# 

# 

CART Resource Concern Assessment (Draft)

Authors

Aaron Lauster, Conservation Planning Branch Chief, NRCS

Casey Sheley, National Technology Specialist, NRCS

Chad Stachowiak, Natural Resource Specialist, NRCS

Danielle Flynn, National Biologist, NRCS

Chris gross, nutrient management specialist, nrcs

Eric Hesketh, Soil Scientist, NRCS

Greg Zwicke, Air Quality Engineer, NRCS

Hank Henry, Wildlife biologist, NRCS

Jason Nemeck, Soil Scientist, NRCS

Jesse Jackson, national partnership liaison, NRCS

Johanna pate, range management specialist, Nrcs

Joseph Bagdon, Natural Resource Specialist, NRCS

Kerry Goodrich, national technology specialist, nrcs

Kip Pheil, Energy Specialist, NRCS

matt flint, national technology specialist, nrcs

Robert Horton, Resource Conservationist, NRCS

with SUPPORT FROM THE rESOURCE cONCERN tEAM AND wORKGROUPS

Updated: July 26, 2019

2019

Contents

[0](#_Toc15047942)

[**Overview** 6](#_Toc15047943)

[**Preliminary Inventory information** 10](#_Toc15047944)

[**Soil** 15](#_Toc15047945)

[**Sheet and Rill Erosion** 15](#_Toc15047946)

[Component: Sheet and Rill Erosion 15](#_Toc15047947)

[**Wind Erosion** 21](#_Toc15047948)

[Component: Wind Erosion 21](#_Toc15047949)

[**Ephemeral Gully Erosion** 27](#_Toc15047950)

[Component: Ephemeral Gully Erosion 27](#_Toc15047951)

[**Classic Gully Erosion** 27](#_Toc15047952)

[Component: Classic Gully Erosion 27](#_Toc15047953)

[**Bank Erosion from Streams, Shorelines, or Water Conveyance Channels** 28](#_Toc15047954)

[Component: Bank Erosion from Streams, Shorelines, or Water Conveyance Channels 28](#_Toc15047955)

[**Subsidence** 29](#_Toc15047956)

[Component: Subsidence 29](#_Toc15047957)

[**Compaction** 30](#_Toc15047958)

[Component: Compaction 30](#_Toc15047959)

[**Organic Matter Depletion** 34](#_Toc15047960)

[Component: Organic Matter Depletion 34](#_Toc15047961)

[**Concentration of Salts or Other Chemicals** 38](#_Toc15047962)

[Component: Concentration of Salts or Other Chemicals 38](#_Toc15047963)

[**Soil Organism Habitat Loss or Degradation** 40](#_Toc15047964)

[Component: Soil Organism Habitat Loss or Degradation 40](#_Toc15047965)

[**Aggregate Instability** 48](#_Toc15047966)

[Component: Aggregate Instability 48](#_Toc15047967)

[**Water** 49](#_Toc15047968)

[**Ponding and Flooding** 49](#_Toc15047969)

[Component: Ponding and Flooding 49](#_Toc15047970)

[**Seasonal High Water Table** 50](#_Toc15047971)

[Component: Seasonal High Water Table 50](#_Toc15047972)

[**Seeps** 50](#_Toc15047973)

[Component: Seeps 50](#_Toc15047974)

[**Drifted Snow** 51](#_Toc15047975)

[Component: Drifted Snow 51](#_Toc15047976)

[**Surface Water Depletion** 52](#_Toc15047977)

[Component: Surface Water Depletion 52](#_Toc15047978)

[**Groundwater Depletion** 53](#_Toc15047979)

[Component: Groundwater Depletion 53](#_Toc15047980)

[**Naturally Available Moisture Use** 53](#_Toc15047981)

[Components: Moisture Management and Drought Susceptibility 53](#_Toc15047982)

[**Inefficient Irrigation Water Use** 56](#_Toc15047983)

[Component: Inefficient Irrigation Water Use 56](#_Toc15047984)

[**Nutrients Transported to Surface Water (field sediment, nutrient, and pathogen loss)** 57](#_Toc15047985)

[Components: Nonpoint Nitrogen Surface Loss and Nonpoint Phosphorus Surface Loss 57](#_Toc15047986)

[**Nutrients Transported to Groundwater (field sediment, nutrient, and pathogen loss)** 59](#_Toc15047987)

[Components: Nonpoint Nitrogen Leaching Loss and Nonpoint Phosphorus Leaching Loss 59](#_Toc15047988)

[**Nutrients Transported to Surface Water (storage and handling of pollutants)** 62](#_Toc15047989)

[Component 1: Concentrated Nutrient and Pathogen Leaching Loss from Domestic Animal Confinement, Including Milhouse Waste and Silage Leachate 62](#_Toc15047990)

[Component 2: Concentrated Nutrient and Pathogen Surface Loss from Domestic Animals Standing in Surface Water 63](#_Toc15047991)

[Component 3: Concentrated Nutrient and Pathogen Surface Loss from Storage and Handling of Manure, Compost, Biosolids, or Non-Ag Food Waste 63](#_Toc15047992)

[**Nutrients Transported to Groundwater (storage and handling of pollutants)** 64](#_Toc15047993)

[Component 1: Concentrated Nutrient and Pathogen Leaching Loss from Domestic Animal Confinement, Including Milhouse Waste and Silage Leachate 64](#_Toc15047994)

[Component 2: Concentrated Nutrient and Pathogen Surface Loss from Storage and Handling of Manure, Compost, Biosolids, and Non-Ag Food Waste 65](#_Toc15047995)

[**Pesticides Transported to Surface Water** 66](#_Toc15047996)

[Component 1: Nonpoint Pesticide Surface Loss 66](#_Toc15047997)

[Component 2: Nonpoint Pesticide Drift 69](#_Toc15047998)

[**Pesticides Transported to Groundwater** 72](#_Toc15047999)

[Component: Nonpoint Pesticide Leaching Loss 72](#_Toc15048000)

[**Pathogens and Chemicals from Manure, Biosolids, or Compost Applications Transported to Surface Water** 75](#_Toc15048001)

[Component: Nonpoint Pathogen Surface Loss 75](#_Toc15048002)

[**Pathogens and Chemicals from Manure, Biosolids, or Compost Applications Transferred to Groundwater** 76](#_Toc15048003)

[Component: Nonpoint Pathogen Loss to Groundwater 76](#_Toc15048004)

[**Salts Transported to Surface Water** 76](#_Toc15048005)

[Component: Salt loss to surface water 76](#_Toc15048006)

[**Salts Transported to Groundwater** 77](#_Toc15048007)

[Component: Salt loss to groundwater 77](#_Toc15048008)

[**Petroleum, heavy metals, and other pollutants transported to surface water** 78](#_Toc15048009)

[Component 1: Concentrated Agrichemical Runoff Loss and Storage and Handling of Fertilizer and Pesticides 78](#_Toc15048010)

[Component 2: Petroleum and Other Pollutant Containment 78](#_Toc15048011)

[Component 3: Mine Waste Remediation and Containment 79](#_Toc15048012)

[**Petroleum, heavy metals, and other pollutants transported to groundwater** 80](#_Toc15048013)

[Component 1: Concentrated Agrichemical Runoff Loss and Storage and Handling of Fertilizer and Pesticides 80](#_Toc15048014)

[Component 2: Petroleum and Other Pollutant Containment 81](#_Toc15048015)

[Component 3: Mine Waste Remediation and Containment 81](#_Toc15048016)

[**Sediment Transported to Surface Water** 82](#_Toc15048017)

[Component: Sediment from Erosion Sources 82](#_Toc15048018)

[**Air** 85](#_Toc15048019)

[**Emissions of Particulate Matter (PM) and PM Precursors** 85](#_Toc15048020)

[Component 1: PM – Diesel Engines 85](#_Toc15048021)

[Component 2: PM – Non-Engine Combustion Sources 87](#_Toc15048022)

[Component 3: PM – Open Burning 88](#_Toc15048023)

[Component 4: PM – Pesticide Drift 89](#_Toc15048024)

[Component 5: PM – Nitrogen Fertilizer 90](#_Toc15048025)

[**Component 6:**  PM – Dust from Field operations 91](#_Toc15048026)

[Component 7: PM – Dust from Unpaved Roads 92](#_Toc15048027)

[Component 8: PM – Windblown Dust 93](#_Toc15048028)

[Component 9: PM – Confined Animal Activities 97](#_Toc15048029)

[**Emissions of Greenhouse Gases (GHGs)** 98](#_Toc15048030)

[Component 1: GHGs – Nitrogen Fertilizer 98](#_Toc15048031)

[Component 2: GHGs – Carbon Stocks 99](#_Toc15048032)

[Component 3: GHGs – Hydric and Organic Soils 100](#_Toc15048033)

[Component 4: GHGs – Confined Animal Activities 100](#_Toc15048034)

[Component 5: GHGs – Grazing Operations 101](#_Toc15048035)

[**Emissions of Ozone Precursors (Ozone Precursors)** 102](#_Toc15048036)

[Component 1: Ozone – Diesel Engines 102](#_Toc15048037)

[**Component 2:** Ozone – Non-Engine Combustion Sources 104](#_Toc15048038)

[**Component 3:**  Ozone – Open Burning 106](#_Toc15048039)

[Component 4: Ozone – Pesticides 106](#_Toc15048040)

[Component 5: Ozone – Confined Animal Activities 107](#_Toc15048041)

[**Objectionable Odors (Odor)** 108](#_Toc15048042)

[Component 1: Odor – Nitrogen Fertilizer 108](#_Toc15048043)

[Component 2: Odor – Confined Animal Activities 109](#_Toc15048044)

[**Emissions of Airborne Reactive Nitrogen (Airborne Nitrogen)** 110](#_Toc15048045)

[Component 1: Reactive Nitrogen – Open Burning 110](#_Toc15048046)

[Component 2: Reactive Nitrogen – Nitrogen Fertilizer 111](#_Toc15048047)

[Component 3: Reactive Nitrogen – Confined Animal Activities 112](#_Toc15048048)

[**Plants** 113](#_Toc15048049)

[**Plant Productivity and Health** 113](#_Toc15048050)

[Component: Plant Productivity and Health 113](#_Toc15048051)

[**Plant Structure and Composition** 118](#_Toc15048052)

[Component: Plant Structure and Composition 118](#_Toc15048053)

[**Plant Pest Pressure** 121](#_Toc15048054)

[Components: Plant Pest Pressure, Chemical Resistance, and Invasive Species 121](#_Toc15048055)

[**Wildfire Hazard from Biomass Accumulation** 123](#_Toc15048056)

[Component: Wildfire Hazard from Biomass Accumulation 123](#_Toc15048057)

[**Animals** 124](#_Toc15048058)

[**Terrestrial Habitat for Wildlife and Invertebrates** 124](#_Toc15048059)

[Component: Terrestrial Habitat for Wildlife and Invertebrates 124](#_Toc15048060)

[**Aquatic Habitat for Fish and Other Organisms** 140](#_Toc15048061)

[Component: Aquatic Habitat for Fish and Other Organisms 140](#_Toc15048062)

[**Elevated Water Temperature (Water Temperature)** 147](#_Toc15048063)

[Component: Water Temperature Effects on Aquatic Habitat 147](#_Toc15048064)

[**Feed and Forage Imbalance** 148](#_Toc15048065)

[Component: Feed and Forage Imbalance 148](#_Toc15048066)

[**Inadequate Livestock Shelter** 149](#_Toc15048067)

[Component: Inadequate Livestock Shelter 149](#_Toc15048068)

[**Inadequate Livestock Water Quantity, Quality, and Distribution** 150](#_Toc15048069)

[Component: Inadequate Livestock Water Quantity, Quality, and Distribution 150](#_Toc15048070)

[**Energy** 150](#_Toc15048071)

[**Energy Efficiency of Equipment and Facilities** 150](#_Toc15048072)

[Component: Energy Efficiency of Equipment and Facilities 150](#_Toc15048073)

[**Energy Efficiency of Farming/Ranching Practices and Field Operations** 152](#_Toc15048074)

[Energy Efficiency of Farming/Ranching Practices and Field Operations 152](#_Toc15048075)

[**Appendices** 154](#_Toc15048076)

[**Appendix A: Acronyms** 154](#_Toc15048077)

[**Appendix B: Glossary** 155](#_Toc15048078)

[**Appendix C: CART Soil Data Access Web Services** 155](#_Toc15048079)

[**Appendix D.1: CART energy module and interaction with off-CART tools** 155](#_Toc15048080)

[**Appendix D.2: CART Data Fields** 158](#_Toc15048081)

[**Appendix D.3: CART Process to Assess Energy Concerns, Step-by-Step** 161](#_Toc15048082)

[**Appendix D.4: Equipment and Systems Indicator & Threshold Flowcharts** 163](#_Toc15048083)

[**Appendix D.5: EUI-CART Converter Overview** 166](#_Toc15048084)

# **Overview**

A conservation plan is the record of decisions and supporting information for treatment of a unit of land meeting planning criteria or other approved assessment threshold for one or more identified natural resource concerns as a result of the planning process. The plan describes the implementation schedule for practices and activities needed to solve identified natural resource concerns and takes advantage of opportunities. The plan may include component plans that address one or more resource concerns. Example component plans include: comprehensive nutrient management plan, grazing plan, integrated pest management plan, wildlife management plan, etc.

The Conservation Assessment Ranking Tool (CART) is designed to assist conservation planners assess site vulnerability, existing conditions, and identified potential resource concerns on a unit of land. Using this information, the tools helps a planner assess and document if planning criteria have been achieved or if additional conservation practices are necessary. This information is used to build a conservation plan for the client and CART captures this information for use in prioritization for programs and outcomes reporting. CART, in its first iteration, will not complete component plans or practice designs.

CART provides a streamlined framework to assess all 47 resource concerns identified by NRCS, but a planner may choose a subset of those concerns to assess and document as part of progressive planning. The assessment questions are not meant to document every question, criteria, and consideration that may be evaluated on a land unit. Rather, they are designed to document resource concerns and the need for conservation practices to meet planning criteria. No assessment can completely capture all the potential variability a conservation planner may encounter across the nation and CART recognizes this by documenting a planner override for the CART Assessment. This override should be used based on factors which clearly meet the planning criteria but may be outside or improperly captured within the CART questions and information. All information is captured on a land unit basis which allows for maintaining this information for future planning efforts on the same operation and also creates a data set which can be used to improve future iterations of the tool.

**CART Methodologies**

CART provides a configurable system to evaluate geospatial information along with planner entered data through targeted questions. To efficiently design a system to both capture the data and utilize it for multiple purposes, a point system framework was developed. Every field is evaluated for key intrinsic site characteristics, when applicable, which affect each resource concern. This creates a threshold score which is intended to represent the effort needed to achieve the planning criteria through conservation management and structural practices. Sites are then evaluated for existing management and conservation efforts and compared to the threshold to determine if they meet the planning criteria.

To combine the many tools and methods in the planning criteria into a streamlined evaluation, the numerous existing methods needed to be modified to fit the point system to allow for streamlined and efficient capture of the planner’s observations and site data. This is not intended to change the expected outcome of planning to the planning criteria on a given land unit but does quantify many of the observations and documents them in a single compatible system which can be used for planning, ranking, outcomes reporting, and environmental assessment.

In general, resource concerns fall into one of three categories for the assessment method used to assess and document a resource concern:

* Client Input/Planner Observation
* Procedural/Deductive
* Predictive

**Client Input/Planner Observation:** Many of the resource concerns fall into this first category of planner criteria. Within the CART system, to the extent possible, a streamlined choice list or lists of options will be presented to the planner to document the client input and/or planner observation. These observations will then be compared against the threshold. The majority of Client Input or Planner Observation resource concerns will have a CART system threshold of 50. If the existing condition choice is below 50, then the planning criteria is not met. Likewise, if the existing condition choice is at or above 50, then the planning criteria is met. In some cases, geospatial interpretations will be available to help set a threshold. In these situations, the variable threshold attempts to communicate a higher risk or priority for this site, which is likely to require additional conservation to address to the threshold and also communicate additional priority to ranking and the environmental assessment.

Resource Concerns (22) in this category include: Sheet and rill erosion on forest and farmstead; Wind erosion on forest and farmstead; Ephemeral gully erosion; Classical gully erosion; Subsidence, Concentration of salts or other chemicals; Soil organism habitat loss or degradation; Aggregate instability; Ponding and flooding; Seasonal high water table; Seeps; Drifted snow; Surface water depletion; Groundwater depletion; Naturally available moisture on crop and forestland; Salts transported to surface water; Salts transported to groundwater; Emissions of particulate matter; Emissions of greenhouse gases, except on farmsteads; Emission of ozone precursors, except on farmsteads; Objectionable odors; Emissions of airborne reactive nitrogen; Energy efficiency of equipment and facilities; and Energy efficiency of farming/ranching/forestry practices and field operations.

**Procedural/Deductive**: A large group of the remaining resource concerns fall into this category and either reference a tool which consists of an inventory which leads to a determination or have a list of inventory-like criteria in the planning criteria write-up. Within the CART system, to the extent possible, a streamlined choice list which either replicates or approximate the data captured in the referenced tools is incorporated. Because of the local variability in state tools, these choices will be broad in nature to allow states to more carefully align them with State conditions. As above, many of these have a set threshold of 50, but may have variable thresholds for the same reasons as above.

Resource Concerns (25) in this category include: Sheet and rill erosion on range; Wind erosion on range; Bank erosion from streams, shorelines or water conveyance channels; Compaction; Organic matter depletion on pasture, range, and forest; Inefficient irrigation water use; Nutrient transported to surface water, Nutrient transported to groundwater; Pathogens and chemicals from manure, bio-solids, or compost applications transported to surface water; Pathogens and chemicals from manure, bio-solids, or compost applications transported to groundwater; Salts transported to surface water; Salts transported to groundwater; Petroleum, heavy metals, and other pollutants transported to surface water; Petroleum, heavy metals, and other pollutants transported to groundwater; Sediment Transported to surface water on pasture, forest, and range; Elevated water temperature; Emissions of greenhouse gases on farmsteads; Emission of ozone precursors on farmsteads; Plant productivity and health; Plant structure and composition; Plant pest pressure; Wildlife hazard from biomass accumulation; Terrestrial habitat for wildlife and invertebrates; Aquatic habitat for fish and other organisms; Feed and forage imbalance; Inadequate livestock shelter; and Inadequate livestock water quality, quantity, and distribution.

**Predictive:** The remaining group of resource concerns are assessed using some sort of predictive interactive model simulation. The CART systems attempt to replicate the outcomes related to the planning criteria being met or not compared to the model outputs. Most of these have variable thresholds related to the intrinsic site conditions which reflect significant impacts on the model outputs.

Resource Concerns (6) in this category include: Sheet and rill erosion on crop and pasture; Wind erosion on crop and pasture; Organic matter depletion on crop; Pesticides transported to surface water; Pesticides transported to groundwater; and Sediment transported to surface water on crop.

**Conservation Practices and Activities:** After identifying resource concerns and answers to existing condition questions, existing and planned conservation practices and activities can be added to the existing condition to determine the state of the management system. Supporting practices may be necessary to support the conservation practices and activities, and will be identified as necessary supporting practices, but do not add conservation management points to the total. A comprehensive list of Conservation Practices and Activities and their points towards addressing each resource concern by land use is available as an attachment to this document.

