:** *Thanks for the comment, the Team will consider putting a graphic in the*
 165 *guidance document.*

166 **C30:** In MN we use 150 feet as common distance from the windbreak to right of way on a
 167 highway.

168 **RESPONSE:** *The edge of right of way may not be apparent and team prefers the*
 169 *fogline as a point of reference. Minimum distance reduced to account for variations.*

170 **Control** soil erosion and/or runoff from melting snow by adjusting the siting of new windbreaks prior to
 171 establishment or by using appropriate supporting practices, **if necessary**.

172 **Additional Criteria for Managing Snow Distribution**

173 To encourage more even distribution of snow across a site, windbreak density during expected snow-
 174 producing months should be 25 to 50 percent with the interval between windbreaks not exceeding 20H.

175 **Additional Criteria to Provide Shelter for Animals, Structures, and Humans and to Reduce Energy** 176 **Use in Structures**

177 Use windbreaks as needed to reduce wind or snow impacts to animals, structures, and humans, or to
 178 reduce energy use.

179 For snow and wind impacts, orient the windbreak as close as possible to perpendicular to the prevailing
 180 wind. To protect a structure, the structure must be a minimum of 5H (to ensure area for snow drift
 181 accumulation) and no greater than 10H from the windward edge of the windbreak. The density for
 182 windbreaks that protect animals from cold and wind must be at least 65 percent during the months when
 183 the wind is most responsible for the resource concern. The density for windbreaks designed to reduce
 184 winter energy use in structures must be at least 50 percent.

185 Prevent snowmelt drainage from a windbreak from flowing across an area of animal confinement. Prevent
 186 drainage of animal waste into a windbreak.

Additional Criteria to Improve Air Quality by Reducing and Intercepting Airborne Particulate Matter, Chemicals, and Odors

Use tree and shrub species with foliar and structural characteristics that optimize interception, adsorption, and absorption of airborne particles, chemicals, or odors.

C14: Is there a reference that tells you what these species might be? I'm a landscape architect and I'm unsure which species are best.

RESPONSE: This information will be part of the guidance document.

Coniferous evergreen trees and/or shrubs are generally preferred. Select windbreak species that are tolerant of identified spray drift and other pollutants to the extent that these impacts are predictable.

Odor/Particulates

Design odor-protecting windbreaks on both the windward side and leeward side of the area that needs protection, to both decrease wind speed and encourage odor particle deposition, and create wind turbulence that disperses and dilutes odor particles. Provide adequate distance from the windward side of the windbreak to the windward side of a structure to accommodate snow deposition, at least 5H.

Table 1: Two-Windbreak System for Odor Protection Purposes

	Windward of Odor Source	Leeward of Odor Source
Mechanically ventilated structure	>50% density 5H-10H	>65% density distance at least 4x fan diameter or 50', whichever is farther, typically 2H-5H
Naturally ventilated structure & Manure storage areas	>50% density 10H-15H	>65% density >4H

Chemicals

Use windbreaks to help USDA certified-organic and transitioning-to-organic producers meet National Organic Program requirements for suitable buffers or barriers between certified organic production areas and nonorganic production areas on the same farm or neighboring farms that utilize National Organic Program prohibited substances. Windbreak density must be at least 50 percent at the time of year when chemical drift is a concern.

Additional Criteria for Carbon Capture and Storage

Plant windbreaks with a larger footprint to increase carbon capture and storage in biomass and soils. Where practical, while meeting the primary objective of the windbreak, adjust plant spacing and species selection to increase above and belowground productivity for increased carbon capture and storage.

Maintain site fertility. Minimize soil disturbance during windbreak establishment, maintenance, and renovation. Manage without tillage, where possible, to reduce impacts on soil organic matter. Limit the use of petroleum-based herbicides and fertilizers.

Use the WI Windbreak Guidance Document to choose species with desirable carbon characteristics (fast growth, long-lived, and/or durable wood products).

C15: A good reference for tree carbon characteristics is Tree Benefits! | i-Tree (itreetools.org)

RESPONSE: Carbon information will be part of the forthcoming guidance document so it is easily accessible to planners. Team will consider referencing this website in the guidance document.

Additional Criteria for Improving Irrigation Efficiency

For sprinkler irrigation systems, design edge-of-field windbreaks taller than the spray height. Windbreak density must be at least 50% during time of year when irrigation is applied.

Design the windbreak to not interfere with the operation of the irrigation system. Design pass-throughs for irrigation equipment wheels.

Additional Criteria for Windbreak Renovation

Renovate windbreaks by planning and implementing treatments to adjust the design, width, length, species composition, and density to achieve functionality for the intended purposes within 20 years from the time of establishment. Protect desirable vegetation as well as soil and site conditions during renovation. Control erosion, runoff, compaction, and displacement.

