Clear Fields

United States Department of Agriculture

NRCS Natural Resources Conservation Service

New York Conservation Practice Job Sheet

Windbreak and Shelterbelt Establishment (380)

Client Name:	Date :
USDA/New York State Program Name:	Program Sign-up Number (if applicable):

Windbreak/Shelterbelt: are strips of trees and/or shrubs planted and maintained to alter wind flow and microclimate, thereby protecting a specific area. They are often planted and managed as part of a crop and/or livestock operation. Windbreaks also improve the quality of life around farmsteads, rural residences, and communities. Other benefits are:

- Enhanced local air quality through the filtration and trapping of airborne pollutants,
- A reduction on energy costs,
- Improved crop yields, livestock health, and vigor,
- Protection of homes and roadways from snow drifts and increased safety, and
- Long term carbon storage.

1. General Windbreak Information:

(a) Purpose of Windbreak

	Conservation Goal	Example
☐	Manage Snow Accumulating/Deposition	Manage snow accumulation with a living snow fence. Reduce snow deposition around structures, homes, and roads by trapping snow. This will not provide full protection.
☐	Energy Conservation	Provide protection of buildings or homes from the wind chill effect.
☐	Domestic Animal Health	Provide protection for livestock from snow accumulation and the wind chill effect.
☐	Air Quality	Reduce and intercept airborne particulate matter, chemicals, and odor.
☐	Soil Erosion and Crop Damage	Crop protection; reduce wind erosion and protect growing plants.
☐	Landscape Views	Block offending views with a visual screen.
☐	Noise Reduction	Reduce noise pollution with a noise screen.
☐	Water Quantity	Improve irrigation efficiency.
☐	Wildlife Habitat	Provide wildlife habitat, benefit wildlife with supplemental plantings, and/or select species for cover and food.

2. WINDBREAK DESIGN:

	Windbreak Purpose and Type	Density (%)	Design Tree or Shrub Height (Feet) at 20 years Maximum distance sheltered	Location on Landscape	Planting Distance from area to be protected Spacing between rows or windbreaks Width of windbreak	Minimum # of Rows and Notes	Species	Spacing
☐	Snow accumulation / deposition Living snow fence	≥ 50	10H	Establish plantings perpendicular to prevailing winter winds. An 'L' shape lay-out would be appropriate for winds out of the north and west.	**Planting distance to maintain from structures, home and concentrated livestock areas:** The inner row will be at least 100–200 ft distant from the area to be protected [to allow for snow drop]. The living snow fence will extend 100 ft in either direction perpendicular from area to be protected. **Distance to maintain from roads:** The inner (windward) row will be a maximum of 250 ft and no closer than 150 ft from the road edge. Trees/shrubs should be planted no closer than 200 ft from corners or intersections to allow for traffic visibility. Design distances will be approved by an appropriate local, state or federal agency.	1 – 2 row(s)of a dense, non-deciduous conifer –OR– 2 rows of deciduous trees and 2 rows of shrubs –OR– 2 rows of dense shrubs.		
☐	Protection of structures, homes and/or livestock from snow and the wind chill effect Windbreak	≥ 65	10H	Establish plantings perpendicular to prevailing winter winds. An 'L' shape lay-out would be appropriate for winds out of the north and west.	**The inner row will be at least 100–200 feet distant from area to be protected [to accommodate snow drop].** The windbreak will extend 100 feet in either direction perpendicular from area to be protected.	2 rows of a dense, non- deciduous conifer and 1 row of shrubs.		

	Windbreak Purpose and Type	Density (%)	Design Tree or Shrub Height (Feet) at 20 years Maximum distance sheltered	Location on Landscape	Planting Distance from area to be protected Spacing between rows or windbreaks Width of windbreak	Minimum # of Rows and Notes	Species	Spacing
☐	Reduce airborne particulate matter, chemicals and odor Shelterbelt	>65 attenuation of particulate matter and odor ≥ 60 for interception of chemical drift	For odor control tree height will exceed the tallest structure associated with odors. The windbreak distance from the odor source will accommodate snow deposition and prevent drifts around buildings. The windbreak interval will be less than or equal to 10H. For chemically treated fields use a design height of 25–30 ft for the tallest row of evergreens or deciduous tree at the end of 20 years.	Waste facility - If possible plant around the entire perimeter. Inner row will be at least 100 ft. distant from the toe slope of an earthen storage facility or from any below ground storage facility to prevent root intrusion. The distance from the inner row to the facility will provide for snow storage and should be 100-150 ft wide or more depending on shelterbelt characteristics. Tunnel ventilated livestock buildings - To attenuate exhaust fan odors and particulate matter locate small tree/shrubs from the fans at least 10 times the exhaust fan diameter or 50 ft, whichever is greater. Establish an additional windbreak 100–150 ft distant to trap snow if needed. Livestock buildings and other odor sources - Plant around all four sides for optimal odor control or establish paired windbreaks 100–200 ft upwind and downwind from the odor source. Assess if establishing plantings around livestock buildings will block summer air flow. The windbreak perpendicular to prevailing winter winds will act as a living snow fence. The distance between the odor source and inner row of trees will be snow storage area. Allocate 100–200 ft of width to accommodate snow drop. Chemically treated fields - locate shelter belts downwind of prevailing winds during the growing season. A perimeter planting that surrounds an entire orchard or vineyard typically follows property boundaries.	NOTE: Buildings and potential odor sources are best located in a 'quite zone' that is approximately 50–100 ft downwind of a windbreak. Most odors are carried on dust particles. The quiet zone allows dust particles to settle out before reaching a potential odor source and attenuates odorous dusts and particles at the source through settling. In the northeast the windbreak density to achieve odor reduction will also effectively trap snow in the 'quite zone'. The planned location of windbreaks, for odor control, in relation to farm structures has to be balanced with the required snow catchment area.	Waste facilities, livestock buildings and other odor sources 2 rows of dense evergreen species –OR– 2 rows of pines (less dense evergreen species) –OR– 1 row of pines with 1 row of a tall growing deciduous species. Exhaust fan(s) impact area from tunnel ventilated poultry buildings- At least two rows. The first row nearest the fan will be small (<25') deciduous trees or shrubs or a waxy-leaf evergreen shrub. The second row will be a small evergreen tree. Vineyard or orchard: 1 or 2 rows to intercept spray drift. The density will be reflective of that time of year when spray operations take place. A single row of conifers or a single row of deciduous trees with a row of shrubs in leaf will be about 60 per cent dense. Two rows allow for use of different species to minimize gaps caused by disease or insects.		