Table 1: NRCS Resource Concerns

| Resource Concern Categories | NRCS Resource Concerns |
| --- | --- |
| Soil | 1. Sheet and rill erosion |
| 2. Wind erosion |
| 3. Ephemeral gully erosion |
| 4. Classic gully erosion |
| 5. Bank erosion from streams, shorelines, or water conveyance channels |
| 6. Subsidence |
| 7. Compaction |
| 8. Organic matter depletion |
| 9. Concentration of salts or other chemicals |
| 10. Soil organism habitat loss or degradation |

|  | 11. Aggregate instability |
| --- | --- |
| Water | 12. Ponding and flooding |
| 13. Seasonal high water table |
| 14. Seeps |
| 15. Drifted snow |
| 16. Surface water depletion |
| 17. Groundwater depletion |
| 18. Naturally available moisture use |
| 19. Inefficient irrigation water use |
| 20. Nutrients transported to surface water |
| 21. Nutrients transported to groundwater |
| 22. Pesticides transported to surface water |
| 23. Pesticides transported to groundwater |
| 24. Pathogens and chemicals from manure, biosolids, or compost applications transported to surface water |
| 25. Pathogens and chemicals from manure, biosolids, or compost applications transported to groundwater |
| 26. Salts transported to surface water |
| 27. Salts transported to groundwater |
| 28. Petroleum, heavy metals, and other pollutants transported to surface water |
| 29. Petroleum, heavy metals, and other pollutants transported to groundwater |
| 30. Sediment transported to surface water |
| 31. Elevated water temperature |
| Air | 32. Emissions of particulate matter (PM) and PM precursors |
| 33. Emissions of greenhouse gasses (GHGs) |
| 34. Emissions of ozone precursors |
| 35. Objectionable odors |
| 36. Emissions of airborne reactive nitrogen |
| Plants | 37. Plant productivity and health |
| 38. Plant structure and composition |
| 39. Plant pest pressure |
| 40. Wildfire hazard from biomass accumulation |
| Animals | 41. Terrestrial habitat for wildlife and invertebrates |
| 42. Aquatic habitat for fish and other organisms |
| 43. Feed and forage imbalance |
| 44. Inadequate livestock shelter |
| 45. Inadequate livestock water quantity, quality, and distribution |
| Energy | 46. Energy efficiency of equipment and facilities |
| 47. Energy efficiency of farming/ranching practices and field operations |

# **Preliminary Inventory information**

Several preliminary inventory questions in CART will be asked which will inform other resource assessment questions specific to resource concerns. For example, if a planner selects “yes” for “Does a surface water feature exist within the PLU?” then they will be asked the next question “What type of surface water feature is in the PLU?”. However, if they select no to the first question then the second question will not be asked. Land use specific questions will only be asked for the applicable land use. For example, planners will only be asked to identify the crop group, if the PLU they are completing the assessment for is categorized as cropland.

Table 2*: Does a surface water feature exist with the PLU?*

|  |
| --- |
| Answer |
| Yes |
| No |

Table 3*: What type of surface water feature is in the PLU?*

|  |
| --- |
| Answer |
| Lake or Pond |
| River |
| Seep |
| Spring |
| Stream |
| Water Conveyance Channel |
| Wetland |

Table 4*: Furrow Irrigation*

|  |
| --- |
| Answer |
| Yes |
| No |

Table 5*: Irrigation Amount (inches per acre per year)*

|  |
| --- |
| Answer |
| <12 |
| 12 – 23.9 |
| 24 – 35.9 |
| >=36 |

Table 6*: Livestock present on the PLU?*

|  |
| --- |
| Answer |
| Yes |
| No |

Table 7*: Primary Species*

|  |
| --- |
| Answer |
| Cattle Beef Cow/Calf |
| Cattle Beef Stocker |
| Horse |
| Sheep |
| Goat |
| Poultry |
| Other |

Table 8*: Animal Numbers*

|  |
| --- |
| Answer |
| 1-10 |
| 11-100 |
| 101-300 |
| 301-1,000 |
| 1,001-5,000 |
| 5,001-10,000 |
| 10,001-100,000 |
| >100,000 |

Table 9:  *Crop Group*

|  |
| --- |
| Answer |
| Unknown |
| Orchards, vineyards, berries and nut crops |
| Vegetable Crops |
| Cotton |
| Seed crops |
| Flooded rice and cranberry crops |
| Turfgrass for sod and nursery crops |
| Close grown crops - residue not harvested |
| Close grown crops – residue removed |
| Row crops – durable residue not harvested |
| Row crops - residue removed or fragile |
| Christmas trees |
| Hay crops - forage |

Table 10:  *Range Group*

|  |
| --- |
| Answer |
| Natural Grasslands |
| Savannas |
| Most Deserts |
| Tundra |
| Alpine Plant Communities |
| Coastal and Freshwater Marshes |
| Wet Meadows |

Table 11:  *Pasture Group*

|  |
| --- |
| Answer |
| Warm Season Grasses |
| Cool Season Grasses |

Table 12:  *Forest Group*

|  |
| --- |
| Answer |
| 100 White/Red/Jack Pine group |
| 120 Spruce/Fir group |
| 140 Longleaf/Slash Pine group |
| 150 Tropical softwoods group |
| 160 Loblolly/Shortleaf Pine group |
| 170 Other eastern softwoods group |
| 180 Pinyon/Juniper group |
| 200 Douglas-fir group |
| 220 Ponderosa Pine group |
| 240 Western White Pine group |
| 260 Fir/Spruce/Mountain Hemlock group |
| 280 Lodgepole Pine group |
| 300 Hemlock/Sitka Spruce group |
| 320 Western Larch group |
| 340 Redwood group |
| 360 Other Western Softwood group |
| 370 California Mixed Conifer group |
| 380 Exotic Softwoods group |
| 390 Other softwood group |
| 400 Oak/Pine group |
| 500 Oak/Hickory group |
| 600 Oak/Gum/Cypress group |
| 700 Elm/Ash/Cottonwood group |
| 800 Maple/Beech/Birch group |
| 900 Aspen/Birch group |
| 910 Alder/Maple group |
| 920 Western Oak group |
| 940 Tanoak/Laurel group |
| 950 Other Western Hardwoods group |
| 960 Other Hardwood group |
| 970 Woodland Hardwoods group |
| 980 Tropical Hardwoods group |
| 988 Cloud Forest |
| 990 Exotic Hardwoods group |
| 999 Nonstocked |

# **Soil**

## **Sheet and Rill Erosion**

### Component: Sheet and Rill Erosion

**Description:** Detachment and transport of soil particles caused by rainfall, melting snow, or irrigation.

**Objective:** Reduce sheet and rill erosion to T.

**Analysis within CART:**

**Cropland**

Each planned land unit (PLU) designated as cropland will have a calculated PLU Erodibility Index - water (EIwt) based on the dominant critical soil (see equation 1 below) in the PLU. The (EIwt) will be categorized into four soil erodibility potentials through the Conservation Resource Web Services – PLU Modified Erodibility Potential-Water. The service utilizes the NRCS published soils database (SSURGO) according to equations 1 and 2.

Equation 1: EIwt = K\*(LS)/T

Where K is the soil erodibility factor of the surface horizon of the dominant critical soil component. The dominant critical soil component is determined as the soil with the highest surface K factor and is a major map unit component (majorcompflag=True) that is greater than 10% of the PLU. In case of a K factor tie, choose the soil component among the set having the highest percent of the PLU. K is obtained from the SSURGO data base data element for soil erodibility factor (chorizon.kffact).

LS is derived from a simplification of the original LS calculation of Wischmeier and Smith (1978). This simplification by Stone and Hilborn (2012) removes the need for trigonometric functions in the LS calculation.

Equation 2: LS = [0.065 + 0.0456 (slope) + 0.006541 (slope)2] (slope length ÷ constant) NN

Where:   
slope = slope steepness in percent from the representative slope in SSURGO (component.slope\_r).  
  
slope length = length of slope in m (ft) calculated using “default slope parameters” created by  Lightle and Weesies (1998, data not shown) using the representative slope in SSURGO (component.slope\_r).

constant = 22.1 metric (72.5 Imperial)

NN is derived from the slope. For slopes <1, NN = 0.2; for slopes equal to 1 and less than 3, NN = 0.3; for slopes equal to three and less than 5, NN = 0.4; for slopes equal to and greater than 5, NN = 0.5

Table 13: *PLU Modified Erodibility Potential – Water (EIw) Categories.*

|  |
| --- |
| PLU Modified Erodibility Potential – Water (EIwt) |
| High (=>0.20) |
| Moderately High (=>0.10 – <0.20) |
| Moderate (=>0.05 – <0.10) |
| Low (<0.05) |

Using the R factor from digitized map of R factor classes (via a web service) and the EIwt the threshold of conservation management points necessary to meet the planning criteria can be determined in Table 14 and modified by irrigation amount and type in Table 15.

Table 14:  *Determining Sheet and Rill Erosion Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| PLU Modified Erodibility Potential – Water (EIwt) | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 30 | 40 | 60 | 80 |
| Moderately High | 20 | 30 | 50 | 60 |
| Moderate | 10 | 20 | 40 | 50 |
| Low | 10 | 10 | 20 | 40 |

**Irrigation Adjustment:**

Table 15: *Irrigation R Factor Adjustment*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Irrigation R Factor Adjustment** | | | | |
| R Factor Modification | R Factor Class  Inches Per Acre Per Year | | | |
| <=50 | >50 – 150 | >150 – 250 | >250 |
| Move 1 Class Higher | 12 to 23.9 | 12 to 23.9 | ≥12 | N/A |
| Move 2 Classes Higher | 24 to 35.9 | ≥24 | N/A | N/A |
| Move 3 Classes Higher | ≥36 | N/A | N/A | N/A |
| \* Cannot move class higher than “>250” | | | | |

**If yes is selected for furrow irrigation, R factor modification is >250.**

The existing condition Crop Rotation Cover/Residue/Biomass Creditquestion will set the existing score as seen in Table 16. Note: This question, like others, is only asked once in CART but points will be assigned to multiple resource concerns as appropriate.

Table 16: *Crop Rotation Cover/Residue/Biomass Credit*

|  |  |
| --- | --- |
| **Existing Condition - Crop Rotation Credit** Existing condition credits are based on system benefits for cover/residue/biomass of all crops and cover crops in the rotation combined with the effects of harvesting, grazing and tillage. Individual credits for associated practices like crop rotation, cover crop and residue management are added to this system level credit. | Sheet and Rill Erosion Points |
| **None – Rapidly Depleting Soil Organic Matter**   * Soil Conditioning Index is well below zero * Generally fallow, or crops with no durable residue or cover crops, with up to full field tillage. | 0 |
| **Low – Depleting Soil Organic Matter**   * Soil Conditioning Index is just below zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with up to full field tillage. | 5 |
| **Moderate – Maintaining Soil Organic Matter**   * Soil Conditioning Index is zero or above * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with reduced tillage or no-till. | 15 |
| **High – Building Soil Organic Matter**   * Soil Conditioning Index is well above zero * Generally high residue conserving use crops or perennial crops with full ground cover, not tilled or tilled infrequently. | 40 |

**Forest, Farmstead, Associated Ag Land, and Other Land Uses:**

Each PLU will default to a value of “-1” meaning the sheet and rill resource concern is “not yet assessed”. If the planner determines that the resource concern component *is not applicable* a value of “0” will be used and the planner will be allowed to continue to the next resource concern component.

If the Resource concern component is applicable the planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in Table 17.

Table 17: *Sheet and Rill Erosion Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 0 |
| Site is stable and without visible signs of active erosion. | 51 |
| Site is NOT stable and has visible signs of active erosion. | 1 |

**Range:**

For Range land uses, this component will be addressed by answering the Soil/Site Stability Limitations in Table 18.

Table 18: *Range Soil/Site Stability Limitations*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| None to Slight | 60 | Rangeland Health Assessment |
| Slight to Moderate | 51 | Rangeland Health Assessment |
| Moderate | 30 | Rangeland Health Assessment |
| Moderate to Extreme | 15 | Rangeland Health Assessment |
| Extreme to Total | 1 | Rangeland Health Assessment |

**Pasture:**

For Pasture land uses, this component will be addressed by answering the following three existing condition questions in Table 19, Table 20, and Table 21.

Table 19: *Pasture Plant Vigor*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 20 | * Recovery: Rapid * Color: Deep green * Insect/Wilting/Disease Loss: None * Productivity: well above site avg * Pasture Condition Score element score < 5 |
| Good | 17 | * Recovery: Few days longer * Color: slightly light green * Insect/Wilting/Disease Loss: Very Minor * Productivity: At site avg * Pasture Condition Score element score < 4 |
| Fair | 10 | * Recovery: Takes 1wk longer * Color: pale green, not dung/urine spots * Insect/Wilting/Disease Loss: Minor * Productivity: ≤ avg. * Pasture Condition Score element score < 3 |
| Low | 5 | * Recovery: Takes 2wks longer * Color: yellowish green * Insect/Wilting/Disease Loss: Major * Productivity: Low * Pasture Condition Score element score < 2 |
| Poor | 1 | * Recovery: None * Color: yellow/brown * Insect/Wilting/Disease Loss: High * Productivity: none to very low * Pasture Condition Score element score < 1 |

Table 20: *Pasture Cover*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 20 | * Canopy: 95% to 100% * Basal: >50% * Runoff at basal: very little to no runoff * Pasture Condition Score element score < 5 |
| Good | 17 | * Canopy: 90% to 94% * Basal: 35%to 50% * Runoff at basal: high vegetal retardance * Pasture Condition Score element score < 4 |
| Fair | 10 | * Canopy: 70% to 89% * Basal: 25%to 34% * Runoff at basal: moderate vegetal retardance * Pasture Condition Score element score < 3 |
| Low | 5 | * Canopy: 50% to 69% * Basal: 15%to 24% * Runoff at basal: low vegetal retardance * Pasture Condition Score element score < 2 |
| Poor | 1 | * Canopy: <50% * Basal: <15% * Runoff at basal: not slowed * Pasture Condition Score element score < 1 |

Table 21: *Pasture Erosion*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 20 | * No visual signs of erosion present. * Streambanks and drainages are not eroding * Pasture Condition Score element score < 5 |
| Good | 17 | * Sheet and rills: None, past is grassed * Depth: None * Grazing Terracettes: None but a few small debris dams * Pasture Condition Score element score < 4 |
| Fair | 10 | * Sheet and rills: Only at HUAs and water * Depth: >0.5-3" * Grazing Terracettes: None, but debris fans * Pasture Condition Score element score < 3 |
| Low | 5 | * Sheet and rills: only on steep areas * Depth: >0.5-3" * Grazing Terracettes: present * Pasture Condition Score element score < 2 |
| Poor | 1 | * Sheet and rills: yes, active in pasture * Depth: >3<8 " * Grazing Terracettes: yes, close-spaced * Pasture Condition Score element score < 1 |

## **Wind Erosion**

### Component: Wind Erosion

**Description:** Detachment and transport of soil particles caused by wind.

**Objective:** Reduce wind erosion to T.

**Analysis within CART:**

**Cropland**

Each PLU for crop will have the PLU soil wind erosion potential determined based on the dominant critical soil component as described below. The (EPwd) will be categorized into four soil erodibility potentials through the Conservation Resource Web Services – PLU Modified Erodibility Potential-Wind (EPwd). The service utilizes the NRCS-published soils database (SSURGO).

The Stewardship Tool for Environmental Performance (STEP) PLU Erodibility Potential – Wind for a PLU is calculated as

EPwd= C\*I/T

Where:

C Factor (Wind erosion climatic factor). Using geolocation, the C Factor is obtained established from a digitized C Factor map. For future versions we may investigate a better estimation of a wind energy utilizing the climate data used in WEPS.

I Factor (soil erodibility factor – wind) of the surface horizon of the dominant critical soil component. Dominant critical is determined as the soil with the highest surface sand percentage, is a major map unit component (majorcompflag=True) that is greater than 10% of the PLU. The I factor is obtained from the SSURGO data base data element for wind erodibility index (component.wei).

T is the soil loss tolerance factor for the component. The T factor is determined for the dominant critical soil component. T is obtained from the SSURGO data base data element for the soil loss tolerance factor (component.tfact).

Table 22*: Determining Wind Erosion Vulnerability*

|  |  |
| --- | --- |
| Wind Erosion Vulnerability (Based on C\*I/T) | Threshold |
| High (≥16) | 80 |
| Moderately High (≥8 to <16) | 50 |
| Moderate (≥4 to <8) | 20 |
| Low (<4) | 10 |

**Irrigation Adjustment:**

If the PLU is irrigated, the I value used for the calculation will be lowered by one I factor for factors that are 180 or less.

The existing condition question will set the existing score as seen in Table 23.

Table 23*: Crop Rotation Cover/Residue/Biomass Credit*

|  |  |
| --- | --- |
| **Existing Condition - Crop Rotation Credit** Existing condition credits are based on system benefits for cover/residue/biomass of all crops and cover crops in the rotation combined with the effects of harvesting, grazing and tillage. Individual credits for associated practices like crop rotation, cover crop and residue management are added to this system level credit. | Wind Erosion Points |
| **None – Rapidly Depleting Soil Organic Matter**   * Soil Conditioning Index is well below zero * Generally fallow, or crops with no durable residue or cover crops, with up to full field tillage. | 0 |
| **Low – Depleting Soil Organic Matter**   * Soil Conditioning Index is just below zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with up to full field tillage. | 5 |
| **Moderate – Maintaining Soil Organic Matter**   * Soil Conditioning Index is zero or above * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with reduced tillage or no-till. | 15 |
| **High – Building Soil Organic Matter**   * Soil Conditioning Index is well above zero * Generally high residue conserving use crops or perennial crops with full ground cover, not tilled or tilled infrequently. | 40 |

**Forest and Other Land Uses:**

Each PLU will default to a value of “-1” meaning the resource concern is “not yet assessed”. If the planner determines that the resource concern component *is not applicable* a value of “0” will be used and the planner will be allowed to continue to the next resource concern component.

If the resource concern component is applicable the planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in Table 24.

Table 24*: Wind Erosion Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Site is stable and without visible signs of active erosion | 51 |
| Site is NOT stable and has visible signs of active erosion | 1 |
| Not applicable | 0 |

**Range:**

For Range land uses, this component will be addressed by answering the Soil/Site Stability Limitations in Table 25.

Table 25: *Range Soil/Site Stability Limitations*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| None to Slight | 60 | Rangeland Health Assessment |
| Slight to Moderate | 51 | Rangeland Health Assessment |
| Moderate | 30 | Rangeland Health Assessment |
| Moderate to Extreme | 15 | Rangeland Health Assessment |
| Extreme to Total | 1 | Rangeland Health Assessment |

**Pasture:**

For Pasture land uses, this component will be addressed by answering the following three existing condition questions in Table 26, Table 27, and Table 28.

Table 26: *Pasture Plant Vigor*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 30 | * Recovery: Rapid * Color: Deep green * Insect/Wilting/Disease Loss: None * Productivity: well above site avg * Pasture Condition Score element score < 5 |
| Good | 20 | * Recovery: Few days longer * Color: slightly light green * Insect/Wilting/Disease Loss: Very Minor * Productivity: At site avg * Pasture Condition Score element score < 4 |
| Fair | 17 | * Recovery: Takes 1wk longer * Color: pale green, not dung/urine spots * Insect/Wilting/Disease Loss: Minor * Productivity: ≤ avg. * Pasture Condition Score element score < 3 |
| Low | 10 | * Recovery: Takes 2wks longer * Color: yellowish green * Insect/Wilting/Disease Loss: Major * Productivity: Low * Pasture Condition Score element score < 2 |
| Poor | 5 | * Recovery: None * Color: yellow/brown * Insect/Wilting/Disease Loss: High * Productivity: none to very low * Pasture Condition Score element score < 1 |

Table 27: *Pasture Cover*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 30 | * Canopy: 95% to 100% * Basal: >50% * Runoff at basal: very little to no runoff * Pasture Condition Score element score < 5 |
| Good | 20 | * Canopy: 90% to 94% * Basal: 35%to 50% * Runoff at basal: high vegetal retardance * Pasture Condition Score element score < 4 |
| Fair | 17 | * Canopy: 70% to 89% * Basal: 25%to 34% * Runoff at basal: moderate vegetal retardance * Pasture Condition Score element score < 3 |
| Low | 10 | * Canopy: 50% to 69% * Basal: 15%to 24% * Runoff at basal: low vegetal retardance * Pasture Condition Score element score < 2 |
| Poor | 5 | * Canopy: <50% * Basal: <15% * Runoff at basal: not slowed * Pasture Condition Score element score < 1 |

Table 28: *Pasture Erosion*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 30 | * No visual signs of erosion present. * Streambanks and drainages are not eroding * Pasture Condition Score element score < 5 |
| Good | 20 | * Sheet and rills: None, past is grassed * Depth: None * Grazing Terracettes: None but a few small debris dams * Pasture Condition Score element score < 4 |
| Fair | 17 | * Sheet and rills: Only at HUAs and water * Depth: >0.5-3" * Grazing Terracettes: None, but debris fans * Pasture Condition Score element score < 3 |
| Low | 10 | * Sheet and rills: only on steep areas * Depth: >0.5-3" * Grazing Terracettes: present * Pasture Condition Score element score < 2 |
| Poor | 5 | * Sheet and rills: yes, active in pasture * Depth: >3<8 " * Grazing Terracettes: yes, close-spaced * Pasture Condition Score element score < 1 |

## **Ephemeral Gully Erosion**

### Component: Ephemeral Gully Erosion

**Description:** Soil erosion that results in small gullies in the same flow area that can be obscured by tillage.

**Objective:** Control the formation of ephemeral gullies.

**Analysis within CART:**

**Applicable on Cropland Only**

Each PLU will default to a value of -1 meaning that the resource concern is “not yet assessed” (geospatial layers such as lidar-based maps may be used in the future to identify potential locations where ephemeral gullies may occur). The planner will identify this resource concern based on aerial maps and site-specific conditions. A threshold value of 50 will be set and the existing condition questions will be triggered. The existing condition question will set the existing score as seen in Table 29.

Table 29*: Ephemeral Gully Erosion Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| No ephemeral gullies observed | 51 |
| Ephemeral gullies are observed | 1 |

## **Classic Gully Erosion**

### Component: Classic Gully Erosion

**Description:** Gullies created by runoff that can enlarge a channel progressively by head cutting, lateral widening. Lack of infiltration could be contributing factor here, or both.

**Objective:** Stabilize the actively eroding gully.

**Analysis within CART:**

**All Land Uses**

Each PLU will default to a value of -1 meaning the resource concern is “not yet assessed” (in future versions potential for lidar-based maps to identify potential locations where classic gully erosion may occur). The planner will identify this resource concern based on site-specific conditions, a threshold value of 50 will be set, and existing condition questions will be triggered. The existing condition question will set the existing score as seen in Table 30.

Table 30*: Classic Gully Erosion Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| No active gully erosion observed | 51 |
| Active gully erosion is observed | 1 |

## **Bank Erosion from Streams, Shorelines, or Water Conveyance Channels**

### Component: Bank Erosion from Streams, Shorelines, or Water Conveyance Channels

**Description:** Erosion resulting from poor land management practices upstream such as reduced soil infiltration water holding capacity, storm events, wave action, rain, ice, wind, runoff, loss of vegetation, hydrologic dynamics, stream isolation from floodplains, other disturbed or altered geomorphological processes, or some combination of these.

**Objective:** Restore the stability of eroding banks.

**Analysis within CART:**

**All Land Uses**

The land unit inventory will ask whether a surface water feature exists within the PLU. If the answer is “no” a default value of 0 will be assigned meaning the concern is “not applicable”. If the answer is “yes” the planner will be required to identify the type of water feature that exists (geospatial layers may be used in the future to indicate blue line streams or state specified stream designations and other water features such as ponds).

The planner will then be required to identify the bank condition. The existing bank condition will be classified into four categories as identified in Table 31. The threshold value of 50 is equivalent to a moderately stable bank (i.e. meets planning criteria). This is consistent with the planning criteria that requires that *Element 3 Bank Condition* in the Stream Visual Assessment Protocol 2 (SVAP2) be at least moderately stable.

Table 31*: Bank Erosion Existing Condition*

|  |  |
| --- | --- |
| Answer | Conservation Management Points |
| Not assessed | -1 |
| Not applicable | 0 |
| Stable | 60 |
| Moderately stable | 51 |
| Moderately unstable | 25 |
| Unstable | 1 |

## **Subsidence**

### Component: Subsidence

**Description:** Loss of volume and depth of organic soils due to oxidation caused by above normal microbial activity resulting from excessive water drainage, soil disturbance, or extended drought. This excludes karst, sinkholes, and issues or depressions caused by underground activities.

**Objective:** Reduce potential for subsidence to occur and treat existing subsidence.

**Analysis within CART:**

**All land uses**

If the planner determines assessment of the resource concern will occur, a Soil Data Access (Agricultural Organic Soil Subsidence Interpretation, <https://jneme910.github.io/CART/chapters/Agricultural_Organic_Soil_Subsidence>) web service will be used to determine the percentage of organic soils in the PLU. The Soil Data Access services utilizes the NRCS published soils database (SSURGO). Oxidation of organic matter, by introduction of conditions favorable to development of aerobic organisms causes subsidence and may negatively affect the intended land use. If greater than 10% soils with a severe, moderate, or low rating for vulnerability to subsidence are present, a threshold value of 50 will be set (see Table 32) and existing condition question will be triggered. The planner may also identify this resource concern based on observation of site-specific conditions, then a threshold of 50 will be set and trigger the existing condition question. The existing condition question will set the existing score as shown in Table 33.

Table 32*: Determining Subsidence Threshold*

|  |  |  |
| --- | --- | --- |
| Answer | Subsidence Vulnerability Points | Definition |
| >10% soil in PLU has Severe moderate, or low vulnerability to subsidence | 50 | The soil has features that are vulnerable to subsidence. |
| Soils a classified as “low subsidence” or “mineral soil”, and when less than 10% of PLU contains soils that are vulnerable to subsidence | no threshold set | "Low subsidence" indicates that the soil has one or more features that are unfavorable for aerobic soil organisms. With careful management, the soil can be used for crop production and be nearly sustainable. Soils that are not organic are rated "Mineral soil" that do not subside due to organic matter oxidation. |

Table 33*: Subsidence Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Organic soil-building conditions have been restored | 51 |
| Impairs the intended land use | 1 |
| Does not occur | 51 |

## **Compaction**

### Component: Compaction

**Description:**  Management-induced soil compaction at any level throughout the soil profile resulting in reduced plant productivity, biological activity, infiltration, aeration, or some combination of these.

**Objective:** Reduce potential for compaction to occur and treat existing compaction.

**Analysis within CART:**

If the planner determines assessment of the resource concern will occur, a Soil Data Access (Soil Susceptibility to Compaction Interpretation, <https://jneme910.github.io/CART/chapters/Soil_Susceptibility_to_Compaction>) web service will be used to determine the percentage of soils with inherent susceptibility to compaction. The Soil Data Access services utilizes the NRCS-published soils database (SSURGO). A threshold value will be set to 50 when >10% of soils in a PLU have a High or Medium vulnerability to compaction rating; and existing condition questions will be triggered for each land use. The planner may also identify this resource concern based on site-specific conditions and a threshold of 50 will be set.

Table 34*: Determining Compaction Threshold*

|  |  |  |
| --- | --- | --- |
| Answer | Compaction Vulnerability Points | Definition |
| >10% soil in PLU has High or Medium vulnerability to compaction | 50 | High – The intrinsic potential for compaction is significant. The growth rate of seedlings will be reduced following compaction. After initial compaction, this soil is still able to support standard equipment, but will continue to compact with each subsequent pass. The soil is moisture sensitive, exhibiting large changes in density with changing moisture content. |
| Medium – The intrinsic potential for compaction is significant. The growth rate of seedlings may be reduced following compaction. After the initial compaction (e.g., the first equipment pass), this soil can support standard equipment with only minimal increases in soil density. The soil is intermediate between moisture insensitive and moisture sensitive. |
| Soils a classified with less potential for compaction and when less than 10% of PLU contains soils that are vulnerable to compaction | no threshold set | Soil with low vulnerability can still suffer compaction. The planner override should be used along with field observation, such as the In-field Soil Health Assessment Worksheet to assess the situation. |

**Crop, Forest, Associated Ag Land, Other:**

Table 35*: Compaction Existing Points*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Penetrometer rating less than 150 psi within top 6” depth and < 300 in 6-18” depth;  OR  Slight or no resistance with wire flag inserted to 12”  OR  No ponding evident within 12h following rainfall or surface irrigation event. | 51 |
| Penetrometer rating greater than 150 psi within top 6” depth and > 300 in 6-18” depth;  OR  Moderate or greater resistance with wire flag inserted to 12”  OR  A platy soil structure limiting root depth/water infiltration is observed  OR  Ponding is evident at least 12h after rainfall or surface irrigation event. | 1 |
| Compaction does not occur | 51 |
| Not assessed | -1 |

**Range:**

For Range land uses, this component will be addressed by answering the Soil/Site Stability Limitations and Hydrologic Function in the tables below.

Table 36: *Range Soil/Site Stability Limitations*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| None to Slight | 30 | Rangeland Health Assessment |
| Slight to Moderate | 26 | Rangeland Health Assessment |
| Moderate | 17 | Rangeland Health Assessment |
| Moderate to Extreme | 8 | Rangeland Health Assessment |
| Extreme to Total | 1 | Rangeland Health Assessment |

Table 37: *Range Hydrologic Function*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| None to Slight | 30 | Rangeland Health Assessment |
| Slight to Moderate | 26 | Rangeland Health Assessment |
| Moderate | 17 | Rangeland Health Assessment |
| Moderate to Extreme | 8 | Rangeland Health Assessment |
| Extreme to Total | 1 | Rangeland Health Assessment |

**Pasture:**

Table 38: *Pasture Compaction*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 60 | * Infiltration and surface runoff affected by SC: little/none * Livestock traffic or trails: None * Resistance to pushing soil probe: None, soil friable * Pasture Condition Score compaction element score < 5 |
| Good | 51 | * Infiltration and surface runoff affected by SC: low cover % * Livestock traffic or trails: few and small * Resistance to pushing soil probe: None * Pasture Condition Score compaction element score < 4 |
| Fair | 30 | * Infiltration and surface runoff affected by SC: yes, areas of no plant cover * Livestock traffic or trails: some but small * Resistance to pushing soil probe: at compacted layer * Pasture Condition Score compaction element score < 3 |
| Low | 15 | * Infiltration and surface runoff affected by SC: yes, dense surface layer * Livestock traffic or trails: Common * Resistance to pushing soil probe: yes, hard * Pasture Condition Score compaction element score < 2 |
| Poor | 1 | * Infiltration and surface runoff affected by SC: Severe * Livestock traffic or trails: Excessive over wide areas * Resistance to pushing flag/soil probe: major, very hard * Pasture Condition Score compaction element score < 1 |

## **Organic Matter Depletion**

### Component: Organic Matter Depletion

**Description:** Management-induced depletion of any or all pools of soil organic matter resulting in limited soil function and processes that support plant productivity, biological activity, water and nutrient cycling, or some combination of these (see <https://jneme910.github.io/CART/chapters/Organic_Matter_Depletion>).  
  
**Objective:** Maintain, increase, or improve soil organic matter.

**Analysis within CART:**

**Crop**

When selected for evaluation, a threshold value will be set to 50 and the existing condition question (matching one used in soil erosion evaluations) will be triggered. The planner may also identify this resource concern based on site-specific conditions and a threshold of 50 will be set.

Table 39*: Organic Matter Existing Condition Points*

|  |  |
| --- | --- |
| Existing condition points are based on system benefits for cover/residue/biomass of all crops and cover crops in the rotation combined with the effects of harvesting, grazing and tillage. Individual points for associated practices like crop rotation, cover crop and residue management are added to this system level credit. | Existing Condition Points |
| **None – Rapidly Depleting Soil Organic Matter**   * Soil Conditioning Index is well below zero * Generally fallow, or crops with no durable residue or cover crops, with up to full field tillage. | 0 |
| **Low - Depleting Soil Organic Matter**   * Soil Conditioning Index is just below zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with up to full field tillage. | 10 |
| **Moderate - Maintaining Soil Organic Matter**   * Soil Conditioning Index is zero or above * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with reduced tillage or no-till. | 20 |
| **High - Building Soil Organic Matter**   * Soil Conditioning Index is well above zero * Generally high residue conserving use crops or perennial crops with full ground cover, not tilled or tilled infrequently. | 51 |
| **Not assessed** | -1 |

**Forest**

When selected for evaluation, a threshold value will be set to 50 and existing condition questions (matching ones used in soil erosion evaluations) will be triggered. The planner may also identify this resource concern based on site specific conditions and a threshold value of 50 will be set. The existing condition questions will be triggered as shown in

Table 40.

Table 40*: Organic Matter Existing Condition (Forest)*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| The ground is covered with plant litter in various stages of decomposition, herbaceous vegetation, and/or a biological crust that protects the soil. | 51 |
| Soil organic matter depletion exists and is uncontrolled | 1 |
| Not applicable | 0 |
| Not assessed | -1 |

**Range**

This component is met for Range when the Soil Site Stability Limitations and Biotic Integrity are both Slight to Moderate or less.

Table 41*: Soil/Site Stability Limitations*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| None to Slight | 30 | Rangeland Health Assessment |
| Slight to Moderate | 26 | Rangeland Health Assessment |
| Moderate | 15 | Rangeland Health Assessment |
| Moderate to Extreme | 8 | Rangeland Health Assessment |
| Extreme to Total | 1 | Rangeland Health Assessment |

Table 42*: Biotic Integrity*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| None to Slight | 30 | Rangeland Health Assessment |
| Slight to Moderate | 26 | Rangeland Health Assessment |
| Moderate | 15 | Rangeland Health Assessment |
| Moderate to Extreme | 8 | Rangeland Health Assessment |
| Extreme to Total | 1 | Rangeland Health Assessment |

**Pasture**

This component is met for Pasture when Plant Cover, Plant Residue, and Plant Diversity elements are all greater than or equal to a PCS score of 4 (Good).

Table 43*: Plant Cover*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not Assessed | -1 |  |
| High | 20 | * Canopy: 95% to 100% * Basal: >50% * Runoff at basal: very little to no runoff * Pasture Condition Score element score < 5 |
| Good | 17 | * Canopy: 90% to 94% * Basal: 35%to 50% * Runoff at basal: high vegetal retardance * Pasture Condition Score element score < 4 |
| Fair | 8 | * Canopy: 70% to 89% * Basal: 25%to 34% * Runoff at basal: moderate vegetal retardance * Pasture Condition Score element score < 3 |
| Low | 5 | * Canopy: 50% to 69% * Basal: 15%to 24% * Runoff at basal: low vegetal retardance * Pasture Condition Score element score < 2 |
| Poor | 1 | * Canopy: <50% * Basal: <15% * Runoff at basal: not slowed * Pasture Condition Score element score < 1 |

Table 44*: Plant Residue*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not Assessed | -1 |  |
| High | 20 | * Ground cover: 30% to 70% OR no thatch. * Standing Dead: None available below minimum grazing height for species in pasture. * Pasture Condition Score element score < 5 |
| Good | 17 | * Ground cover: 20% to 29% OR no thatch. * Standing Dead: <5% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 4 |
| Fair | 8 | * Ground cover: 10% to 19% OR <½ inch. * Standing Dead: 5% to15% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 3 |
| Low | 5 | * Ground cover: <10% OR ½ to 1 inch thick. * Standing Dead: 15% to 25% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 2 |
| Poor | 1 | * Ground cover: None OR >1 inch thick. * Standing Dead: >25% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 1 |

Table 45*: Plant Diversity*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not Assessed | -1 |  |
| High | 20 | * 4 to 5 species with three functional groups present, 1 or more species in each with each species ≥ 20% of stand, equally distributed in pasture. * Pasture Condition Score element score < 5 |
| Good | 17 | * 2 to 5 from only one functional group (>75%) Each in patches. * Pasture Condition Score element score < 4 |
| Fair | 8 | * 3 from only one functional group total is >75% of stand, equally distributed OR two functional groups with 1 species each but not evenly distributed. * Pasture Condition Score element score < 3 |
| Low | 5 | * 2 to 5 from only one functional group (>75%) Each in patches. * Pasture Condition Score element score < 2 |
| Poor | 1 | * 1 Dominant (>75%) OR >5 (with each <20%) from only one functional group. Poorly distributed in the pasture. * Pasture Condition Score element score < 1 |

**Associated Ag Land**

Table 46*: Soil Organic Matter Existing Condition (AAL, Other)*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not applicable | 0 |
| Not assessed | -1 |
| Soil Health management System (SHMS) that address Organic matter depletion is being followed OR Soil test that shows organic matter, labile carbon, or labile nitrogen at or above typical value for the specific soil map unit and in site condition OR Improved organic matter over multiple years of results | 51 |
| Soil organic matter depletion exists and is uncontrolled | 1 |

## **Concentration of Salts or Other Chemicals**

### Component: Concentration of Salts or Other Chemicals

**Description:** Concentration of salts leading to salinity and/or sodicity reducing productivity or limiting desired use, or concentrations of other chemicals impacting productivity, populations of beneficial organisms, or limiting desired use.

**Objective:** Reduce concentration of chemicals of concern in the soil.

**Analysis within CART:**

When selected for evaluation, a Soil Data Access web service (<https://jneme910.github.io/CART/chapters/Surface_Salt_Concentration>) to determine if any saline or sodic soils occur in the PLU. The Soil Data Access services utilizes the NRCS-published soils database (SSURGO). If saline or sodic soils are present, a threshold value will be set according to Table 47*: Determining Threshold for Concentration of Salts and Other Chemicals* and existing condition question will be triggered. The planner may also identify this resource concern based on site specific conditions and a threshold value of 50 will be set.

Table 47*: Determining Threshold for Concentration of Salts and Other Chemicals*

|  |  |  |
| --- | --- | --- |
| Answer | Concentration of Salts and Other Chemicals Vulnerability Points | Definition |
| High surface salinization risk or already saline | 50 | “High surface salinization risk or already saline” indicates that the soil has features that are very favorable for the accumulation of salts at the surface or are already saline. These soils are already limited by excess surface salts. |
| Surface salinization risk | 30 | “Surface salinization risk” indicates that the soil has features that are somewhat favorable for surface salinization. Careful management will be needed to avoid damage from salinity. |
| Low surface salinization risk | 1 | “Low surface salinization risk” indicates that the soil has one or more features that are unfavorable for salinization. These soils exist in climates where salinization does not occur or on landscape positions where salts are unlikely to accumulate. |
| SSURGO did not indicate have potential Concentration of Salts and Other Chemicals | no threshold set | Soil with low vulnerability can still suffer salinity or sodicity. On-site observation and use of the planner override should be used. |

Table 48*: Surface Salinization Risk (All Land Uses)*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Soil or irrigation water test report indicates salinity/sodicity is within suitable range for desired plants. (Crop specific electrical conductivity (EC), pH, or sodium adsorption ratio (SAR) threshold values are not exceeded.)  OR  No plant tissue salt injury symptoms are apparent  OR  For range and pasture, salt concentrations are match what is expected for the ecological site description | 51 |
| Observation of mineral crust on the soil surface,  OR  Soil or irrigation water test report indicates a salinity/sodicity impairment for desired plants. (Crop specific electrical conductivity (EC), pH, or sodium adsorption ratio (SAR) threshold values are exceeded.)  OR  Observation of plant tissue salt injury symptoms including necrosis (burning) of leaf margins, stunted plants, wilting and in severe cases, plant death  OR  For range and pasture, salt concentrations are outside what is expected for the ecological site description. | 1 |
| No evidence of existing salinity/sodicity problem | 51 |
| Not assessed | -1 |

## **Soil Organism Habitat Loss or Degradation**

### Component: Soil Organism Habitat Loss or Degradation

**Description:** Quantity, quality, diversity or connectivity of food, cover, space, shelter and/or water is inadequate to meet requirements of beneficial organisms (see <https://jneme910.github.io/CART/chapters/Suitability_for_Aerobic_Soil_Organisms>).

**Objective:** Improve habitat for beneficial soil organisms.

**Analysis within CART:**

Each PLU will default to a “not assessed” status. The planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score.**Pasture**

This component is met for pasture if Live or Dormant Plant Cover, Plant Residue as Soil Cover, Plant Diversity by Dry Weight, and Soil Compaction, and Soil Regenerative Features are all greater than or equal to 4 (good).