Thin trees and/or shrubs as needed to reduce plant competition, alter windbreak density, remove dead, injured or diseased vegetation, or provide access for maintenance. Identify woody and herbaceous invasive species that are on federal or state invasive species or noxious weed lists, and plan for removal, replacement (if required for windbreak effectiveness), and continued management of new infestations from existing seedbank.

C16: [After “invasive species...”, add] “as defined by Wisconsin NR40”

RESPONSE: Language will be adjusted to include federal or state-listed species, similar to the language in the General Criteria section.

Use NRCS Tree/Shrub Pruning (CPS 660) for branch or root pruning. Cut trees and/or shrubs that regrow from their base (i.e., coppicing) close to the ground when vigorous regrowth is desired.

Retain vegetative residues (the woody material left on the ground after removal) onsite except where fire hazard or threats from diseases and insect pests are of concern or where prescribed burning will take place to meet other management objectives. Place retained woody material so that it does not interfere with the intended purpose or other management activities. Use NRCS Woody Residue Treatment (CPS 384) to treat woody debris as necessary to assure that it does not present an unacceptable fire, safety, environmental, or pest hazard. When woody residue or other debris requires onsite burning, use NRCS Prescribed Burning (CPS 338).

C17: Residues is a strange term to me, so I suggest a brief explanation [at first usage]: “..., materials left behind after removals, ...”

RESPONSE: Change will be made.

Add rows of trees and/or shrubs adjacent to or within an existing windbreak to increase windbreak density as needed to achieve the purpose. Plant individual trees and/or shrubs to fill gaps or replace declining plants. Before adding trees or shrubs, evaluate existing growing space, shade level, and root competition to determine that conditions are acceptable for the growth of new plantings.

256 Where herbicide application will occur, evaluate and interpret risks using the Windows Pesticide
 257 Screening Tool (WIN-PST) or other approved tools or guides, or use NRCS Pest Management
 258 Conservation System (CPS 595).

259 **CONSIDERATIONS**

260 **Considerations for Species Selection**

261 Plan and design windbreaks to be visually pleasing while meeting the purposes for the planned area.
 262 Design plantings to complement natural landscape features. Consider including trees and shrubs that
 263 produce edible fruits and nuts, provided that windbreak function is not impacted and that edible produce
 264 will not be contaminated with chemicals or odor particulates.

265 **C18:** [Propose to add] "...or contaminated with airborne particles, chemicals, or odors while
 266 acting as an air quality windbreak."

267 **RESPONSE:** *Change will be made.*

268 **C31:** Nice to include edible fruits and nuts. However, sounds like harvest is only allowed on
 269 riparian buffers and not windbreaks in CRP and the landowner payment is reduced because
 270 of harvest. There should not be any reduction in CRP payments as long as the planting is still
 271 functionable.

272 **RESPONSE:** *CRP policy is not within the scope of this project.*

273 Visual quality can be enhanced by using evergreen species or species with features such as showy
 274 flowers, brilliant fall foliage, or persistent colorful fruits. Avoid using potentially invasive species.

275 **C19 / C32:** [Propose to add] "...or species listed on the Wisconsin NR 40 Invasive Species
 276 Identification, Classification and Control." // [Propose to add] "...or noxious weed species."

277 **RESPONSE:** *The General Criteria, which planners must follow, prohibit use of invasive
 278 and noxious species.*

279 In cropping systems, select windbreak species that minimize adverse effects on crop growth (e.g., shade,
 280 allelopathy, competing root systems, or root sprouts). Avoid aggressive species that may invade
 281 neighboring cropland. Avoid using plants that may be alternate hosts to undesirable pests, e.g., cedar
 282 apple rust. Consider species diversity (ideally, genus-level diversity), including the use of native species,
 283 to avoid loss of function due to species-specific pests. Where feasible, plant native species that benefit
 284 wildlife, including pollinators and natural enemies of crop pests.

285 Use conifer windbreaks to reduce impacts of prevailing winter winds and reduce energy use.

286 **Considerations for Windbreak Design**

287 Windbreaks are not usually fully functional immediately after installation. Plan other practices as
 288 appropriate to control wind erosion in adjacent fields until a windbreak is fully functional.

289 Use one or more "legs" (i.e., windbreak extensions oriented at right angles to the main windbreak), where
 290 practical, to provide protection from changing winds and to increase the area of the protected zone.

291 Windbreaks established for odor and chemical drift reduction are more effective as the amount of foliage
 292 surface area increases. Wide, multiple-row plantings offer greater interception potential than smaller
 293 plantings.

294 Tree or shrub rows should be oriented on or near the contour where water erosion is a concern. Where
 295 water erosion and/or runoff from melting snow is a hazard, it should be controlled by supporting practices.