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☐	Crop protection Windbreak	40 for crop protection 60 for soil erosion control	Maximum distance sheltered be 10H	Establish trees perpendicular to the growing season prevailing winds.	The spacing between windbreaks will be determined using the current approved wind erosion prediction model.	1 row of dense conifers –OR– 1 row of pines with branches close to the ground –OR– 1 row of deciduous trees in full leaf plus a shrub row –OR– 1 – 2 row(s) of shrubs. NOTE: Use deep rooted plants that have a non suckering root system.		
☐	Block offending views Visual screen	≥ 65	Planned height should obscure the view from the observer's line of sight.	Establish trees and/or shrubs as close to the observer as possible. In some instances, with multiple viewing angles, i.e., along a roadway, the visual screen may need to be as close to the offending area as possible.		2 rows of non-deciduous conifers –OR– 2 rows of non-deciduous conifers and a dense shrub row. NOTE: Consider using at least one non-deciduous conifer that is fast growing. To shorten the length of time to reach design height, consider the use of larger size planting stock, including transplants, containerized nursery stock, or balled and burlap stock.		

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☐	Noise reduction Noise screen	≥ 65		The screen should be as close to the noise source as practicable and legal. The length of the planting should be twice as long as the distance from the noise source to the receiver, extending equal distances on each side of the receiver. Shrubs will be placed closest to noise source with backup rows of taller trees. Noise screens for traffic will not cause snow deposition on roads. For high speed traffic: The tallest tree row should be capable of attaining 45 ft at maturity. Use a tree species that is closest to this height for the 20 year design height. For moderate speed traffic: The tallest tree row should be capable of attaining a mature height of at least 30 ft.	The screen will not be less than 65 ft wide. The screen width will not be less than 20 ft wide.	All season noise screening: 2 rows of non-deciduous conifers –OR– 2 rows of non-deciduous conifers and a shrub row. Noise screening for the summer: 2 rows of deciduous trees and 2 shrub rows. NOTE: To shorten the length of time to reach design height, consider the use of larger planting stock, including transplants or balled and burlap stock.		
☐	Improve irrigation efficiency Windbreak	≥ 50	The maximum distance sheltered will be 10 times the design tree height.	For sprinkler irrigation systems the windbreak will be as tall as the sprinkler heads. The windbreak will not interfere with the operation of the irrigation system. Consider a system of shrub rows that allow the sprinklers to pass overhead.		1 row of pines with branches close to the ground –OR– 1 row of shrubs. NOTE: Use deep rooting plants that have non-suckering root systems.		

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☐	Wildlife habitat All windbreaks shelterbelts and screens	≥ 50		A windbreak lay-out that includes a partial east-west orientation is beneficial. During winter months, direct sunlight is available on southern rows throughout the day. The opportunity to 'sun" in a protected southern exposure decreases food needs for wildlife.		If a windbreak is to be a **travel corridor**, it must be at least 50 ft wide. If winter storms are common and **winter wildlife habitat** is required than the density will be enough that most snow is caught in the windbreak and the trees and shrub rows on downwind side have little snow accumulation. This requires a 6–12 row planting. A minimum of three rows of dense conifers are required for the tallest trees. Consider establishing a snow trap of 1–2 rows of low growing shrubs located upwind (10H of shrub height) of the planned windbreak to catch snow and increase the habitat effectiveness of the main windbreak. Replace a planned shrub row with two rows and increase within row spacing to 8 ft to favor fruit production. Increase shrub rows after the minimal desired density has been achieved. NOTE: Favor those shrubs that enhance cover or food production. Use a different species for each row. Additional shrub rows added after the minimal density has been achieved can be placed at optimal spacing to achieve fruit production and allow sunlight penetration to favor branch development low to the ground. Stagger the spacing between rows.		