Table 52*: Plant Cover*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not Assessed | -1 |  |
| High | 11 | * Canopy: 95% to 100% * Basal: >50% * Runoff at basal: very little to no runoff * Pasture Condition Score element score < 5 |
| Good | 10 | * Canopy: 90% to 94% * Basal: 35%to 50% * Runoff at basal: high vegetal retardance * Pasture Condition Score element score < 4 |
| Fair | 5 | * Canopy: 70% to 89% * Basal: 25%to 34% * Runoff at basal: moderate vegetal retardance * Pasture Condition Score element score < 3 |
| Low | 3 | * Canopy: 50% to 69% * Basal: 15%to 24% * Runoff at basal: low vegetal retardance * Pasture Condition Score element score < 2 |
| Poor | 1 | * Canopy: <50% * Basal: <15% * Runoff at basal: not slowed * Pasture Condition Score element score < 1 |

Table 53*: Plant Residue*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not Assessed | -1 |  |
| High | 11 | * Ground cover: 30% to 70% OR no thatch. * Standing Dead: None available below minimum grazing height for species in pasture. * Pasture Condition Score element score < 5 |
| Good | 10 | * Ground cover: 20% to 29% OR no thatch. * Standing Dead: <5% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 4 |
| Fair | 5 | * Ground cover: 10% to 19% OR <½ inch. * Standing Dead: 5% to15% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 3 |
| Low | 3 | * Ground cover: <10% OR ½ to 1 inch thick. * Standing Dead: 15% to 25% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 2 |
| Poor | 1 | * Ground cover: None OR >1 inch thick. * Standing Dead: >25% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 1 |

Table 54*: Plant Diversity*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not Assessed | -1 |  |
| High | 11 | * 4 to 5 species with three functional groups present, 1 or more species in each with each species ≥ 20% of stand, equally distributed in pasture. * Pasture Condition Score element score < 5 |
| Good | 10 | * 2 to 5 from only one functional group (>75%) Each in patches. * Pasture Condition Score element score < 4 |
| Fair | 5 | * 3 from only one functional group total is >75% of stand, equally distributed OR two functional groups with 1 species each but not evenly distributed. * Pasture Condition Score element score < 3 |
| Low | 3 | * 2 to 5 from only one functional group (>75%) Each in patches. * Pasture Condition Score element score < 2 |
| Poor | 1 | * 1 Dominant (>75%) OR >5 (with each <20%) from only one functional group. Poorly distributed in the pasture. * Pasture Condition Score element score < 1 |

Table 55: *Pasture Compaction*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 11 | * Infiltration and surface runoff affected by SC: little/none * Livestock traffic or trails: None * Resistance to pushing soil probe: None, soil friable * Pasture Condition Score element score < 5 |
| Good | 10 | * Infiltration and surface runoff affected by SC: low cover % * Livestock traffic or trails: few and small * Resistance to pushing soil probe: None * Pasture Condition Score element score < 4 |
| Fair | 5 | * Infiltration and surface runoff affected by SC: yes, areas of no plant cover * Livestock traffic or trails: some but small * Resistance to pushing soil probe: at compacted layer * Pasture Condition Score element score < 3 |
| Low | 3 | * Infiltration and surface runoff affected by SC: yes, dense surface layer * Livestock traffic or trails: Common * Resistance to pushing soil probe: yes, hard * Pasture Condition Score element score < 2 |
| Poor | 1 | * Infiltration and surface runoff affected by SC: Severe * Livestock traffic or trails: Excessive over wide areas * Resistance to pushing flag/soil probe: major, very hard * Pasture Condition Score element score < 1 |

Table 56: *Pasture Soil Regenerative Features*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 11 | * Pasture Condition Score element score < 5 |
| Good | 10 | * Pasture Condition Score element score < 4 |
| Fair | 5 | * Pasture Condition Score element score < 3 |
| Low | 3 | * Pasture Condition Score element score < 2 |
| Poor | 1 | * Pasture Condition Score element score < 1 |

**Crop, Forest, AAL, Farmstead**

Table 49*: Soil organism habitat loss or degradation existing condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Soil Organism Habitat Degradation meets the In-Field Soil Health Assessment Worksheet criteria (at least 4 of the 6 habitat indicators are met) | 51 |
| Client is not following a Soil Health Management System  OR  Soil Organism Habitat Degradation is a concern that can be improved through management and does not meet the In Field Soil health assessment Tool Criteria | 1 |
| Not Assessed | -1 |

**Range**

This component is met for Range if Soil Site Stability and Biotic Integrity are both Slight to Moderate or less.

Table 50*: Soil/Site Stability Limitations*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| None to Slight | 30 | Rangeland Health Assessment |
| Slight to Moderate | 26 | Rangeland Health Assessment |
| Moderate | 15 | Rangeland Health Assessment |
| Moderate to Extreme | 8 | Rangeland Health Assessment |
| Extreme to Total | 1 | Rangeland Health Assessment |

Table 51*: Biotic Integrity*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| None to Slight | 30 | Rangeland Health Assessment |
| Slight to Moderate | 26 | Rangeland Health Assessment |
| Moderate | 15 | Rangeland Health Assessment |
| Moderate to Extreme | 8 | Rangeland Health Assessment |
| Extreme to Total | 1 | Rangeland Health Assessment |

**Pasture**

This component is met for pasture if Live or Dormant Plant Cover, Plant Residue as Soil Cover, Plant Diversity by Dry Weight, and Soil Compaction, and Soil Regenerative Features are all greater than or equal to 4 (good).

Table 52*: Plant Cover*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not Assessed | -1 |  |
| High | 11 | * Canopy: 95% to 100% * Basal: >50% * Runoff at basal: very little to no runoff * Pasture Condition Score element score < 5 |
| Good | 10 | * Canopy: 90% to 94% * Basal: 35%to 50% * Runoff at basal: high vegetal retardance * Pasture Condition Score element score < 4 |
| Fair | 5 | * Canopy: 70% to 89% * Basal: 25%to 34% * Runoff at basal: moderate vegetal retardance * Pasture Condition Score element score < 3 |
| Low | 3 | * Canopy: 50% to 69% * Basal: 15%to 24% * Runoff at basal: low vegetal retardance * Pasture Condition Score element score < 2 |
| Poor | 1 | * Canopy: <50% * Basal: <15% * Runoff at basal: not slowed * Pasture Condition Score element score < 1 |

Table 53*: Plant Residue*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not Assessed | -1 |  |
| High | 11 | * Ground cover: 30% to 70% OR no thatch. * Standing Dead: None available below minimum grazing height for species in pasture. * Pasture Condition Score element score < 5 |
| Good | 10 | * Ground cover: 20% to 29% OR no thatch. * Standing Dead: <5% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 4 |
| Fair | 5 | * Ground cover: 10% to 19% OR <½ inch. * Standing Dead: 5% to15% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 3 |
| Low | 3 | * Ground cover: <10% OR ½ to 1 inch thick. * Standing Dead: 15% to 25% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 2 |
| Poor | 1 | * Ground cover: None OR >1 inch thick. * Standing Dead: >25% of air dry weight of total pasture biomass. * Pasture Condition Score element score < 1 |

Table 54*: Plant Diversity*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not Assessed | -1 |  |
| High | 11 | * 4 to 5 species with three functional groups present, 1 or more species in each with each species ≥ 20% of stand, equally distributed in pasture. * Pasture Condition Score element score < 5 |
| Good | 10 | * 2 to 5 from only one functional group (>75%) Each in patches. * Pasture Condition Score element score < 4 |
| Fair | 5 | * 3 from only one functional group total is >75% of stand, equally distributed OR two functional groups with 1 species each but not evenly distributed. * Pasture Condition Score element score < 3 |
| Low | 3 | * 2 to 5 from only one functional group (>75%) Each in patches. * Pasture Condition Score element score < 2 |
| Poor | 1 | * 1 Dominant (>75%) OR >5 (with each <20%) from only one functional group. Poorly distributed in the pasture. * Pasture Condition Score element score < 1 |

Table 55: *Pasture Compaction*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 11 | * Infiltration and surface runoff affected by SC: little/none * Livestock traffic or trails: None * Resistance to pushing soil probe: None, soil friable * Pasture Condition Score element score < 5 |
| Good | 10 | * Infiltration and surface runoff affected by SC: low cover % * Livestock traffic or trails: few and small * Resistance to pushing soil probe: None * Pasture Condition Score element score < 4 |
| Fair | 5 | * Infiltration and surface runoff affected by SC: yes, areas of no plant cover * Livestock traffic or trails: some but small * Resistance to pushing soil probe: at compacted layer * Pasture Condition Score element score < 3 |
| Low | 3 | * Infiltration and surface runoff affected by SC: yes, dense surface layer * Livestock traffic or trails: Common * Resistance to pushing soil probe: yes, hard * Pasture Condition Score element score < 2 |
| Poor | 1 | * Infiltration and surface runoff affected by SC: Severe * Livestock traffic or trails: Excessive over wide areas * Resistance to pushing flag/soil probe: major, very hard * Pasture Condition Score element score < 1 |

Table 56: *Pasture Soil Regenerative Features*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 11 | * Pasture Condition Score element score < 5 |
| Good | 10 | * Pasture Condition Score element score < 4 |
| Fair | 5 | * Pasture Condition Score element score < 3 |
| Low | 3 | * Pasture Condition Score element score < 2 |
| Poor | 1 | * Pasture Condition Score element score < 1 |

## **Aggregate Instability**

### Component: Aggregate Instability

**Description:** Management-induced degradation of water stable soil aggregates resulting in destabilized soil carbon; surface crusting; reduced water infiltration, reduced water holding capacity, reduced aeration; depressed resilience to extreme weather; increased ponding and flooding; increased soil erosion and plant stress; and reduced habitat and soil biological activity (see <https://jneme910.github.io/CART/chapters/Aggregate_stability>).

**Objective:** Improve stability of soil aggregates.

**Analysis within CART:**

Each PLU will default to a “not assessed” status. The planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in Table 57 and Table 58.

Table 57*: Aggregate Stability Points for Crop, Pasture, Forest, Assoc. Ag Land, and Farmstead*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Yes – Clods remain intact no slaking | 51 |
| No – Clods Disintegrate (<80%) remain OR Client is not following a Soil Health Management System | 1 |
| Not assessed | -1 |

Table 58*: Existing Aggregate Instability Points for Range*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Stability Class 1: 75-100% of soil remains on sieve after 5 dipping cycles | 51 |
| Stability Class 2: 25-75% of soil remains on sieve after 5 dipping cycles | 25 |
| Stability Class 3: 10-25% of soil remains on sieve after 5 dipping cycles | 15 |
| Stability Class 4: 50% of structural integrity lost 30-300 seconds after insertion or | 10 |
| Stability Class 5: 50% of structural integrity lost 5-30 seconds after insertion. | 5 |
| Stability Class 6: 50% of structural integrity lost within 5 seconds of insertion in water OR too unstable to sample (falls through sieve). | 1 |
| Not assessed | -1 |

# **Water**

## **Ponding and Flooding**

### Component: Ponding and Flooding

**Description:** Water covering the land surface, along with saturated conditions below the surface, degrades natural resources, or restricts capability of land to support its intended use.

**Objective:** Reduce the risk of natural resource degradation, or limitation to land use caused by flooding or ponding.

**Analysis within CART:**

Each PLU, regardless of land use, will trigger a soil data web service (<https://jneme910.github.io/CART/chapters/Ponding_or_Flooding>) to determine flood frequency and ponding frequency rating of occasional, frequent, or very frequent for any major soil component and will also trigger a web service to evaluate if the PLU is within a 100-year flood plain according to FEMA maps. Either condition will trigger the resource concern for assessment and set the threshold to 50. It is anticipated few sites will have FEMA flood plain maps and the use of the map will be a secondary source of information as well as support use of the web service in addressing the special environmental concerns associated with floodplains. The planner may identify the presence or absence of this resource concern based on site specific conditions and manually select the resource concern. The existing condition question will set the existing score as seen in Table 59.

Table 59*: Ponding and/or Flooding Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Occurs but does not negatively affect the intended use of the PLU | 51 |
| Occurs and negatively affects the intended use of the PLU | 1 |
| Does not occur on the PLU | 0 |

## **Seasonal High Water Table**

### Component: Seasonal High Water Table

**Description:** Groundwater or a perched water table causing saturated conditions near the surface degrades water resources or restricts capability of land to support its intended use.

**Objective:** Reduce the risk of natural resource degradation or limitation to land use caused by a seasonal high water table.

**Analysis within CART:**

Each PLU, regardless of land use, will trigger a soil data web service (<https://jneme910.github.io/CART/chapters/Depth_to_Water_Table>) to determine if the water table is within 18 inches of the surface. If a high water table is identified through the service, a threshold of 50 will be set. The planner may also identify the presence or absence of this resource concern based on site specific conditions and manually select the resource concern. The existing condition score will be set by the planner as seen in Table 60*:* .

Table 60*: Seasonal High Water Table Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Occurs but does not negatively affect the intended use of the PLU | 51 |
| Occurs and negatively affects the intended use of the PLU | 1 |
| Does not occur on the PLU | 0 |

## **Seeps**

### Component: Seeps

**Description:** Sub-surface saturated flows that percolate slowly to the surface, degrades water resources, or restrict capability of land to support its intended use.

**Objective:** Reduce the risk of natural resource degradation or limitation to land use caused by a seep.

**Analysis within CART:**

Each PLU, regardless of land use, will trigger a soil data web service (<https://jneme910.github.io/CART/chapters/Hydric_Rating_by_Map_Unit>) to determine if the soil map unit’s dominant component has a hydric rating of 1 or greater in Web Soil Survey and occurs on a representative slope gradient of 3% or more. If the web service doesn’t trigger a positive response to the parameters, the planner may identify the presence or absence of this resource concern based on photo interpretation and/or site-specific conditions. These conditions will include “wet spot” special point features on a Web Soil Survey map, aerial imagery showing vegetation color and type differences consistent with a seep pattern, or both. Either will set the threshold value at 50. The site will default to a not assessed status for seeps if neither the web services nor planner input come back positive for potential seeps. The existing condition question will set the existing score as seen in Table 61*:* .

Table 61*: Seeps Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Do not negatively affect the intended use of the PLU. | 51 |
| Negatively affect the intended use of the PLU. | 1 |

## **Drifted Snow**

### Component: Drifted Snow

**Description:** Windblown snow accumulates around and over surface structures, which restricts access to humans and animals; or wind removes snow from desired locations where it can be used to accumulate water.

**Objective:** Control where snow drifts accumulate.

**Analysis within CART:**

Each PLU, regardless of land use, will default to a “not assessed” status for drift snow. The planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and existing condition question will be triggered. The existing condition question will set the existing score as seen in Table 62*:* .

Table 62*: Drifted Snow Existing Condition*

Note: Drifted snow typically is thought of as a negative affect when it accumulates in unwanted locations. Consider the beneficial effects of forcing snow to accumulate in strategic locations for such things as snow melt for season soil moisture or supplemental water for livestock.

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Does not occur on PLU | 51 |
| Causes damage to buildings or structures; interferes with livestock access to food, water, or shelter; interferes with access to essential agricultural operations; planner or client can document that retention or accumulation of snow in strategic locations is beneficial to the enterprise. | 1 |
| Does not cause damage to buildings or structures; interfere with livestock accessing food, water, or shelter; interfere with access to essential agricultural operations; planner or client can document that retention or accumulation of snow in strategic locations is not needed. | 51 |

## **Surface Water Depletion**

### Component: Surface Water Depletion

**Description:** Water from collected precipitation runoff, ponds, lakes, surface watercourses, and reservoirs are used at a rate that is detrimental to ecological functions or other identified uses.

**Objective:** Reduce surface water depletion.

**Analysis within CART:**

Each PLU for any land use will default to a “not assessed” status for surface water depletion. Table 63 will be used to assess the existing condition through observation for all land uses. The threshold value for surface water depletion will be 50.

Table 63*: Surface Water Depletion Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| PLU activities do not affect water withdrawals | 60 |
| PLU activities are commensurate with available water supplies and/or meet state/local regulations | 51 |
| PLU activities contribute to depletions and/or do not meet state/local regulations | 1 |

## **Groundwater Depletion**

### Component: Groundwater Depletion

**Description:** Underground water is used at a rate greater than aquifer recharge.

**Objective:** Reduce groundwater depletion.

**Analysis within CART:**

Each PLU for any land use will default to a “not assessed” status for Groundwater depletion. Table 64 will be used to assess the existing condition through observation for all land uses. The threshold value for Groundwater depletion will be 50.

Table 64*: Groundwater Depletion Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| PLU activities do not affect water withdrawals | 60 |
| PLU activities are commensurate with available water supplies and/or meet state/local regulations | 51 |
| PLU activities contribute to depletions and/or do not meet state/local regulations | 1 |

## **Naturally Available Moisture Use**

### Components: Moisture Management and Drought Susceptibility

**Description:** Natural precipitation is not optimally managed to support desired land use goals or ecological processes.

**Objective:** Manage natural precipitation more efficiently.

**Analysis within CART:**

Each PLU for any land uses will default to a “not assessed” status for naturally available moisture use. Table 65 will be used to assess the existing condition through observation for all land uses except for range and pasture.

The appropriate Pasture Condition Score and Rangeland Health Assessment questions will be used to assess the existing condition through observation on range and pasture. A threshold value for naturally available moisture use will be set at 50.

**All land uses but pasture and Range**

Table 65*: Naturally Available Moisture Is Being Managed to the Extent Possible*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Yes | 51 |
| No | 1 |

**Pasture**

This component is met for pasture if the PCS is greater than or equal to 4 (good) for compaction and live plant cover.

Table 66: *Pasture Compaction*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 30 | * Infiltration and surface runoff affected by SC: little/none * Livestock traffic or trails: None * Resistance to pushing soil probe: None, soil friable * Pasture Condition Score element score < 5 |
| Good | 26 | * Infiltration and surface runoff affected by SC: low cover % * Livestock traffic or trails: few and small * Resistance to pushing soil probe: None * Pasture Condition Score element score < 4 |
| Fair | 15 | * Infiltration and surface runoff affected by SC: yes, areas of no plant cover * Livestock traffic or trails: some but small * Resistance to pushing soil probe: at compacted layer * Pasture Condition Score element score < 3 |
| Low | 8 | * Infiltration and surface runoff affected by SC: yes, dense surface layer * Livestock traffic or trails: Common * Resistance to pushing soil probe: yes, hard * Pasture Condition Score element score < 2 |
| Poor | 1 | * Infiltration and surface runoff affected by SC: Severe * Livestock traffic or trails: Excessive over wide areas * Resistance to pushing flag/soil probe: major, very hard * Pasture Condition Score element score < 1 |

Table 67*: Plant Cover*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not Assessed | -1 |  |
| High | 30 | * Canopy: 95% to 100% * Basal: >50% * Runoff at basal: very little to no runoff * Pasture Condition Score element score < 5 |
| Good | 26 | * Canopy: 90% to 94% * Basal: 35%to 50% * Runoff at basal: high vegetal retardance * Pasture Condition Score element score < 4 |
| Fair | 15 | * Canopy: 70% to 89% * Basal: 25%to 34% * Runoff at basal: moderate vegetal retardance * Pasture Condition Score element score < 3 |
| Low | 8 | * Canopy: 50% to 69% * Basal: 15%to 24% * Runoff at basal: low vegetal retardance * Pasture Condition Score element score < 2 |
| Poor | 1 | * Canopy: <50% * Basal: <15% * Runoff at basal: not slowed * Pasture Condition Score element score < 1 |

**Range**

This component is met for Range if the Rangeland Health Assessment (RHA) hydrologic function attributes slight to moderate or less

Table 68: *Range Hydrologic Function*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| None to Slight | 60 | Rangeland Health Assessment |
| Slight to Moderate | 51 | Rangeland Health Assessment |
| Moderate | 25 | Rangeland Health Assessment |
| Moderate to Extreme | 15 | Rangeland Health Assessment |
| Extreme to Total | 1 | Rangeland Health Assessment |

## **Inefficient Irrigation Water Use**

### Component: Inefficient Irrigation Water Use

**Description:** Irrigation water is not stored, delivered, scheduled, and/or applied efficiently.

**Objective:** Manage irrigation water efficiently.

**Analysis within CART:**

Each PLU with “irrigated” assigned as a land use modifier will trigger the assessment with a threshold of 50 being set. The existing condition question will set the existing score as seen in Table 69*:* .

Table 69*: Irrigation System Existing Condition*

Note: System includes point of diversion (on site or off site), delivery ditches, canals, or pipelines (on site or off site), and on field delivery and application.

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Irrigation water is being transported to, stored on, and/or applied to PLU in a manner that controls a known volume, frequency, and rate of application | 51 |
| Irrigation water is poorly managed or fails to meet critical crop growth needs even when water is available. | 40 |
| The irrigation delivery system is inadequate to control the rate of flow through the system and to the field, the conveyance system (ditches, canals, and/or reservoirs) has obvious leaks or soils that are naturally erosive, susceptible to excessive seepage, or both (e.g., sandy and gravelly soils) | 30 |
| The on-field irrigation method is uncontrolled flood and/or improvements to on-field application system will benefit natural resources | 20 |

## **Nutrients Transported to Surface Water (field sediment, nutrient, and pathogen loss)**

### Components: Nonpoint Nitrogen Surface Loss and Nonpoint Phosphorus Surface Loss

**Description:** Applied nutrients are transported beyond the edge of the field and have the potential to contaminate surface waters in quantities that degrade water quality and limit its use.

**Objective:** Reduce nonpoint nutrient transport beyond the edge of the field to an average of less than 15 pounds of nitrogen and 3 pounds of phosphorus loss per acre per year by requiring a level of conservation management that is appropriate for each site’s potential for nonpoint nutrient runoff.

**Analysis within CART:**

**Cropland and Pasture**

Each PLU will have the PLU soil runoff potential determined. Each soil map unit within the PLU will be categorized into one of four soil runoff potential classes through the Water Quality Management Services - Soil Runoff, based on its published map unit components. This service utilizes the NRCS published soils database (SSURGO) according to the chart in Table 70 (<https://jneme910.github.io/CART/chapters/Nitrogen_Leaching_Potential>). Dual hydrologic group soils with an apparent water table in the rootzone will default their runoff rating to the drained phase if the PLU is drained and to the undrained phase if the PLU is not drained. The acre weighted average for the PLU is then determined based on ratings for each soil map unit in the PLU.

Table 70*: Determining Soil Runoff Potential*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Runoff Potential | Hydrologic Group A | Hydrologic Group B | Hydrologic Group C | Hydrologic Group D |
| Low = 0 | All | Slope <4 | Slope <2 | Slope <2 and K <0.28 and no apparent or perched high water table |
| Moderate = 1 | None | ≥4 Slope <6 and K <0.32 | ≥2 Slope <6 and K <0.28 | ≥2 Slope <6 and K <0.28 and no apparent or perched high water table |
| Moderately High = 2 | None | ≥4 Slope <6 and K ≥0.32 | ≥2 Slope <6 and K ≥0.28 | ≥2 Slope <4 and no apparent or perched high water table |
| High = 3 | None | Slope >6 | Slope >6 | Slope >4 or an apparent or perched high water table |

**Irrigation Adjustment:**

Using the R factor from Water Quality R factor service modified by the amount of irrigation and the PLU soil runoff potential, determine the threshold of conservation management points necessary to meet the planning criteria. **Note that Nutrients Transported to Surface Water has a nitrogen component and a phosphorus component that each have separate thresholds established as seen in** Table 71 **and** Table 72**.**

Table 71*: Determining Nonpoint Nitrogen Surface Loss Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Runoff | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 25 | 55 | 70 | 90 |
| Moderately High | 25 | 40 | 40 | 45 |
| Moderate | 25 | 40 | 40 | 40 |
| Low | 25 | 30 | 30 | 30 |

Table 72*: Determining Nonpoint Phosphorus Surface Loss Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Vulnerability to Runoff | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 25 | 60 | 75 | 100 |
| Moderately High | 20 | 40 | 50 | 75 |
| Moderate | 20 | 25 | 25 | 30 |
| Low | 15 | 15 | 20 | 20 |

The existing condition question will set the existing condition points as seen in Table 73.

Table 73*: Existing Condition - Cover/Residue/Biomass Crop Rotation Credit*

|  |  |  |
| --- | --- | --- |
| **Existing Condition - Crop Rotation Credit** Based on system benefits for cover/residue/biomass of all crops and cover crops in the rotation combined with the effects of harvest/grazing and tillage system. ***Note that individual credits for associated practices like crop rotation, cover crop and residue management are added to this system level credit.*** | **Nitrogen Runoff** | **Phosphorus Runoff** |
| **None – Rapidly Depleting Soil Organic Matter**   * Soil Conditioning Index is well below zero * Generally, fallow or crops with no durable residue or cover crops, with up to full field tillage. | 0 | 0 |
| **Low – Depleting Soil Organic Matter**   * Soil Conditioning Index is moderately below zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with up to full field tillage. | 2 | 5 |
| **Moderate – Maintaining Soil Organic Matter**   * Soil Conditioning Index is at or moderately above zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with reduced tillage or no-till. | 5 | 10 |
| **High – Building Soil Organic Matter**   * Soil Conditioning Index is well above zero * Generally, high residue conserving use crops or perennial crops with full ground cover, not tilled or tilled infrequently. | 10 | 15 |

## **Nutrients Transported to Groundwater (field sediment, nutrient, and pathogen loss)**

### Components: Nonpoint Nitrogen Leaching Loss and Nonpoint Phosphorus Leaching Loss

**Description:** Applied nutrients are transported below the rootzone and have the potential to contaminate groundwater in quantities that could degrade water quality and limit its use.

**Objective:** Reduce nonpoint nutrient transport below the rootzone to groundwater to an average of less than 25 pounds of nitrogen and 1 pound of phosphorus per acre per year by requiring a level of management that is appropriate for each site’s potential for nonpoint nutrient leaching.

**Analysis within CART:**

**Crop and Pasture**

Each PLU will have the PLU soil leaching potential determined. Each soil map unit within the PLU will be categorized into one of four soil leaching potentials through the Water Quality Management Services - Soil Leaching, based on published map unit components. The service utilizes the NRCS-published soils database (SSURGO) according to the chart in Table 74 (<https://jneme910.github.io/CART/chapters/Nitrogen_Leaching_Potential>). Dual hydrologic group soils with an apparent water table in the rootzone will default their leaching rating to High whether the PLU is drained or undrained. The acre weighted average rating for the PLU is then determined based on ratings for each soil map unit in the PLU.

Table 74*: Determining Soil Leaching Potential*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Leaching Potential | Hydrologic Group A | Hydrologic Group B | Hydrologic Group C | Hydrologic Group D |
| Low = 0 |  | Slope ≤12 and K factor <0.24 |  | All except histosols or high water table ≤76 cm |
| Moderate = 1 |  | Slope >12 and K factor ≥0.24, except histosols or high water table ≤76 cm | All except histosols or high water table ≤76 cm |  |
| Moderately High = 2 | Slope >12, except histosols or high water table ≤76 | Slope ≥3 and ≤12 and K factor <0.24, except histosols or high water table ≤76 cm |  |  |
| High = 3 | Slope ≤12 or histosols or high water table ≤76 cm | Slope <3 and K factor <0.24 or histosols or high water table ≤76 cm | histosols or high water table ≤76 cm | histosols or high water table ≤76 cm |

**Irrigation Adjustment:**

Using the R factor from Water Quality R factor service modified by the amount of irrigation and the PLU soil leaching potential, determine the threshold of conservation management points necessary to meet the planning criteria. **Note that Nutrients Transported to Groundwater has a nitrogen component and a phosphorus component that each have separate thresholds established as seen in** Table 75 **and** Table 76**.**

Table 75*: Determining Nonpoint Nitrogen Leaching Loss Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Leaching Vulnerability | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 25 | 45 | 45 | 50 |
| Moderately High | 25 | 35 | 40 | 45 |
| Moderate | 25 | 30 | 35 | 45 |
| Low | 25 | 30 | 30 | 45 |

Table 76*: Determining Nonpoint Phosphorus Leaching Loss Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Leaching Vulnerability | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 15 | 20 | 35 | 55 |
| Moderately High | 10 | 15 | 35 | 55 |
| Moderate | 10 | 15 | 30 | 55 |
| Low | 10 | 10 | 20 | 45 |

The existing condition question will set the existing condition points as seen in Table 77.

Table 77*: Existing Condition - Cover/Residue/Biomass Crop Rotation Credit*

|  |  |  |
| --- | --- | --- |
| **Existing Condition - Crop Rotation Credit** Based on system benefits for cover/residue/biomass of all crops and cover crops in the rotation combined with the effects of harvest/grazing and tillage system. ***Note that individual credits for associated practices like crop rotation, cover crop and residue management are added to this system level credit.*** | **Nitrogen Leaching** | **Phosphorus Leaching** |
| **None – Rapidly Depleting Soil Organic Matter**   * Soil Conditioning Index is well below zero * Generally, fallow or crops with no durable residue or cover crops, with up to full field tillage. | 0 | 0 |
| **Low – Depleting Soil Organic Matter**   * Soil Conditioning Index is moderately below zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with up to full field tillage. | 2 | 2 |
| **Moderate – Maintaining Soil Organic Matter**   * Soil Conditioning Index is at or moderately above zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with reduced tillage or no-till. | 5 | 5 |
| **High – Building Soil Organic Matter**   * Soil Conditioning Index is well above zero * Generally, high residue conserving use crops or perennial crops with full ground cover, not tilled or tilled infrequently. | 10 | 10 |

## **Nutrients Transported to Surface Water (storage and handling of pollutants)**

### Component 1: Concentrated Nutrient and Pathogen Leaching Loss from Domestic Animal Confinement, Including Milhouse Waste and Silage Leachate

**Description:** Concentrated nutrients and pathogen effluent from domestic animal confinement (including milkhouse waste and silage leachate) impact surface waters in sufficient quantities that degrade water quality and may limit its use (see <https://jneme910.github.io/CART/chapters/Nitrogen_Leaching_Potential>).

**Objective:** Reduce concentrated losses of nutrients and pathogen from domestic animal confinement by requiring appropriate management wherever concentrated sources of contaminants are identified by the planner.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for the resource concern: nutrients and pathogens under the Nutrients transported – Surface Water resource concern. The planner will identify the applicable resource concern based on site-specific conditions. Where identified, at least 50 points of mitigation will be required for each subcomponent resource concern from appropriate conservation practices and activities.

Table 78*: Concentrated nutrient and pathogen effluent discharged or stored on the PLU*

Note: (both agricultural including milkhouse waste, feedstocks such as grains, silage, etc. and non-agricultural such as food waste)

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not applicable - Nutrient and pathogen effluents are **NOT discharged or** **stored** on the PLU. | 60 |
| Not assessed - Nutrient and pathogen effluents **ARE discharged or stored** on the PLU and **UNKNOWN** if adequate control/treatment is in place. | -1 |
| Nutrient and pathogen effluents **ARE discharged or stored** on the PLU and adequate control/treatment is **NOT** in place. | 0 |
| Nutrient and pathogen effluents **ARE discharged or stored** on the PLU and adequate control/treatment IS in place. | 51 |

### Component 2: Concentrated Nutrient and Pathogen Surface Loss from Domestic Animals Standing in Surface Water

**Description:** Concentrated nutrients and pathogens are lost when domestic animals have direct access to surface waters in sufficient quantities that degrade water quality and limits its use.

**Objective:** Reduce concentrated losses of nutrients and pathogen from direct domestic animal access to surface water by requiring appropriate management wherever concentrated sources of contaminants are identified by the planner.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for the resource concern: nutrients and pathogens under the Nutrients transported – Surface Water resource concern. The planner will identify the applicable resource concern based on site-specific conditions. Where identified, at least 50 points of mitigation will be required for each subcomponent resource concern from appropriate conservation practices and activities, such as 50 points of mitigation that is needed for agrichemical mixing and loading areas can be applied with an agrichemical handling facility.

Table 79*: Animal Access to Surface Waterbodies*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not applicable - Animals do **NOT** have direct access to surface water bodies | 60 |
| Not assessed - Is UNKNOWN if animals have direct access to surface water bodies | -1 |
| Animals have UNCONTROLLED access to surface water bodies | 0 |
| Animals have CONTROLLED access to surface water bodies | 51 |

### Component 3: Concentrated Nutrient and Pathogen Surface Loss from Storage and Handling of Manure, Compost, Biosolids, or Non-Ag Food Waste

**Description:** Manures, biosolids, compost, non-ag food wastes or other soil amendment and pathogen sources are present on the PLU, so they have the potential to contaminate surface waters. The planner will identify this resource concern based on site-specific conditions.

**Objective:** Control accidental release of manures, biosolids, compost, or other nutrient and pathogen sources products to prevent contamination of surface waters.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for manures, biosolids, compost, or other nutrient and pathogen sources. The planner will identify this resource concern based on site-specific conditions. A planning threshold value of 50 will be set and the three existing condition questions will be triggered. The existing condition questions (Yes/No) will set the existing score as seen in Table 80.

Table 80*: Manures, Biosolids, Compost, or Other Soil Amendment and Pathogen Sources Stockpiled or Stored on PLU*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not applicable | 0 |
| Not assessed | -1 |
| Only solid material storage - contained | 51 |
| Only solid material storage - not contained | 1 |
| Liquid or mixed manure storage - contained | 51 |
| Liquid or mixed manure storage - not contained | 1 |

## **Nutrients Transported to Groundwater (storage and handling of pollutants)**

### Component 1: Concentrated Nutrient and Pathogen Leaching Loss from Domestic Animal Confinement, Including Milhouse Waste and Silage Leachate

**Description:** Concentrated nutrients and pathogen effluent from domestic animal confinement (including milkhouse waste and silage leachate) impact groundwater in sufficient quantities that degrade water quality and may limit its use (see <https://jneme910.github.io/CART/chapters/Nitrogen_Leaching_Potential>).

**Objective:** Reduce concentrated losses of nutrients and pathogen from domestic animal confinement by requiring appropriate management wherever concentrated sources of contaminants are identified by the planner.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for the resource concern: nutrients and pathogens under the Nutrients transported – Groundwater resource concern. The planner will identify the applicable resource concern based on site-specific conditions. Where identified, at least 50 points of mitigation will be required for each subcomponent resource concern from appropriate conservation practices and activities.

Table 81*: Concentrated nutrient and pathogen effluent discharged or stored on the PLU*

Note: (both agricultural including milkhouse waste, feedstocks such as grains, silage, etc. and non-agricultural such as food waste)

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not applicable - Nutrient and pathogen effluents are **NOT discharged or** **stored** on the PLU. | 60 |
| Not assessed - Nutrient and pathogen effluents **ARE discharged or stored** on the PLU and **UNKNOWN** if adequate control/treatment is in place. | -1 |
| Nutrient and pathogen effluents **ARE discharged or stored** on the PLU and adequate control/treatment is **NOT** in place. | 0 |
| Nutrient and pathogen effluents **ARE stored** on the PLU and adequate control/treatment IS in place. | 51 |

### Component 2: Concentrated Nutrient and Pathogen Surface Loss from Storage and Handling of Manure, Compost, Biosolids, and Non-Ag Food Waste

**Description:** Manures, biosolids, compost, non-ag food wastes or other soil amendment and pathogen sources are present on the PLU, so they have the potential to contaminate groundwater. The planner will identify this resource concern based on site-specific conditions.

**Objective:** Control accidental release of manures, biosolids, compost, or other nutrient and pathogen sources products to prevent contamination of groundwater.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for manures, biosolids, compost, or other nutrient and pathogen sources. The planner will identify this resource concern based on site-specific conditions. A planning threshold value of 50 will be set and the three existing condition questions will be triggered. The existing condition questions will set the existing score as seen in Table 82 below.

Table 82*: Manures, Biosolids, Compost, or Other Soil Amendment and Pathogen Sources Stockpiled or Stored on the PLU*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not applicable | 0 |
| Not assessed | -1 |
| Only solid material storage - contained | 51 |
| Only solid material storage - not contained | 1 |
| Liquid or mixed manure storage - contained | 51 |
| Liquid or mixed manure storage - not contained | 1 |

## **Pesticides Transported to Surface Water**

### Component 1: Nonpoint Pesticide Surface Loss

**Description:** Applied pesticides move offsite in runoff or drift and have the potential to be transported to surface water sources in quantities that degrade water quality and limit its use.

**Objective:** Reduce hazardous nonpoint pesticide losses in surface runoff or drift that can be transported to surface water sources.

**Analysis within CART:**

**All Land Uses**

Each PLU will have the PLU soil runoff potential determined. Each soil map unit within the PLU will be categorized into one of four soil runoff potentials through the Water Quality Management Services - Soil Runoff, based on its published map unit components. This service utilizes the NRCS-published soils database (SSURGO) according to the chart in Table 83 (<https://jneme910.github.io/CART/chapters/Nitrogen_Leaching_Potential>). The acre weighted average rating for the PLU is then determined based on ratings for each soil map unit in the PLU. Note that for simple CART analysis these runoff ratings do not split out solution runoff and adsorbed runoff the way the Windows Pesticide Screening Tool (WIN-PST) does to support the application of the Integrated Pest Management Conservation Practice (Code 595).

Table 83*: Determining Soil Runoff Potential*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Runoff Potential | Hydrologic Group A | Hydrologic Group B | Hydrologic Group C | Hydrologic Group D |
| Low = 0 | All | Slope <4 | Slope <2 | Slope <2 and K <0.28 and no apparent or perched high water table |
| Moderate = 1 | None | ≥4 Slope <6 and K <0.32 | ≥2 Slope <6 and K <0.28 | ≥2 Slope <6 and K <0.28 and no apparent or perched high water table |
| Moderately High = 2 | None | ≥4 Slope <6 and K ≥0.32 | ≥2 Slope <6 and K ≥0.28 | ≥2 Slope <4 and no apparent or perched high water table |
| High = 3 | None | Slope >6 | Slope >6 | Slope >4 or an apparent or perched high water table |

Each PLU will have the PLU R factor class determined by the R Factor Service. This could be a CART question if that service will not be available. The R factor class result will be matrixed with the acre weighted average soil rating for the PLU in Table 77: Determining Nonpoint Pesticide Surface Loss Threshold.

Table 84*: Determining Nonpoint Pesticide Surface Loss Threshold*

|  |  |  |
| --- | --- | --- |
| Soil Vulnerability to Runoff |  | R Factor |
| Dry Climate:  ≤50 R Factor | Humid Climate: >50 R Factor |
| High | 30 | 60 |
| Moderately High | 30 | 60 |
| Moderate | 30 | 60 |
| Low | 15 | 30 |

Pesticide risk existing condition credit will come from the worst-case selection for the PLU.

For cropland the highest risk crop in the rotation should be selected for Crop Group to inform the Pesticide Use and Risk category choice, and “High” should be the default when Pesticide Use and Risk is unknown.

Table 85*: Cropping Risk Categories for Pesticide Loss*

|  |  |  |  |
| --- | --- | --- | --- |
| Answer | Pesticide Use and Risk | Existing Condition Score Dry Climate | Existing Condition Score Humid Climate |
| 1. Unknown | High | 1 | 1 |
| 2. Orchards, vineyards, berries and nut crops | High | 1 | 1 |
| 3. Vegetable Crops | High | 1 | 1 |
| 4. Cotton | high | 1 | 1 |
| 5. Seed crops | High | 1 | 1 |
| 6. Flooded rice and cranberry crops | High | 1 | 1 |
| 7. Turfgrass for sod and nursery crops | High | 1 | 1 |
| 8. Close grown crops - residue not harvested | Moderate | 10 | 20 |
| 9. Close grown crops – residue removed | Moderate | 10 | 20 |
| 10. Row crops – durable residue not harvested | Moderate | 10 | 20 |
| 11. Row crops - residue removed or fragile | Moderate | 10 | 20 |
| 12. Christmas trees | Moderate | 10 | 20 |
| 13. Hay crops - forage | Low | 15 | 30 |

Table 86*:*  *Forestry, Pasture, and Range Groups*

|  |  |  |  |
| --- | --- | --- | --- |
| Forest, Pasture, and Range Groups | Pesticide Use and Risk | Existing Condition Score  Dry Climate | Existing Condition Score  Humid Climate |
| All | Low | 15 | 30 |
| All | None | 30 | 60 |

Table 87*: Existing Condition - Cover/Residue/Biomass Crop Rotation Credit*

|  |  |
| --- | --- |
| **Existing Condition - Crop Rotation Credit** Based on system benefits for cover/residue/biomass of all crops and cover crops in the rotation combined with the effects of harvest/grazing and tillage system. ***Note that individual credits for associated practices like crop rotation, cover crop and residue management are added to this system level credit.*** | **Pesticide Runoff** |
| **None – Rapidly Depleting Soil Organic Matter**   * Soil Conditioning Index is well below zero * Generally, fallow or crops with no durable residue or cover crops, with up to full field tillage. | 0 |
| **Low – Depleting Soil Organic Matter**   * Soil Conditioning Index is moderately below zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with up to full field tillage. | 10 |
| **Moderate – Maintaining Soil Organic Matter**   * Soil Index is at or moderately above zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with reduced tillage or no-till. | 20 |
| **High – Building Soil Organic Matter**   * Soil Conditioning Index is well above zero * Generally, high residue conserving use crops or perennial crops with full ground cover, not tilled or tilled Conditioning infrequently. | 30 |

Table 88*:* *Integrated Pest Management – IPM System*

Note: Is an Integrated Pest Management (IPM) System implemented on the PLU to manage pests and pesticide environmental risk with pest Prevention, Avoidance, Monitoring, and Suppression (PAMS)?

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Full IPM System for Efficient Production and Environmental Protection | 51 | The client utilizes a full IPM System including Prevention, Avoidance, Monitoring, and Suppression (PAMS) to address production needs and manage pesticide environmental risk associated with the PLU based on Windows Pesticide Screening Tool (WIN-PST) results. |
| Full IPM System for Efficient Production | 25 | The client utilizes a full IPM System including Prevention, Avoidance, Monitoring, and Suppression (PAMS) to address production needs associated with the PLU. |
| Pesticides are applied according to label guidance without an IPM System, but spray drift is carefully managed. | 1 | An IPM system is not utilized on the PLU, but pesticides are applied according to label guidance to manage pests and pesticide drift is minimized with drift reducing spray technologies. |
| Pesticides are applied according to label guidance without an IPM System. | 1 | An IPM System is not utilized on the PLU, but pesticides are applied according to label guidance to manage pests. |
| No pesticides are applied | 51 | Pest management needs on the PLU are met without the use of pesticides. |

### Component 2: Nonpoint Pesticide Drift

**All Land Uses**

Each PLU will default to a not assessed status for Pesticides Transported to Surface Water – Nonpoint Pesticide Drift to Surface Water. The planner will identify this resource concern based on site-specific conditions including proximity to a surface water body. Where identified, at least 50 points of pesticide drift mitigation will be required from appropriate conservation practices and activities.

When the planner identifies this resource concern, the Pesticide Use and Risk category is determined based on the Crop group or range, forest, or pasture type. Select “not applicable” if pesticides are not applied. For other risk categories a Pest Management Conservation System and/or other drift mitigation practices will be credited for nonpoint pesticide drift. For cropland the highest risk crop in the rotation should be used to inform the Pesticide Use and Risk category choice and “High” is the default when Pesticide Use and Risk is unknown.

Table 89*: Cropping Risk Categories for Pesticide Loss*

|  |  |  |  |
| --- | --- | --- | --- |
| Answer | Pesticide Use and Risk | Existing Condition Score Dry Climate | Existing Condition Score Humid Climate |
| 1. Unknown | High | 1 | 1 |
| 2. Orchards, vineyards, berries and nut crops | High | 1 | 1 |
| 3. Vegetable Crops | High | 1 | 1 |
| 4. Cotton | high | 1 | 1 |
| 5. Seed crops | High | 1 | 1 |
| 6. Flooded rice and cranberry crops | High | 1 | 1 |
| 7. Turfgrass for sod and nursery crops | High | 1 | 1 |
| 8. Close grown crops - residue not harvested | Moderate | 10 | 20 |
| 9. Close grown crops – residue removed | Moderate | 10 | 20 |
| 10. Row crops – durable residue not harvested | Moderate | 10 | 20 |
| 11. Row crops - residue removed or fragile | Moderate | 10 | 20 |
| 12. Christmas trees | Moderate | 10 | 20 |
| 13. Hay crops - forage | Low | 15 | 30 |

Table 90*:*  *Forestry, Pasture, and Range Groups*

|  |  |  |  |
| --- | --- | --- | --- |
| Forest, Pasture Range Groups | Pesticide Use and Risk | Existing Condition Score  Dry Climate | Existing Condition Score  Humid Climate |
| All | Low | 15 | 30 |
| All | None | 30 | 60 |

Table 91*: Integrated Pest Management – IPM System*

Note: Is an Integrated Pest Management (IPM) System implemented on the PLU to manage pests and pesticide environmental risk with pest Prevention, Avoidance, Monitoring, and Suppression (PAMS)?

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Full IPM System for Efficient Production and Environmental Protection | 51 | The client utilizes a full IPM System including Prevention, Avoidance, Monitoring, and Suppression (PAMS) to address production needs and manage pesticide environmental risk associated with the PLU. |
| Full IPM System for Efficient Production | 25 | The client utilizes a full IPM System including Prevention, Avoidance, Monitoring, and Suppression (PAMS) to address production needs associated with the PLU. |
| Pesticides are applied according to label guidance without an IPM System, but spray drift is carefully managed. | 25 | An IPM system is not utilized on the PLU, but pesticides are applied according to label guidance to manage pests and pesticide drift is minimized with drift reducing spray technologies. |
| Pesticides are applied according to label guidance without an IPM System. | 1 | An IPM System is not utilized on the PLU, but pesticides are applied according to label guidance to manage pests. |
| No pesticides are applied | 51 | Pest management needs on the PLU are met without the use of pesticides. |

## **Pesticides Transported to Groundwater**

### Component: Nonpoint Pesticide Leaching Loss

**Description:** Applied pesticides move below the rootzone and have the potential to be transported to groundwater sources in quantities that degrade water quality and limit its use.

**Objective:** Reduce hazardous nonpoint pesticide losses that can be transported to groundwater sources.

**Analysis within CART:**

**All Land Uses**

Each PLU will have the PLU soil leaching potential determined. Each soil map unit component within the PLU will be categorized into one of four WIN-PST soil leaching potentials through the Water Quality Management Services – WIN-PST Soil Leaching. This service utilizes the NRCS-published soils database (SSURGO) data according to published WIN-PST criteria. Note that soils with a dual hydrologic group due to an apparent water table in the rootzone are rated as “High”. The acre weighted average rating for the PLU is then determined based on ratings for each soil map unit in the PLU.

Users will select a Pesticide Use and Risk category. For cropland the highest risk crop in the rotation should be selected for Crop Group to inform the Pesticide Use and Risk category choice, and “High” should be the default when Pesticide Use and Risk is unknown.

Table 92*: Determining Nonpoint Pesticide Surface Loss Threshold*

|  |  |  |
| --- | --- | --- |
| Soil Vulnerability to Runoff |  | R Factor |
| Dry Climate:  ≤50 R Factor | Humid Climate: >50 R Factor |
| High | 30 | 60 |
| Moderately High | 30 | 60 |
| Moderate | 30 | 60 |
| Low | 15 | 30 |

Pesticide risk existing condition credit will come from the worst-case selection for the PLU.

For cropland the highest risk crop in the rotation should be selected for Crop Group to inform the Pesticide Use and Risk category choice, and “High” should be the default when Pesticide Use and Risk is unknown.

Table 93*: Cropping Risk Categories for Pesticide Loss*

|  |  |  |  |
| --- | --- | --- | --- |
| Answer | Pesticide Use and Risk | Existing Condition Score Dry Climate | Existing Condition Score Humid Climate |
| 1. Unknown | High | 1 | 1 |
| 2. Orchards, vineyards, berries and nut crops | High | 1 | 1 |
| 3. Vegetable Crops | High | 1 | 1 |
| 4. Cotton | high | 1 | 1 |
| 5. Seed crops | High | 1 | 1 |
| 6. Flooded rice and cranberry crops | High | 1 | 1 |
| 7. Turfgrass for sod and nursery crops | High | 1 | 1 |
| 8. Close grown crops - residue not harvested | Moderate | 10 | 20 |
| 9. Close grown crops – residue removed | Moderate | 10 | 20 |
| 10. Row crops – durable residue not harvested | Moderate | 10 | 20 |
| 11. Row crops - residue removed or fragile | Moderate | 10 | 20 |
| 12. Christmas trees | Moderate | 10 | 20 |
| 13. Hay crops - forage | Low | 15 | 30 |

Table 94*:*  *Forestry, Pasture, and Range Groups*

|  |  |  |  |
| --- | --- | --- | --- |
| Forest, Pasture Range Groups | Pesticide Use and Risk | Existing Condition Score  Dry Climate | Existing Condition Score  Humid Climate |
| All | Low | 15 | 30 |
| All | None | 30 | 60 |

The existing condition question will set the existing condition points as seen in Table 95.

Table 95*: Existing Condition - Cover/Residue/Biomass Crop Rotation Credit*

|  |  |
| --- | --- |
| **Existing Condition - Crop Rotation Credit** Based on system benefits for cover/residue/biomass of all crops and cover crops in the rotation combined with the effects of harvest/grazing and tillage system. ***Note that individual credits for associated practices like crop rotation, cover crop and residue management are added to this system level credit.*** | **Pesticide Leaching** |
| **None – Rapidly Depleting Soil Organic Matter**   * Soil Conditioning Index is well below zero * Generally, fallow or crops with no durable residue or cover crops, with up to full field tillage. | 0 |
| **Low – Depleting Soil Organic Matter**   * Soil Conditioning Index is moderately below zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with up to full field tillage. | 5 |
| **Moderate – Maintaining Soil Organic Matter**   * Soil Conditioning Index is at or moderately above zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with reduced tillage or no-till. | 10 |
| **High – Building Soil Organic Matter**   * Soil Conditioning Index is well above zero * Generally, high residue conserving use crops or perennial crops with full ground cover, not tilled or tilled infrequently. | 15 |

Table 96*:*  *Integrated Pest Management – IPM System*

Note: Is an Integrated Pest Management (IPM) System implemented on the PLU to manage pests and pesticide environmental risk with pest Prevention, Avoidance, Monitoring, and Suppression (PAMS)?

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Full IPM System for Efficient Production and Environmental Protection | 51 | The client utilizes a full IPM System including Prevention, Avoidance, Monitoring, and Suppression (PAMS) to address production needs and manage pesticide environmental risk associated with the PLU based on Windows Pesticide Screening Tool (WIN-PST) results. |
| Full IPM System for Efficient Production | 25 | The client utilizes a full IPM System including Prevention, Avoidance, Monitoring, and Suppression (PAMS) to address production needs associated with the PLU. |
| Pesticides are applied according to label guidance without an IPM System, but spray drift is carefully managed. | 1 | An IPM system is not utilized on the PLU, but pesticides are applied according to label guidance to manage pests and pesticide drift is minimized with drift reducing spray technologies. |
| Pesticides are applied according to label guidance without an IPM System. | 1 | An IPM System is not utilized on the PLU, but pesticides are applied according to label guidance to manage pests. |
| No pesticides are applied | 51 | Pest management needs on the PLU are met without the use of pesticides. |

## **Pathogens and Chemicals from Manure, Biosolids, or Compost Applications Transported to Surface Water**

### Component: Nonpoint Pathogen Surface Loss

**Description:** Pathogens, pharmaceuticals, and chemicals from land applied manure, biosolids or compost are transported to surface waters in quantities that degrade water quality and limit its use.

**Objective:** Reduce nonpoint pathogen, pharmaceutical, and chemical transport beyond the edge of the field from land applied manure, biosolids or compost, by requiring a level of conservation management that is appropriate for each site’s potential for nonpoint pathogen, pharmaceutical and chemical loss.

**Analysis within CART:**

**Crop and Pasture**

Each PLU will default to a not assessed status for Nonpoint Pathogen Surface Loss. The planner will identify this resource concern based on site specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in Table 97. The planner will identify this resource concern based on the application of manure, biosolids or compost, or the presence of domestic livestock on the PLU. Where identified, at least 50 points of mitigation will be required from appropriate conservation practices and activities, including Nutrient Management that utilizes application timing to avoid high runoff periods, incorporation to reduce runoff potential, and application setbacks to protect nearby surface water bodies, waste treatment practices that destroy potentially harmful pathogens, and Prescribed Grazing and other practices that can help manage livestock waste.

Table 97*: Manure, compost or biosolid application*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 60 |
| Left on the surface without incorporation | 0 |
| Injected or incorporated into the soil soon after application | 51 |

## **Pathogens and Chemicals from Manure, Biosolids, or Compost Applications Transferred to Groundwater**

### Component: Nonpoint Pathogen Loss to Groundwater

**Description:** Pathogens, pharmaceuticals, and chemicals from land applied manure, biosolids or compost are transported to groundwater in quantities that degrade water quality and limit its use.

**Objective:** Reduce nonpoint pathogen, pharmaceutical, and chemical transport below the rootzone from land applied manure, biosolids or compost, by requiring a level of conservation management that is appropriate for each site’s potential for nonpoint pathogen, pharmaceutical and chemical loss.

**Analysis within CART:**

**Crop and Pasture**

Each PLU will default to a not assessed status for Nonpoint Pathogen Loss to Groundwater. The planner will identify this resource concern based on site specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in Table 98. The planner will identify this resource concern based on the application of manure, biosolids or compost, or the presence of domestic livestock on the PLU. Where identified, at least 50 points of mitigation will be required from appropriate conservation practices and activities, including Nutrient Management that utilizes application timing to avoid high water table periods, waste treatment practices that destroy potentially harmful pathogens, and Prescribed Grazing and other practices that can help manage livestock waste.

Table 98*: Manure, compost or biosolid application*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 60 |
| Left on the surface without incorporation | 0 |
| Injected or incorporated into the soil soon after application | 51 |

## **Salts Transported to Surface Water**

### Component: Salt loss to surface water

**Description:** Irrigation or rainfall runoff transports salts to receiving surface waters in quantities that degrade water quality and limit its use.

**Objective:** Limit transfer of salts from PLU to receiving surface waters.

**Analysis within CART:**

Each PLU will default to a not assessed status for Salt Loss to Surface Water. The planner will identify this resource concern based on site-specific conditions such as being in a known salinity project area. Where identified, at least 50 points of salinity mitigation will be required from appropriate conservation practices and activities, including irrigation water management and irrigation tailwater recovery.

Table 99*: Salt Loss to Surface Water*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 60 |
| Yes - Is a concern but is NOT currently being managed | 0 |
| Yes - Is a concern and is being managed with irrigation water management and tail water recovery | 51 |

## **Salts Transported to Groundwater**

### Component: Salt loss to groundwater

**Description:** Irrigation or rainfall runoff transport salts to groundwater in quantities that degrade aquifer water quality and limit its use.

**Objective:** Limit loss of salts from PLU to groundwater.

**Analysis within CART:**

Each PLU will default to a not assessed status for salts – groundwater. The planner will identify this resource concern based on site-specific conditions such as being in a known salinity project area. Where identified, at least 50 points of salinity mitigation will be required from appropriate conservation practices and activities, including irrigation water management.

Table 100*: Salt Loss to Groundwater*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed - Is UNKNOWN if it is a concern | -1 |
| Not applicable | 60 |
| Yes - Is a concern but is NOT currently being managed | 0 |
| Yes - Is a concern but is being managed with the irrigation water management system | 51 |

## **Petroleum, heavy metals, and other pollutants transported to surface water**

### Component 1: Concentrated Agrichemical Runoff Loss and Storage and Handling of Fertilizer and Pesticides

**Description:** Agrichemical products (fertilizers and pesticides) are stored, mixed, loaded, or handled onsite, so they have the potential to contaminant surface waters.

**Objective:** Control accidental release of stored agrichemical products to prevent contamination of surface waters.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for agrichemical products. The planner will identify this resource concern based on site-specific conditions. A planning threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in Table 101.

Table 101*: Agrichemical Product Storage (Pesticides and Fertilizers)*

Note: Are agrichemical products stored, mixed, loaded, or handled on the PLU?

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 60 |
| Yes - ARE stored, mixed, loaded, or handled on PLU AND secondary containment is NOT in place | 0 |
| Yes - ARE stored, mixed, loaded, or handled on PLU AND secondary containment IS in place | 51 |

### Component 2: Petroleum and Other Pollutant Containment

**Description:** Petroleum products are stored and handled on site without secondary containment, so the potential exists to contaminate surface waters. As well, heavy metals or other pollutants are present on the PLU from mining operations or other activities including storage and handling. Materials containing these pollutant types are present, stored or handled on site, so they have the potential to contaminate surface waters. The planner will identify this resource concern based on site-specific conditions.

**Objective:** Control accidental release of stored petroleum products, heavy metals and other pollutants to prevent contamination of surface waters.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for petroleum storage or other pollutants present. The planner will identify this resource concern based on site-specific conditions. A planning threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in Table 102.

Table 102*: Petroleum* *products stored and handled on the PLU*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed - ARE stored and handled on the PLU, but it is UNKNOWN if secondary containment is in place. | -1 |
| Not applicable | 60 |
| Yes - ARE stored and handled on the PLU, but secondary containment is **NOT** in place. | 0 |
| Yes - ARE stored and handled on the PLU and secondary containment IS in place that meets the minimum planning criteria. | 51 |

### Component 3: Mine Waste Remediation and Containment

**Description:** Mining operations on the PLU have the potential to contaminate surface waters, including heavy metals or other mining effluent pollutants. Mine waste and materials containing pollutants are present, generated, released, stored or handled on site, so they have the potential to contaminate surface waters. The planner will identify this resource concern based on site-specific conditions.

**Objective:** Control release of mine waste and materials containing pollutants to prevent contamination of surface waters.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for mine waste or other mining effluent pollutants present. The planner will identify this resource concern based on site-specific conditions. A planning threshold value of 50 will be set and the existing condition question (Yes/No) will be triggered. The existing condition question will set the existing score as seen in Table 103.

Table 103*: Mine Waste Pollutants Present on the PLU*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed - present on the PLU but is UNKNOWN if adequate control or treatment is in place | -1 |
| Not applicable | 60 |
| Yes - present on the PLU, and adequate control or treatment is NOT in place | 0 |
| Yes - present on the PLU, but adequate control or treatment **IS** in place | 51 |

## **Petroleum, heavy metals, and other pollutants transported to groundwater**

### Component 1: Concentrated Agrichemical Runoff Loss and Storage and Handling of Fertilizer and Pesticides

**Description:** Agrichemical products (fertilizers and pesticides) are stored, mixed, loaded, or handled onsite, so they have the potential to contaminant groundwater.

**Objective:** Control accidental release of stored agrichemical products to prevent contamination of groundwater.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for agrichemical products. The planner will identify this resource concern based on site-specific conditions. A planning threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in Table 104.

Table 104*: Agrichemical Product Storage (Pesticides and Fertilizers)*

Note: Are agrichemical products stored, mixed. Loaded, or handled on the PLU?

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 60 |
| Yes - ARE stored, mixed, loaded, or handled on PLU AND secondary containment is NOT in place | 0 |
| Yes - ARE stored, mixed, loaded, or handled on PLU AND secondary containment IS in place | 51 |

### Component 2: Petroleum and Other Pollutant Containment

**Description:** Petroleum products are stored and handled on site without secondary containment, so the potential exists to contaminate groundwater. As well, heavy metals or other pollutants are present on the PLU from mining operations or other activities including storage and handling. Materials containing these pollutant types are present, stored or handled on site, so they have the potential to contaminate groundwater. The planner will identify this resource concern based on site-specific conditions.

**Objective:** Control accidental release of stored petroleum products and other pollutants to prevent contamination of groundwaters.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for petroleum storage or other pollutants present. The planner will identify this resource concern based on site-specific conditions. A planning threshold value of 50 will be set and the existing condition question (Yes/No) will be triggered. The existing condition question will set the existing score as seen in Table 105 below.

Table 105*:* Petroleum products stored on the PLU

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed - ARE stored and handled on the PLU, but it is UNKNOWN if secondary containment is in place. | -1 |
| Not applicable | 60 |
| Yes - ARE stored and handled on the PLU, but secondary containment is **NOT** in place. | 0 |
| Yes - ARE stored and handled on the PLU and secondary containment IS in place that meets the minimum planning criteria. | 51 |

### Component 3: Mine Waste Remediation and Containment

**Description:** Mining operations on the PLU have the potential to contaminate surface waters, including heavy metals or other mining effluent pollutants. Mine waste and materials containing pollutants are present, generated, released, stored or handled on site, so they have the potential to contaminate groundwater. The planner will identify this resource concern based on site-specific conditions.