296 **C20:** I attempted to reword this sentence. I struggled with the intent. The words “near the
 297 contour” are difficult to visualize. Might benefit from a graphic.

298 “Place tree or shrub rows strategically to prevent erosion from intense water runoff. Consider
 299 additional erosion control practices where water runoff flows may be high to cause hazards
 300 during intense rain events and snow melts.”

301 **RESPONSE:** *Conservation planners are familiar with the contour concept since it is*
 302 *used in other practices.*

303 Where windbreaks will be installed to protect a structure and wildland fire danger is a concern, consider
 304 using Firewise USA® recommendations for spacing and management of the windbreak.

305 A fast-growing willow or poplar row may offer early protection while the windbreak is becoming
 306 established. Fast-growing trees present greater maintenance challenges as they might be large and
 307 produce large amounts of woody residue when removed; monitor for timely removal from the windbreak.

308 **C33:** [Propose to add] “A fast-growing willow or poplar row may offer early protection while
 309 the windbreak is becoming established.”

310 **RESPONSE:** *Similar language will be added, with caution that removal of fast-growing*
 311 *trees will be necessary.*

312 Consider establishing a native grass/forb (pollinator) field border between the outer windbreak row and
 313 the crop. Reference the current WI CPS 386 Field Border and CPS 420 Wildlife Habitat Planting.

314 **C34:** [Propose to add] “Consider establishing a native grass/forb (pollinator) buffer (16.5 feet)
 315 between the outer windbreak row and the crop. This buffer would benefit the crop as well as
 316 the windbreak plus benefits to wildlife.”

317 **RESPONSE:** *Similar language will be added.*

318 **Considerations for Managing Snow**

319 Consider additional actions for situations where a windbreak alone does not provide enough snow
 320 storage. Add windbreak rows or obtain supplementary storage with temporary or herbaceous wind
 321 barriers, constructed or living snow fences, or by retaining standing crop residues within the fetch
 322 (storage) area. Retain standing crop rows or residues to enhance the effectiveness of windbreaks in
 323 uniformly distributing snow across a field. Refer to the current WI CPS 589 Cross Wind Trap Strips.

324 To control end drifts, extend the length of the windbreak beyond the protected area, add supplemental
 325 windbreak legs, use greater setback distances, and/or use temporary or herbaceous wind barriers.

326 Secondary windbreaks made up of shorter tree species can be used to address snow control when winds
 327 come from directions different than the prevailing wind.

328 **C35:** [Propose to add] “Standing corn rows can be left in the field bordering the windbreak to
 329 offer added snow and wind protection.”

330 **RESPONSE:** *Clarifying language will be added to 1st paragraph.*

Considerations for Wildlife Habitat

When compatible with the purposes and criteria for application of this practice, modify windbreak design to better address identified wildlife needs. Windbreak dimensions, density, and species composition can be designed to provide food and/or shelter for desired wildlife species, and windbreaks can be located as wildlife travel corridors to connect existing patches of habitat. Consider windbreak proximity to roads and potential conflicts between wildlife and vehicles.

Address pollinator and beneficial organism needs when selecting or siting tree or shrub species and when planning windbreak management. Ground-dwelling pollinators may find habitat in an untilled area within the windbreak. Windbreaks may provide habitat for species that pollinate or consume pests in nearby crops. Early-blooming trees can provide nectar sources for pollinators and pest predators in the spring before herbaceous sources are available. Consider adding plantings of suitable, noncompetitive forbs and legumes that bloom at times when trees are not flowering; this action may favor a greater diversity of native pollinators and natural enemies of crop pests by providing additional nectar and pollen sources.

C36: [Propose to add] “Be aware that some tree and shrub species may need to be protected from deer and wildlife browsing, examples include – white pine, white cedar, Juneberry, etc.”

RESPONSE: Similar language will be added to the General Criteria section.

Considerations for Windbreak Renovation

Windbreak renovations may require a period of years to fully implement.

Where insect pests and plant diseases are not of concern, treat woody debris by mulching or chipping to increase soil organic matter and reduce herbaceous weed competition. Debris and other vegetation requiring removal during renovation could become biofuel for energy generation.

PLANS AND SPECIFICATIONS

Prepare specifications for windbreak establishment in accordance with this standard for each site and purpose in the implementation requirements document. At a minimum, include—

- Maps, drawings, and/or narratives identifying and describing areas planned for windbreak establishment, including location and distances to adjacent features, structures, and known utilities.
- A planting plan, including—
 - o Dimensions and configuration of plantings, including the number of rows of trees and/or shrubs and their spacing both in-row and between rows;

C37: [Propose to add] “(spacing within the row and between rows for each species)”

RESPONSE: Similar language will be added.