3. PLANNING CONSIDERATIONS:

- ☐ The maximum design height (H) for the windbreak shall be the expected height of the tallest row of trees or shrubs at 20 years of age for the given site.
- ☐ If using equal spacing in adjacent rows, stagger tree spacing so the trees in one row will be planted opposite the opening or the gap between the planted trees in the preceding row. See diagram 1.

Diagram 1

- ☐ Plant the same species within a row, or species with the same growth characteristics (i.e, height, density, longevity).
- ☐ Minimize disease, insect and animal predation problems by choosing different species for multi row plantings.
- ☐ For multiple row windbreaks/shelterbelts/barriers, the rows should be planned for an orderly progression of plant height, from the lowest height on the windward; tallest in the center and tapering to smaller on the leeward side. A windbreak that is in the form of a triangle will have the shorter growing species planted in the outside rows.
- ☐ A windbreak in the form of a right triangle will have the shorter growing row(s) facing the prevailing winds with the taller species downwind.
- ☐ A noise screen will have the shortest growing plant materials closest to the noise source.
- ☐ Shrub species that are intolerant to shading can be placed in a snow 'trip' row or outside rows with between row spacing that approaches the maximum of 20 ft.
- ☐ Laneways that pass through windbreaks will be at an angle to the prevailing winds to avoid a wind tunnel effect.

4. OPERATION AND MAINTENANCE:

- ☐ Newly planted trees and shrubs may require supplemental water during the first year of establishment or until their root system is firmly established.
- ☐ Weed control or suppression will be necessary for the first three years of establishment. All pesticide recommendations must be made by a professional consultant with the appropriate state pesticide applicator certification following all manufacturers labeling.
- ☐ All plant materials will be inspected at least once annually for survivability. All dead trees or shrubs will be replaced in the spring (April or early May).
- ☐ Trees and shrubs will be monitored for disease outbreaks, pest problems or possible animal predation. Corrective actions will be taken as appropriate.
- ☐ Inspect conifers, pines and deciduous trees and shrubs during the growing season for insects and disease. Trees and shrubs are susceptible to rabbits, deer and mice. The damage may be very noticeable after winter snows have melted away. Protect seedlings with plastic tubing, mats and weed/grass control.
- ☐ Perform between row maintenance and perimeter activities, such as mowing, on a regular schedule. Grasses in close proximity to tree seedlings compete for moisture and sunlight and offer habitat for rodents. In addition to suppressing weeds and grasses around the circumference of individual windbreak tree/shrub plants, mow on a regular frequency to eliminate completion from undesirable species and prevent grasses from overtopping young tree/shrub seedlings. After the initial establishment period of three years, mowing frequency may decrease to that necessary to control brush or other aggressive growing plants and plant growth conditions that would favor animal predation.
- ☐ Protect windbreaks from spray drift when cropland chemical applications are being made. Herbicide drift can cause significant damage during the early growth years.
- ☐ Thin or prune the windbreak to maintain its function.

5. PLANT MATERIALS, SPACING AND ADDITIONAL INFORMATION FOR SPECIFIED WINDBREAK:

Refer to the following for additional/more detailed information:

- Natural Resources Conservation Service – New York
  Plant Materials Technical Note –TN #38 – Approved Tree and Shrub Species for Planting
- Natural Resources Conservation Service – New York
  Conservation Practice Specification – Windbreak and Shelterbelt Establishment (380)

Tract:		Field Number(s):					
Row # Row 1 will be the tallest tree row, closest to the area being protected.	Species	Kind of Stock	Distance between trees and or shrubs	Distance between rows	Distance of windward tree row from structure, road, odor source etc.	Length of row	# Trees/shrubs per row
1							
2							
3							
4							
5							
6							
7							

6. MAP/SKETCH AND ADDITIONAL DOCUMENTATION:

Attach additional documentation such as photos, sketches, or maps as needed.

CONSERVATION PRACTICE JOB SHEET CERTIFICATION

I certify that this practice has been planned with the landowner/producer and meets NRCS Practice Standards and Specifications for Windbreak Establishment (380). I further certify that the practice details as presented on this job sheet reflect the landowner's/producer's decisions as reflected in the agreed to conservation plan.

Conservation Planner Signature _____ Date _____

I agree that I will follow the recommendations, seeding requirements, and other items checked and that I have participated in the planning of and made the decision to implement this practice.

Producer/Landowner _____ Date _____

CONSERVATION PRACTICE INSTALLATION CERTIFICATION

I certify that I have made an on-site inspection of this practice as appropriate to the practice extent to ensure that the conditions reflect those found in the entire practice area. I further certify that the practice is successfully established and meets NRCS Practice Standards and Specifications and is within my assigned job approval authority.

Conservation practice checked by: Please print your name _____

Conservation Planner Certification Signature _____ Date _____

☐ This practice meets the NRCS-NY standard and specification for Windbreak Establishment (380).

☐ This practice does not meet the NRCS-NY Service standard and specification for Windbreak Establishment (380).

Notes: