Field Determination of Soil Component Conservation Tree and Shrub Groups

For most tree plantings, the scale of the planting is considerably smaller than the scale of the soil map unit as identified on a soil map. The following procedures will assist those designing a tree planting to determine which soil component will affect the health and vigor of the tree planting. Failure to match the correct species of woody plant to the appropriate soil could cause the planting to perform unsatisfactorily or fail completely.

Designers will not be able, nor are they expected, to map soils based on the following instructions. However, these simple instructions should allow planners to determine which of the potential components (soils) located within a map unit will impact the tree design. Area resource soil scientists are available for discussion or onsite investigation if there is still uncertainty. Digital photos of the site and a legal description sent to the area resource soil scientist may be all that is needed to make a solid determination of the soils on the site.

Steps to Determine the Specific Soil Where the Trees are to be planted

- Review the soil map for the area. Up-to-date soil maps are available through toolkit or web soil survey.
- Review the Soil Interpretation Tables for a given county to determine which soil components may be included within the map unit. Soil Interpretation tables are located in section II of the Field Office Technical Guide. They should be used for every design.
- Look at recent aerial photos of the site to spot obvious land forms or conditions that may affect windbreak design. In most cases these maps are found in toolkit.
- One or more of the following may be identifiable on the aerial photo.
    - Wet areas
        - May be green in late summer.
        - May show standing water.
        - Darker areas often indicate flatter topography.
        - Often show a vegetation tone or color change from the surrounding area.
    - Steep or eroded slopes
        - Will appear as lighter colored soils.
        - May show a change in vegetation from surrounding area.
    - Potential soil chemistry changes
        - Low flats or areas around wetlands that appear gray on the surface (discharge sites) indicate potential high pH ($CaCO_3$).
        - Knobs or ridge tops appearing gray, indicate potential high pH ($CaCO_3$).
        - Areas near water, wetlands or adjacent to ditches that appear to have a white crust on the surface may indicate potential salts.
        - Salt and pepper or blotchy areas appear on aerial photo.
    - Sites subject to flooding from streams or overland flows
        - Check descriptions of components within the interpretation tables. A flooded phase may be identified.
        - Look at size of watershed, vegetation changes, or meander channels to determine likelihood of flooding.
        - May show a vegetation change from upland sites.
- ON SITE INVESTIGATION: Nothing can give a better indication of the site potential than looking at the site through experienced eyes, or talking to the landowner who has managed the site for years.
- The following clues identify which potential soil component (affecting conservation tree and shrub group and design) may lie within the designed planting area.
- Tree species within the row may need to be changed to match soil capability. If producers desire only one species within the row, then plan for the “worst” soil condition.
- When in doubt, contact the area resource soil scientist for guidance or on-site assistance.

Field Determination of Soil Component Conservation Tree and Shrub Groups

This Page Intentionally Left Blank

Field Determination of Soil Component Conservation Tree and Shrub Groups

Soil characteristic affecting tree growth and vigor	Field observations	Conservation Tree and Shrub Groups (CTSG) That Could Be Affected
Salinity (Even slight amounts can affect species selection.)	• White crust on soil surfaces. Salt tolerant vegetation such as foxtail barley, Russian olive, inland salt grass, alkali cord grass. • Salt appears as white concentrations or threads on the soil ped; dig a hole. • If salt could be deeper than the salt free surface, dig a hole to 20" and check for salts. • Death of existing species not tolerant to salts. • Conversations with landowner confirm salinity. • Salinity meter readings above 4 mmhos/cm. • Usually found adjacent to wetlands, ditches or in saline seeps. • Potentially all discharge soils (e.g., Hamerly, Vallers, Wyndmere, Arveson, Bearden, Colvin, Glyndon, Borup, Hegne)	If field observations indicate saline conditions, assume the site is the saline component of the map unit as indicated in the interpretation tables. Conservation Tree and Shrub Group (CTSG) would be 9N (heavy textured), or 9W (wet). If extremely salty, the component may show as a CTSG 10. The best alternative is to try and relocate the planting to avoid saline conditions. Even "adapted" species grow poorly on most saline sites.
Wetness	• Hydrophytic vegetation such as cattails and rushes, or ponded water usually mean – too wet for any tree – CTSG – 10. Smartweed, cordgrass or temporarily ponded water may indicate a CTSG – 2 or 2K or 2KK site. • Vegetation or crops have drowned out. • Owner confirms site gets wet or suffers crop loss. • Vegetation is green and healthy while surrounding areas have dried out (gone dormant). • Wetland indicators are present. • Landscape position may indicate likely ponding.	All CTSG groups could have wetness affected components. Rarely are these sites found on hilltops or hillsides, though side hill seeps could exist. If wet enough to restrict production, a wet component has usually been identified within the map unit. CTSG could be 2 or 10, depending upon degree of wetness.
Perched water table	• Often identified by presence of redox features within the soil profile or free water above 30". • May need field assistance from a soil scientist. • Existing species, on site, may be those appropriate for a wetter site. • May be a <u>better</u> tree growing site, or <u>too wet</u> for tree growing, depending on amount of additional water from run on or water table.	The included component may be CTSG 1,1S, 2, 3, 4, 4c, or possibly 1K, 2K, or 8, or 10.***** This is the most confusing characteristic to determine in the field, but is critical to know, especially within the high water table sands of the state. Design planting based on surface texture and chemistry as trees must survive before they can benefit from the water table.
Slope	• Rills or gullies visible on site. • Component name indicates slope. • Measure slope with a clinometer, or other instrument.	Most soils greater than 15% are not suitable for trees (CTSG 10) due to reduced water holding, infiltration & erosion risk. But within that delineation there may be components not as steep & better suited to trees. Sometimes erosion & short water can be addressed, through a variance request, making planting possible.

Field Determination of Soil Component Conservation Tree and Shrub Groups

Texture	• Is the surface soil sandy, gravelly, "heavy" etc. • Is the subsoil (to 20") sandy, gravelly, "heavy" etc? • Use "Texturing Soil by Feel." • Are drought tolerant plants growing? • Are plants stunted from too much water? • Dig a hole to determine textures throughout profile. • Look for layers restricting root growth or perching a water table. • Look at descriptive names of components. • When the soil is dry, large cracks on the surface extending into the profile indicate higher clay content.	The coarser the texture the more "droughty" the soil. The thicker the coarse texture layer the more "droughty the soil. Fine textured soils (clays and silty clays) can stay wet enough to drown some species. Coarse textures soak up precipitation rapidly, but dry quickly. Fine textured soils have more runoff but dry slower. Fine textures may be classed 1,1K, 1KK, 2, 2K, 2KK, 3, 4, 4C, 4CK, or 10. Coarse textures are often classed 1S, 5, 6D, 6G, 7 or 10.
Restrictive layers	• Look at existing vegetation health and vigor. • Check depth to restrictive layer; dig a hole. • Sodic restrictive layers are often fine textured, columnar and roots penetrating the layer are skinny, following fracture lines of the columns. • Bed rock restrictions can be identified by digging. In moist conditions they are not as easily identified. Soft sandstone, siltstone, and mudstone are more easily identified when dry. • Fractured bed rock may allow some root passage, but solid bedrock does not and roots may form a layer immediately above the bedrock.	Restrictive layers usually make the site less suitable to tree growth by restricting water holding capacity (depth). In rare cases, restrictive layers may perch a water table making the site better for tree growth. A restrictive layer on a slope may result in a saline seep. Soils with restrictive layers are usually identified within the Interpretive Table.
pH	• Do hill tops show up as gray-colored areas on aerial photos? • Does a soil sample fizz (effervesce) when treated with a weak hydrochloric acid solution? • Is one of the potential soils (components) within the map unit calcareous?	If effervescence is observed, design the planting based on the appropriate wetness (i.e., somewhat poorly drained vs poorly drained). CTSG 1K, 1KK, 2K, and 2KK soils are located in level to nearly level and lowland positions within the topography. WSG 8 and 10 soils are usually located on shoulder slope and convex positions.
Flooding	• Is flood debris caught in fences? • Do locals describe flooding events? • Does watershed size indicate likelihood of flooding? • Does the soil description include components with a "flooded phase"? • Are old oxbows present?	Flooding can rip out or bend over trees. Silt can render fabric ineffective. Flood debris complicates maintenance. Weed pressure is usually severe. Tree shelters are nearly impossible to maintain. Long duration flooding or saturation can kill trees shrubs.

- ***** CTSG 1S sites may have a sandy loam to loamy fine surface texture with a seasonal water table within 30" of the surface. Tree species can be selected from CTSG- 1 but will require supplemental water for 2-3 years until roots reach the capillary fringe of the water table.