- o Species to use (both common and Latin name);

C21: [Specify] “Common and Latin name of species to use.”

RESPONSE: Similar language will be added.

- o Type and size of plant material;
- o Planting or seeding rates;
- o Required survival density;

- 369 o Site preparation, if any;
- 370 o Season of planting;

371 **C22:** [Specify] “Season and timing of planting.”

372 ***RESPONSE:** Season of planting adequately captures the timing. The*
 373 *Implementation Requirements will ask for month and year of planting.*

- 374 o Sequence of planting, if applicable;
- 375 o Fertilizer and weed control, if needed;
- 376 o Type of plant protection, if needed; and,

377 **C38:** [Propose to add] “(tree tubes for deciduous trees, bud caps for conifers, etc.)”

378 ***RESPONSE:** These options will be included in the Implementation*
 379 *Requirements, and are detailed in a guidance document in the CPS 612*
 380 *Tree/Shrub Establishment practice.*

- 381 o Moisture management during establishment, if needed.

382 **C39:** [Propose to add] “(Extremely important first 3 years).”

383 ***RESPONSE:** Moisture management is not often necessary in WI and is at the*
 384 *discretion of the planner and weather.*

385 **C23:** [Propose to add bullet] “Soil type and amendments, if needed.”

386 ***RESPONSE:** General Criteria states that species must be adapted to site*
 387 *conditions, so soil amending should not be needed. Soil maps are included in*
 388 *every conservation plan.*

389 **C24:** [Propose to add bullet] “Expected time frame of establishment period.”

390 ***RESPONSE:** Tree establishment is variable based on species selection and*
 391 *factors outside of planner control, such as weather. O&M section and NRCS*
 392 *Implementation Requirements will include establishment time frame as needed.*

- 393 • Contingency plans to achieve project goals in case of drought, insect/disease impacts, undesired
- 394 plant invasions, animal pressure, or other occurrences that may limit vegetation establishment.
- 395 • The landowner is responsible for notifications and for obtaining all necessary permits for the project
- 396 prior to installation.

397 Prepare specifications for this practice and record using the approved Wisconsin Implementation
 398 Requirements for CPS 380.

399 OPERATION AND MAINTENANCE

400 Prepare an operation and maintenance (O&M) plan and review it with the landowner or operator prior to
 401 practice installation. The O&M plan ensures the practice will function as intended throughout its expected
 402 life. The plan will include normal repetitive activities that occur during use of the practice (operation), and
 403 repair and upkeep (maintenance). At a minimum, include—

- 404 • Inspecting the planting at least annually and after major storm events or other disturbances to
- 405 identify needs for repair and maintenance.

C40: [Propose to add] “(inspecting 3 times in the summer is best)”

***RESPONSE:** Inspection as stated is more feasible for the landowners and would result in more likely implementation.*

C41: [Propose to add] “Look for invasive species and noxious weeds.”

***RESPONSE:** This change will be made under “Manage competing vegetation during establishment.”*

- Maintaining protection for trees and/or shrubs during establishment, and removing protective structures (e.g., tube shelters, cages) when plants are large enough to withstand environmental stressors.
- Protecting trees and shrubs from adverse impacts including insects, diseases, competing vegetation, fire damage, spray drift, animals, etc.
- Applying maintenance practices and activities at times that minimize wildlife disturbance during the reproductive period for desired species, where wildlife habitat is a consideration.
- Monitoring tree or shrub establishment or renovation and replacing dead trees or shrubs as needed until the windbreak is functional.
- Providing supplemental water if needed during the establishment period.

C42: Water and vegetation control [bullet above and bullet below] the first 3 to 5 years is best. [Propose to add] “Year 1 and 2 check weekly and water as needed.”

***RESPONSE:** The Team prefers to keep flexibility with these maintenance tasks taking place as needed.*

- Managing competing vegetation during establishment, including removal of species on federal and state invasive species or noxious weeds lists.
- Thinning or pruning the windbreak to remove dead, injured, or diseased wood and to maintain windbreak function.
- Applying nutrients periodically to maintain plant vigor following approved fertilizer recommendations.

Renovate a windbreak that has lost its functionality due to impacts of storms, disease, insects, or other natural events, or because trees have reached their life expectancy and are deteriorating.

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- 470 **C25:** [Propose to add] “Wisconsin Legislature: 66.0407 Noxious weeds.” I added because
471 “field bindweed” is not on NR40 and it addresses local noxious weed laws.
- 472 **RESPONSE:** *This reference will be added.*
- 473 **C26:** [Propose to add] “Tree Benefits! | i-Tree (itreetools.org) Tools for Assessing and
474 Managing Forests & Community Trees.”
- 475 **RESPONSE:** *The guidance document will have this information so this reference is not*
476 *needed.*