**Objective:** Control release of mine waste and materials containing pollutants to prevent contamination of groundwater.

**Analysis within CART:**

Each PLU will default to a “not assessed” status for mine waste or other mining effluent pollutants present. The planner will identify this resource concern based on site-specific conditions. A planning threshold value of 50 will be set and the existing condition question (Yes/No) will be triggered. The existing condition question will set the existing score as seen in Table 106 below.

Table 106*: Mine Waste Pollutants Present on the PLU*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed - present on the PLU but is UNKNOWN if adequate control or treatment is in place | -1 |
| Not applicable | 60 |
| Yes - present on the PLU, and adequate control or treatment is NOT in place | 0 |
| Yes - present on the PLU, but adequate control or treatment **IS** in place | 51 |

## **Sediment Transported to Surface Water**

### Component: Sediment from Erosion Sources

**Description:** Offsite transport of sediment to surface waters degrades water quality and limits uses.

All land uses except Cropland will have sediment from sheet and rill erosion and sediment from classic gully erosion evaluated the same way they are evaluated for soil erosion. For Cropland land uses sediment from sheet and rill erosion will have a unique water quality evaluation while sediment from ephemeral and classic gullies will be evaluated the same way they are evaluated for soil erosion.

**Objective:** Limit sediment loss from PLU to surface waters. Sediment delivery from working lands should be limited to less than 2 tons per acre per year. Appropriate upslope treatment and buffer practices should be in place to address concentrated flow, ephemeral gullies, and classic gullies.

**Analysis within CART:**

For sediment from sheet and rill erosion on cropland and pasture, each PLU will have the PLU soil runoff potential determined. Each soil map unit within the PLU will be categorized into one of four soil runoff potentials through the Water Quality Management Services - Soil Runoff, based on its published map unit components corresponding to the chart in Table 107. The acre weighted average rating for the PLU is then determined based on ratings for each soil map unit in the PLU.

Table 107*: Determining Soil Runoff Potential*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Soil Runoff Potential | Hydrologic Group A | Hydrologic Group B | Hydrologic Group C | Hydrologic Group D |
| Low = 0 | All | Slope <4 | Slope <2 | Slope <2 and K <0.28 and no apparent or perched high water table |
| Moderate = 1 | None | ≥4 Slope <6 and K <0.32 | ≥2 Slope <6 and K <0.28 | ≥2 Slope <6 and K <0.28 and no apparent or perched high water table |
| Moderately High = 2 | None | ≥4 Slope <6 and K ≥0.32 | ≥2 Slope <6 and K ≥0.28 | ≥2 Slope <4 and no apparent or perched high water table |
| High = 3 | None | Slope >6 | Slope >6 | Slope >4 or an apparent or perched high water table |

Using the R factor from R factor service, the PLU soil runoff potential is used to determine the threshold of conservation management points necessary to meet the planning criteria, as seen in Table 108.

Table 108*: Determining Sediment Transport Threshold*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Runoff Vulnerability | R Factor | | | |
| ≤50 | >50-150 | >150-250 | >250 |
| High | 5 | 50 | 85 | 100 |
| Moderately High | 5 | 30 | 50 | 85 |
| Moderate | 1 | 15 | 40 | 50 |
| Low | 1 | 1 | 25 | 40 |

The existing condition question will set the existing score as seen in Table 109.

Table 109*: Existing Rotation Residue Value*

|  |  |
| --- | --- |
| **Existing Condition - Crop Rotation Credit** Based on system benefits for cover/residue/biomass of all crops and cover crops in the rotation combined with the effects of harvest/grazing and tillage system. ***Note that individual credits for associated practices like crop rotation, cover crop and residue management are added to this system level credit.*** | Sediment from Erosion Credit |
| **None – Rapidly Depleting Soil Organic Matter**   * Soil Conditioning Index is well below zero * Generally, fallow or crops with no durable residue or cover crops, with up to full field tillage. | 0 |
| **Low – Depleting Soil Organic Matter**   * Soil Conditioning Index is moderately below zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with up to full field tillage. | 10 |
| **Moderate – Maintaining Soil Organic Matter**   * Soil Conditioning Index is at or moderately above zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with reduced tillage or no-till. | 20 |
| **High – Building Soil Organic Matter**   * Soil Conditioning Index is well above zero * Generally, high residue conserving use crops or perennial crops with full ground cover, not tilled or tilled infrequently. | 40 |

**For Cropland**

Sediment Transported to Surface Water – Sediment Loss to Surface Water analysis within CART is captured by ephemeral and classic gully sediment: see erosion evaluation.

**For all other land uses**

Sediment Transported to Surface Water – Sediment Loss to Surface Water analysis within CART is captured by the sheet and rill erosion evaluation and classic gully erosion evaluation.

# **Air**

## **Emissions of Particulate Matter (PM) and PM Precursors**

### Component 1: PM – Diesel Engines

**Description:** Direct emissions of particulate matter (PM) - dust and smoke - as well as the formation of fine particulate matter in the atmosphere from other agricultural emissions - ammonia, nitrogen oxides (NOx), and volatile organic compounds (VOCs) - can cause multiple negative environmental impacts.

**Objective:** Emissions of PM and PM precursors from diesel engines do not excessively contribute to negative impacts to human, plant, or animal health and do not excessively contribute to regional visibility degradation.

**Analysis within CART:**

Each PLU for all land uses will trigger an intersection with the PM2.5 and PM10 nonattainment maps. A threshold value of 50 will be set, and the combustion sources existing condition question will be triggered for diesel engines.

If there are no diesel engines in operation at the PLU, this component is not applicable. Otherwise, the existing condition question will set the existing condition score as seen in Table 110.

Table 110*: Diesel Engine Combustion Sources Existing Condition*

Note: If yes, document all diesel engines larger than 25 brake horsepower, including engine horsepower rating, model year, and annual hours of usage.

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Low risk combustion sources | 81 | All diesel engines larger than 25 brake horsepower in operation at the PLU are certified to EPA Tier 4 final standards (based on engine model year and horsepower rating). |
| Low-medium risk combustion sources | 74 | **For PM attainment areas:** All diesel engines larger than 25 brake horsepower in operation at the PLU are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating).  **For PM nonattainment areas:** All diesel engines larger than 25 brake horsepower in operation at the PLU are certified to at least EPA Tier 4 interim standards (based on engine model year and horsepower rating). |
| Medium risk combustion sources | 51 | **For PM attainment areas:** At least 75% of the normal annual horsepower-hours for diesel engines larger than 25 brake horsepower in operation at the PLU are from engines that are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating).  **For PM nonattainment areas:** All diesel engines larger than 25 brake horsepower in operation at the PLU are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating). |
| High-medium risk combustion sources | 26 | **For PM attainment areas:** At least 50% of the normal annual horsepower-hours for diesel engines larger than 25 brake horsepower in operation at the PLU are from engines that are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating).  **For PM nonattainment areas:** At least 75% of the normal annual horsepower-hours for diesel engines larger than 25 brake horsepower in operation at the PLU are from engines that are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating). |
| High risk combustion sources | 1 | **For PM attainment areas:** Less than 50% of the normal annual horsepower-hours for diesel engines larger than 25 brake horsepower in operation at the PLU are from engines that are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating).  **For PM nonattainment areas:** Less than 75% of the normal annual horsepower-hours for diesel engines larger than 25 brake horsepower in operation at the PLU are from engines that are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating). |

### Component 2: PM – Non-Engine Combustion Sources

**Description:** Emissions of PM and PM precursors from non-engine combustion sources do not excessively contribute to negative impacts to human, plant, or animal health and do not excessively contribute to regional visibility degradation.

**Analysis within CART:**

Each PLU for all land uses will trigger an intersection with the PM2.5 and PM10 nonattainment maps. A threshold value of 50 will be set. If there are no non-engine combustion sources in operation at the PLU, this component is not applicable. Otherwise, the existing condition question will set the existing condition score as seen in Table 111.

Table 111*: Non-Engine Combustion Sources* *Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Low risk combustion sources | 81 | All non-engine combustion sources utilize natural gas or propane as fuel and/or emissions control for PM and NOx emissions. |
| Medium risk combustion sources | 51 | **For PM attainment areas:** At least 50% of the normal annual fuel usage for non-engine combustion sources in operation at the PLU is either natural gas or propane, or at least 50% of the non-engine combustion sources in operation at the PLU utilize emissions control for PM and NOx emissions.  **For PM nonattainment areas:** At least 75% of the normal annual fuel usage for non-engine combustion sources in operation at the PLU is either natural gas or propane, or at least 75% of the non-engine combustion sources in operation at the PLU utilize emissions control for PM and NOx emissions. |
| High risk combustion sources | 1 | **For PM attainment areas:** Less than 50% of the normal annual fuel usage for non-engine combustion sources in operation at the PLU is either natural gas or propane, and/or less than 50% of the non-engine combustion sources in operation at the PLU utilize emissions control for PM and NOx emissions.  **For PM nonattainment areas:** Less than 75% of the normal annual fuel usage for non-engine combustion sources in operation at the PLU is either natural gas or propane, and/or less than 75% of the non-engine combustion sources in operation at the PLU utilize emissions control for PM and NOx emissions. |

### Component 3: PM – Open Burning

**Description:** Emissions of PM and PM precursors from prescribed fire do not excessively contribute to negative impacts to human, plant, or animal health and do not result in safety or nuisance visibility restrictions.

**Analysis within CART:**

Each PLU for all land uses will default to a not assessed status for this component. A threshold value of 50 will be set, and the following existing condition question will be triggered:

Table 112*: Are you using fire for management?*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 0 |
| Yes - basic smoke management practices are implemented | 51 |
| Yes - basic smoke management practices are NOT implemented | 1 |

If prescribed fire is not applied at the PLU, this component is not applicable.

If less than 100% of all prescribed fire events at the PLU are conducted according to a prescribed burn plan that includes Basic Smoke Management Practices, apply Prescribed Burning (338) to develop, implement, and follow a prescribed burn plan that includes Basic Smoke Management Practices for all prescribed fire events. Additional practices may be necessary to support Prescribed Burning (338).

### Component 4: PM – Pesticide Drift

**Description:** Pesticide use does not result in unwanted chemical droplet drift.

**Analysis within CART:**

Each PLU for all land uses will default to a not assessed status for this component. The Planner may identify a Particulate Matter resource concern for this component based on site specific conditions. A threshold value will be set at 50.

If there is no chemical pesticide application at the PLU, this component is not applicable. Otherwise, the existing condition questions will set the existing condition score.

Table 113*:* *Integrated Pest Management – IPM System*

Note: Is an Integrated Pest Management (IPM) System implemented on the PLU to manage pests and pesticide environmental risk with pest Prevention, Avoidance, Monitoring, and Suppression (PAMS)?

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Full IPM System for Efficient Production and Environmental Protection | 51 | The client utilizes a full IPM System including Prevention, Avoidance, Monitoring, and Suppression (PAMS) to address production needs and manage pesticide environmental risk associated with the PLU. |
| Full IPM System for Efficient Production | 25 | The client utilizes a full IPM System including Prevention, Avoidance, Monitoring, and Suppression (PAMS) to address production needs associated with the PLU. |
| Pesticides are applied according to label guidance without an IPM System, but spray drift is carefully managed. | 25 | An IPM system is not utilized on the PLU, but pesticides are applied according to label guidance to manage pests and pesticide drift is minimized with drift reducing spray technologies. |
| Pesticides are applied according to label guidance without an IPM System. | 1 | An IPM System is not utilized on the PLU, but pesticides are applied according to label guidance to manage pests. |
| No pesticides are applied | 51 | Pest management needs on the PLU are met without the use of pesticides. |

### Component 5: PM – Nitrogen Fertilizer

**Description:** Emissions of ammonia (a PM precursor) from nitrogen fertilizer application do not excessively contribute to negative impacts to human, plant, or animal health and do not excessively contribute to regional visibility degradation.

**Analysis within CART:**

Each PLU for the crop, pasture, forest, and associated agricultural land land uses will default to a not assessed status for this component. The Planner may identify a Particulate Matter resource concern for this component based on site specific conditions. A threshold value will be set at 50.

If nitrogen fertilizers are not applied at the PLU, this component is not applicable. Otherwise, the existing condition question will set the existing condition score as seen in Table 114.

Table 114*: NRCS-approved Nutrient Management Plan applied*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Yes | 51 | All nitrogen fertilizers are applied at the PLU according to an NRCS-approved nutrient management plan. |
| No | 1 | There is no NRCS-approved nutrient management plan. |

If there is no NRCS-approved nutrient management plan that specifically addresses nitrogen for the PLU, apply Nutrient Management (590) to develop such a plan.

Note that if yes is selected, points for having an NRCS-Nutrient Management Plan will also be applied to the following Resource Concern Components. Because a current Nutrient management Plan is captured in the above question, it is important to not select Nutrient Management Plan as a practice when adding existing practices to avoid double counting for having a plan.

Table 115*: Nutrient Management Plan Points*

|  |  |
| --- | --- |
| Resource Concern Components | Points |
| Sheet and Rill | 1 |
| Wind Erosion | 1 |
| Organic Matter Depletion | 10 |
| Nonpoint Nitrogen Surface Loss | 40 |
| Nonpoint Phosphorus Surface Loss | 40 |
| Nonpoint Nitrogen Leaching | 40 |
| Nonpoint Phosphorus Leaching | 40 |
| Nonpoint Pathogen Surface Loss | 40 |
| Nonpoint Pathogen Loss to Groundwater | 40 |
| Plant Productivity and Health | 20 |

### **Component 6:** PM – Dust from Field operations

**Description:** Mechanically-generated emissions of PM from field operations (including tillage, seed bed preparation, planting, harvest operations, or any combination of these) do not excessively contribute to negative impacts to human, plant, or animal health; do not excessively contribute to unwanted deposition on surfaces; and do not result in safety or nuisance visibility restrictions.

**Analysis within CART:**

Each PLU for the Crop and Pasture land uses will default to a not assessed status for this component. The Planner may identify a Particulate Matter resource concern for this component based on site specific conditions. A threshold value will be set at 50.

If field operations are not conducted at the PLU, this component is not applicable. Otherwise, the existing condition questions will set the existing condition score as seen in Table 116.

Table 116*:* *Dust from Field Operations*

Note: Has the client previously applied any practices or techniques to address the previous PM/dust observed issues?

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Minimal potential for dust | 51 | Neither the Planner or client has observed any PM/dust issues related to field operations at the PLU OR The client has previously applied practices or techniques to address the previous PM/dust observed issues, and the applied practices or techniques have been documented. |
| Moderate potential for dust | 26 | The Planner or Client has observed some potential PM/dust issues related to field operations at the PLU and some practices or techniques to address the previous PM/dust observed issues have been applied and documented. |
| Significant potential for dust | 1 | The client has not previously applied practices or techniques to address the previous PM/dust observed issues. |

If there have been previous PM/dust issues from field operations, and practices have not been previously applied, Conservation Practices and Activities can be applied.

### Component 7: PM – Dust from Unpaved Roads

**Description:** Emissions of PM from vehicle and machinery travel on unpaved roads and surfaces do not excessively contribute to negative impacts to human, plant, or animal health; do not excessively contribute to unwanted deposition on surfaces; and do not result in safety or nuisance visibility restrictions.

**Analysis within CART:**

Each PLU for all land uses will default to a not assessed status for this component. The Planner may identify a Particulate Matter resource concern for this component based on site specific conditions. A threshold value will be set at 50.

If there are no unpaved roads or other unpaved travel surfaces used for vehicle or machinery movement at the PLU, this component is not applicable. Otherwise, the existing condition questions will set the existing condition score as seen in Table 117.

Table 117*: Dust from Unpaved Roads*

Note: Has the client previously applied any practices or techniques to address the previous PM/dust observed issues?

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not Assessed | -1 |  |
| Not Applicable | 0 |  |
| Practices have been applied to control dust from unpaved roads | 51 | The client has previously applied practices or techniques to address the previous PM/dust observed issues, the applied practices or techniques have been documented. |
| Practices have NOT been applied to control dust from unpaved roads | 1 | The client has not previously applied practices or techniques to address the previous PM/dust observed issues. |

### Component 8: PM – Windblown Dust

**Description:** Wind-generated emissions of PM do not excessively contribute to negative impacts to human, plant, or animal health; do not excessively contribute to unwanted deposition on surfaces; and do not result in safety or nuisance visibility restrictions.

**Analysis within CART:**

Each PLU for all land uses will default to a not assessed status for this component. The Planner may identify a Particulate Matter resource concern for this component based on site specific conditions. A threshold value will be set at 50, and the wind erosion existing condition question will be triggered and used to answer this component.

**Crop:**

Table 118*: Crop Rotation Cover/Residue/Biomass Credit*

|  |  |
| --- | --- |
| **Existing Condition - Crop Rotation Credit** Existing condition credits are based on system benefits for cover/residue/biomass of all crops and cover crops in the rotation combined with the effects of harvesting, grazing and tillage. Individual credits for associated practices like crop rotation, cover crop and residue management are added to this system level credit. | Windblown Dust |
| **None – Rapidly Depleting Soil Organic Matter**   * Soil Conditioning Index is well below zero * Generally fallow, or crops with no durable residue or cover crops, with up to full field tillage. | 0 |
| **Low – Depleting Soil Organic Matter**   * Soil Conditioning Index is just below zero * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with up to full field tillage. | 5 |
| **Moderate – Maintaining Soil Organic Matter**   * Soil Conditioning Index is zero or above * Generally, crops with durable residue or cover crops, or part of the rotation in high residue conserving use crops, with reduced tillage or no-till. | 15 |
| **High – Building Soil Organic Matter**   * Soil Conditioning Index is well above zero * Generally high residue conserving use crops or perennial crops with full ground cover, not tilled or tilled infrequently. | 40 |

**Forest and Other Land Uses:**

Each PLU will default to a value of “-1” meaning the resource concern is “not yet assessed”. If the planner determines that the resource concern component *is not applicable* a value of “0” will be used and the planner will be allowed to continue to the next resource concern component.

If the resource concern component is applicable the planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing score as seen in Table 24.

Table 119*: Wind Erosion Existing Condition*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 0 |
| Site is stable and without visible signs of active erosion | 51 |
| Site is NOT stable and has visible signs of active erosion | 1 |

**Range:**

For Range land uses, this component will be addressed by answering the Soil/Site Stability Limitations in Table 18.

Table 120: *Range Soil/Site Stability Limitations*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| None to Slight | 60 | Rangeland Health Assessment |
| Slight to Moderate | 51 | Rangeland Health Assessment |
| Moderate | 30 | Rangeland Health Assessment |
| Moderate to Extreme | 15 | Rangeland Health Assessment |
| Extreme to Total | 1 | Rangeland Health Assessment |

**Pasture:**

For Pasture land uses, this component will be addressed by answering the following three existing condition questions in Table 121, Table 122, and Table 123.

Table 121: *Pasture Plant Vigor*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 30 | * Recovery: Rapid * Color: Deep green * Insect/Wilting/Disease Loss: None * Productivity: well above site avg * Pasture Condition Score element score < 5 |
| Good | 20 | * Recovery: Few days longer * Color: slightly light green * Insect/Wilting/Disease Loss: Very Minor * Productivity: At site avg * Pasture Condition Score element score < 4 |
| Fair | 17 | * Recovery: Takes 1wk longer * Color: pale green, not dung/urine spots * Insect/Wilting/Disease Loss: Minor * Productivity: ≤ avg. * Pasture Condition Score element score < 3 |
| Low | 10 | * Recovery: Takes 2wks longer * Color: yellowish green * Insect/Wilting/Disease Loss: Major * Productivity: Low * Pasture Condition Score element score < 2 |
| Poor | 5 | * Recovery: None * Color: yellow/brown * Insect/Wilting/Disease Loss: High * Productivity: none to very low * Pasture Condition Score element score < 1 |

Table 122: *Pasture Cover*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 30 | * Canopy: 95% to 100% * Basal: >50% * Runoff at basal: very little to no runoff * Pasture Condition Score element score < 5 |
| Good | 20 | * Canopy: 90% to 94% * Basal: 35%to 50% * Runoff at basal: high vegetal retardance * Pasture Condition Score element score < 4 |
| Fair | 17 | * Canopy: 70% to 89% * Basal: 25%to 34% * Runoff at basal: moderate vegetal retardance * Pasture Condition Score element score < 3 |
| Low | 10 | * Canopy: 50% to 69% * Basal: 15%to 24% * Runoff at basal: low vegetal retardance * Pasture Condition Score element score < 2 |
| Poor | 5 | * Canopy: <50% * Basal: <15% * Runoff at basal: not slowed * Pasture Condition Score element score < 1 |

Table 123: *Pasture Erosion*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Existing Condition |
| Not assessed | -1 |  |
| High | 30 | * No visual signs of erosion present. * Streambanks and drainages are not eroding * Pasture Condition Score element score < 5 |
| Good | 20 | * Sheet and rills: None, past is grassed * Depth: None * Grazing Terracettes: None but a few small debris dams * Pasture Condition Score element score < 4 |
| Fair | 17 | * Sheet and rills: Only at HUAs and water * Depth: >0.5-3" * Grazing Terracettes: None, but debris fans * Pasture Condition Score element score < 3 |
| Low | 10 | * Sheet and rills: only on steep areas * Depth: >0.5-3" * Grazing Terracettes: present * Pasture Condition Score element score < 2 |
| Poor | 5 | * Sheet and rills: yes, active in pasture * Depth: >3<8 " * Grazing Terracettes: yes, close-spaced * Pasture Condition Score element score < 1 |

If there have been previous windblown dust issues and practices have not been previously applied, Conservation Practices and Activities can be applied.

### Component 9: PM – Confined Animal Activities

**Description:** Emissions of PM and PM precursors from confinement-based animal production do not excessively contribute to negative impacts to human, plant, or animal health; do not excessively contribute to regional visibility degradation; and do not result in safety or nuisance visibility restrictions.

**Analysis within CART:**

Each PLU for the farmstead land use will default to a not assessed status for this component. The Planner may identify a Particulate Matter resource concern for this component based on site specific conditions. A threshold value will be set at 50.

If there are no livestock present on the PLU, this component is not applicable. Otherwise, the existing condition questions will set the existing condition score as seen in Table 124.

Table 124*: Manures, Biosolids, Compost, or Other Soil Amendment and Pathogen Sources*

(Note: Are livestock stockpiled or stored on the PLU?)

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not applicable | 0 |
| Not assessed | -1 |
| Only solid material storage - contained | 51 |
| Only solid material storage - not contained | 1 |
| Liquid or mixed manure storage - contained | 51 |
| Liquid or mixed manure storage - not contained | 1 |

## **Emissions of Greenhouse Gases (GHGs)**

### Component 1: GHGs – Nitrogen Fertilizer

**Description:** Emissions greenhouse gases from agricultural operations increase atmospheric concentrations of these gases (see <https://jneme910.github.io/CART/chapters/Hydric_Rating_by_Map_Unit>).

**Objective:** Emissions of nitrous oxide from nitrogen fertilizer application do not excessively contribute to increased atmospheric concentrations of greenhouse gases.

**Analysis within CART:**

Each PLU for the crop, pasture, forest, and associated agricultural land land uses will default to a not assessed status for this component. The Planner may identify a Greenhouse Gas resource concern for this component based on site specific conditions. A threshold value will be set at 50.

If nitrogen fertilizers are not applied at the PLU, this component is not applicable. Otherwise, the existing condition questions will set the existing condition score.

Table 125*: NRCS-approved Nutrient Management Plan applied*

Note: Are all nitrogen fertilizers applied at the PLU according to an NRCS-approved nutrient management plan that specifically addresses nitrogen?

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Yes | 51 | All nitrogen fertilizers are applied at the PLU according to an NRCS-approved nutrient management plan. |
| No | 1 | There is no NRCS-approved nutrient management plan. |

If there is no NRCS-approved nutrient management plan that specifically addresses nitrogen for the PLU, apply Nutrient Management (590) to develop such a plan.

### Component 2: GHGs – Carbon Stocks

**Description:** Maintain or increase total carbon stored in soils and/or perennial biomass to reduce atmospheric concentrations of carbon dioxide and enhance carbon sequestration (see <https://jneme910.github.io/CART/chapters/Soil_Organic_Carbon_Stock>).

**Analysis within CART:**

Each PLU for the crop, pasture, range, forest, and associated agricultural land land uses will default to a not assessed status for this component. The Planner may identify a Greenhouse Gas resource concern for this component based on site specific conditions. A threshold value will be set at 50 and the following existing condition questions will be triggered:

Table 126*: Strategy exists for maintaining or increasing carbon stocks*

Note: (in soils and perennial biomass being implemented at the PLU)

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not Assessed | -1 |
| Not Applicable | 0 |
| No – carbon stocks stable/increasing | 51 |
| No – carbon stocks decreasing | 1 |
| Yes – carbon stocks stable/increasing | 51 |
| Yes – carbon stocks decreasing | 1 |

If the client is not implementing a strategy for maintaining or increasing carbon stocks in soils and perennial biomass at the PLU, the Planner will make a determination of whether or not a resource concern exists for this Component for carbon stocks. The resource concern determination for carbon stocks will include an analysis of the PLU using either COMET-Farm or COMET-Planner to analyze overall carbon stocks in soils and perennial biomass at the PLU. If the analysis shows that overall carbon stocks in soils and perennial biomass are stable or increasing, an existing score of 51 will be applied. If the analysis shows that overall carbon stocks in soils and perennial biomass are decreasing, an existing score of 1 will be applied. Conservation Practices and Activities related to maintaining or increasing carbon stocks in soils and perennial biomass are determined based on an alternative scenario analysis of the PLU using either COMET-Farm or COMET-Planner and are added to the existing condition to determine the state of the planned management system.

### Component 3: GHGs – Hydric and Organic Soils

**Description:** Maintain or increase total carbon stored in soils and/or perennial biomass to reduce atmospheric concentrations of carbon dioxide and enhance carbon sequestration.

**Analysis within CART:**

Each PLU for the crop, pasture, range, forest, and associated agricultural land land uses will default to a not assessed status for this component. The Planner may identify a Greenhouse Gas resource concern for this component based on site specific conditions. A threshold value will be set at 50 and the following existing condition questions (same as for Soil Organic Matter) will be triggered:

Table 127*: Hydric or organic soils at the PLU*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Score | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| All hydric and organic soils with perennial cover | 51 | All hydric and organic soils at the PLU are maintained with perennial cover |
| < 100% of hydric and organic soils with perennial cover | 1 | < 100% of hydric and organic soil acreage is maintained with perennial cover |

If less than 100% of hydric and organic soils at the PLU are maintained with perennial cover, apply Conservation Cover (327) to ensure that 100% of hydric and organic soils at the PLU are maintained with perennial cover. Additional practices may be necessary to support Conservation Cover (327).

### Component 4: GHGs – Confined Animal Activities

**Description:**  Emissions of methane and nitrous oxide from confinement-based livestock production do not excessively contribute to increased atmospheric concentrations of greenhouse gases.

**Analysis within CART:**

Each PLU for the farmstead land use will default to a not assessed status for this component. The Planner may identify a Greenhouse Gas resource concern for this component based on site specific conditions. A threshold value will be set at 50.

If there is no confinement-based livestock production at the PLU, this component is not applicable. Otherwise, the existing condition questions will set the existing condition score as seen in Table 128 and Table 129.

Table 128: *Manures, Biosolids, Compost, or Other Soil Amendment and Pathogen Sources*

Note: Are they stockpiled or stored on the PLU?

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not applicable | 0 |
| Not assessed | -1 |
| Only solid material storage - contained | 41 |
| Only solid material storage - not contained | 1 |
| Liquid or mixed manure storage - contained | 41 |
| Liquid or mixed manure storage - not contained | 1 |

If a Greenhouse Gas resource concern is determined to exist for methane emissions from confinement-based animal production for this component, Conservation Practices and Activities related to reducing Greenhouse Gas emissions from confinement‑based livestock or poultry production are determined based on an alternative scenario analysis of the PLU using the National Air Quality Site Assessment Tool (NAQSAT – [http://naqsat.tamu.edu](http://naqsat.tamu.edu/)) and the USDA/EPA Agricultural Air Quality Conservation Measures Guide for Poultry and Livestock Production and are added to the benchmark condition to determine the state of the planned management system.

Table 129*: Feed Management Plan or Strategy to Manage Nitrogen Excretion*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Score | Reference for Assessment Condition |
| Feed management plan | 10 | The client can certify that a feed management plan or strategy is in place to manage nitrogen excretion. |
| No feed management plan | 1 | A feed management plan or strategy to manage nitrogen excretion is not being implemented at the PLU. |

### Component 5: GHGs – Grazing Operations

**Description:** Emissions of methane from grazing livestock operations do not excessively contribute to increased atmospheric concentrations of greenhouse gases.

**Analysis within CART:**

Each PLU for all land uses will default to a not assessed status for this component. The Planner may identify a Greenhouse Gas resource concern for this component based on site specific conditions. If there are no grazing animals at the PLU, this component is not applicable. Otherwise, a threshold value will be set at 50, and the following existing condition question will be triggered:

Table 130: *Grazing Management Plan is Implemented at the PLU*

(Note: purpose of the Grazing Management Plan is to balance the energy and nutrition requirements of the grazing animals with the productivity of the grazing lands)

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Score | Additional Information |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Yes | 51 | The client can certify that a grazing management plan to balance the energy and nutrition requirements of the grazing animals with the productivity of the grazing lands is being implemented at the PLU. |
| No | 1 | A grazing management plan to balance the energy and nutrition requirements of the grazing animals with the productivity of the grazing lands is not being implemented at the PLU. |

If a grazing management plan to balance the energy and nutrition requirements of the grazing animals with the productivity of the grazing lands is not being implemented at the PLU, apply Prescribed Grazing (528) to develop, implement, and follow a prescribed grazing plan that balances the energy and nutrition requirements of the grazing animals with the productivity of the grazing lands. Additional practices may be necessary to support Prescribed Grazing (528).

## **Emissions of Ozone Precursors (Ozone Precursors)**

### Component 1: Ozone – Diesel Engines

**Description:** Emissions of ozone precursors (NOx and VOCs) result in formation of ground-level ozone, which can have negative impacts to human, plant, and animal health.

**Objective:** Emissions of ozone precursors from diesel engines do not excessively contribute to negative impacts to human, plant or animal health.

**Analysis within CART:**

Each PLU for all land uses will trigger an intersection with the Ozone nonattainment maps. A threshold value of 50 will be set, and the following existing condition question will be triggered.

If there are no diesel engines in operation at the PLU, this component is not applicable. Otherwise, the existing condition question will set the existing condition score as seen in Table 131.

Table 131*: Diesel Engine Combustion Sources Existing Condition*

Note: If yes, document all diesel engines larger than 25 brake horsepower, including engine horsepower rating, model year, and annual hours of usage.

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Low risk combustion sources | 81 | All diesel engines larger than 25 brake horsepower in operation at the PLU are certified to EPA Tier 4 final standards (based on engine model year and horsepower rating). |
| Low-medium risk combustion sources | 74 | **For Ozone attainment areas:** All diesel engines larger than 25 brake horsepower in operation at the PLU are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating).  **For Ozone nonattainment areas:** All diesel engines larger than 25 brake horsepower in operation at the PLU are certified to at least EPA Tier 4 interim standards (based on engine model year and horsepower rating). |
| Medium risk combustion sources | 51 | **For Ozone attainment areas:** At least 75% of the normal annual horsepower-hours for diesel engines larger than 25 brake horsepower in operation at the PLU are from engines that are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating).  **For Ozone nonattainment areas:** All diesel engines larger than 25 brake horsepower in operation at the PLU are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating). |
| High-medium risk combustion sources | 26 | **For Ozone attainment areas:** At least 50% of the normal annual horsepower-hours for diesel engines larger than 25 brake horsepower in operation at the PLU are from engines that are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating).  **For Ozone nonattainment areas:** At least 75% of the normal annual horsepower-hours for diesel engines larger than 25 brake horsepower in operation at the PLU are from engines that are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating). |
| High risk combustion sources | 1 | **For Ozone attainment areas:** Less than 50% of the normal annual horsepower-hours for diesel engines larger than 25 brake horsepower in operation at the PLU are from engines that are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating).  **For Ozone nonattainment areas:** Less than 75% of the normal annual horsepower-hours for diesel engines larger than 25 brake horsepower in operation at the PLU are from engines that are certified to at least EPA Tier 3 standards (based on engine model year and horsepower rating). |

### **Component 2:** Ozone – Non-Engine Combustion Sources

**Description:** Emissions of ozone precursors from non-engine combustion sources do not excessively contribute to negative impacts to human, plant, or animal health.

**Analysis within CART:**

Each PLU for all land uses will trigger an intersection with the Ozone nonattainment maps. A threshold value of 50 will be set. If there are no non-engine combustion sources in operation at the PLU, this component is not applicable. Otherwise, the existing condition question will set the existing condition score as seen in Table 132.

Table 132*: Non-Engine Combustion Sources Existing Condition*

Note: If yes, document all non-engine combustion sources, including heat input rating, fuel type, and annual hours of usage.

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Low risk combustion sources | 81 | All non-engine combustion sources utilize natural gas or propane as fuel and/or emissions control for NOx emissions. |
| Medium risk combustion sources | 51 | **For Ozone attainment areas:** At least 50% of the normal annual fuel usage for non-engine combustion sources in operation at the PLU is either natural gas or propane, or at least 50% of the non-engine combustion sources in operation at the PLU utilize emissions control for NOx emissions.  **For Ozone nonattainment areas:** At least 75% of the normal annual fuel usage for non-engine combustion sources in operation at the PLU is either natural gas or propane, or at least 75% of the non-engine combustion sources in operation at the PLU utilize emissions control for NOx emissions. |
| High risk combustion sources | 1 | **For Ozone attainment areas:** Less than 50% of the normal annual fuel usage for non-engine combustion sources in operation at the PLU is either natural gas or propane, and/or less than 50% of the non-engine combustion sources in operation at the PLU utilize emissions control for NOx emissions.  **For Ozone nonattainment areas:** Less than 75% of the normal annual fuel usage for non-engine combustion sources in operation at the PLU is either natural gas or propane, and/or less than 75% of the non-engine combustion sources in operation at the PLU utilize emissions control for NOx emissions. |

### **Component 3:** Ozone – Open Burning

**Description:** Emissions of ozone precursors from prescribed fire do not excessively contribute to negative impacts to human, plant, or animal health.

**Analysis within CART:**

Each PLU for all land uses will default to a not assessed status for this component. A threshold value of 50 will be set, and the following existing condition questions will be triggered:

Table 133*: Are you using fire for management?*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 0 |
| Yes - basic smoke management practices are implemented | 51 |
| Yes - basic smoke management practices are NOT implemented | 1 |

If less than 100% of all prescribed fire events at the PLU are conducted according to a prescribed burn plan that includes Basic Smoke Management Practices, apply Prescribed Burning (338) to develop, implement, and follow a prescribed burn plan that includes Basic Smoke Management Practices for all prescribed fire events. Additional practices may be necessary to support Prescribed Burning (338).

### Component 4: Ozone – Pesticides

**Description:** Emissions of VOCs from pesticide use do not excessively contribute to negative impacts to human, plant or animal health.

**Analysis within CART:**

Each PLU for all land uses will trigger an intersection with the Ozone nonattainment maps. If the PLU is not within a nonattainment or maintenance area for Ozone, this component is not applicable. If the PLU is within a nonattainment or maintenance area for Ozone, a threshold value of 50 will apply to cover both fumigant and non-fumigant pesticide requirements.

The existing condition questions will set the existing condition score as seen in **Error! Reference source not found.**.

Table 134: *Integrated Pest Management – IPM System*

Note: Is an Integrated Pest Management (IPM) System implemented on the PLU to manage pests and pesticide environmental risk with pest Prevention, Avoidance, Monitoring, and Suppression (PAMS)?

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 | The PLU is NOT in an ozone nonattainment or maintenance area. |
| Full IPM System for Efficient Production and Environmental Protection | 51 | he PLU is in an ozone nonattainment or maintenance area and the client utilizes a full IPM System including Prevention, Avoidance, Monitoring, and Suppression (PAMS) to address production needs and manage pesticide environmental risk associated with the PLU. |
| Full IPM System for Efficient Production | 25 | The PLU is in an ozone nonattainment or maintenance area and the client utilizes a full IPM System including Prevention, Avoidance, Monitoring, and Suppression (PAMS) to address production needs associated with the PLU. |
| Pesticides are applied according to label guidance without an IPM System, but spray drift is carefully managed. | 1 | The PLU is in an ozone nonattainment or maintenance area and the client does not utilize an IPM system, but pesticides are applied according to label guidance to manage pests and pesticide drift is minimized with drift reducing spray technologies. |
| Pesticides are applied according to label guidance without an IPM System. | 1 | The PLU is in an ozone nonattainment or maintenance area and the client does not utilize an IPM system, but pesticides are applied according to label guidance to manage pests. |
| No pesticides are applied | 51 | The PLU is in an ozone nonattainment or maintenance area and the client’s pest management needs are met without the use of pesticides. |

### Component 5: Ozone – Confined Animal Activities

**Description:** Emissions of VOCs from confinement-based livestock production do not excessively contribute to negative impacts to human, plant or animal health.

**Analysis within CART:**

Each PLU for the farmstead land use will trigger an intersection with the Ozone nonattainment maps. If the PLU is not within a nonattainment or maintenance area for Ozone, this component is not applicable. If the PLU is within a nonattainment or maintenance area for Ozone, each PLU for the Farmstead land use will default to a not assessed status for this component. The Planner may identify an Ozone resource concern for this component based on site specific conditions. A threshold value will be set at 50.

If there is no confinement-based livestock production at the PLU, this component is not applicable. Otherwise, the existing condition questions will set the existing condition score as seen in Table 135.

Table 135*: Manures, Biosolids, Compost, or Other Soil Amendment and Pathogen Sources*

(Note: Are they stockpiled or stored on the PLU?)

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not applicable | 0 |
| Not assessed | -1 |
| Only solid material storage - contained | 51 |
| Only solid material storage - not contained | 1 |
| Liquid or mixed manure storage - contained | 51 |
| Liquid or mixed manure storage - not contained | 1 |

If an Ozone resource concern is determined to exist for VOC emissions from confinement-based animal production for this component, Conservation Practices and Activities related to reducing VOC emissions from confinement‑based livestock or poultry production are determined based on an alternative scenario analysis of the PLU using the National Air Quality Site Assessment Tool (NAQSAT – [http://naqsat.tamu.edu](http://naqsat.tamu.edu/)) and the USDA/EPA Agricultural Air Quality Conservation Measures Guide for Poultry and Livestock Production and are added to the benchmark condition to determine the state of the planned management system.

## **Objectionable Odors (Odor)**

### Component 1: Odor – Nitrogen Fertilizer

**Description:** Emissions of odorous compounds (VOCs, ammonia and odorous sulfur compounds) can cause nuisance conditions.

**Objective:** Emissions of ammonia from nitrogen fertilizer application do not excessively contribute to negative odor impacts.

**Analysis within CART:**

Each PLU for the crop, pasture, forest, and associated agricultural land land uses will default to a not assessed status for this component. The Planner may identify an Odor resource concern for this component based on site specific conditions. A threshold value will be set at 50.

If nitrogen fertilizers are not applied at the PLU, this component is not applicable. Otherwise, the existing condition questions will set the existing condition score.

Table 136*: NRCS-approved Nutrient Management Plan applied*

Note: Are all nitrogen fertilizers applied at the PLU according to an NRCS-approved nutrient management plan that specifically addresses nitrogen?

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Yes | 51 | All nitrogen fertilizers are applied at the PLU according to an NRCS-approved nutrient management plan. |
| No | 1 | There is no NRCS-approved nutrient management plan. |

If there is no NRCS-approved nutrient management plan that specifically addresses nitrogen for the PLU, apply Nutrient Management (590) to develop such a plan.

### Component 2: Odor – Confined Animal Activities

**Description:** Emissions of volatile organic compounds (VOCs), ammonia, and odorous sulfur compounds from confinement-based animal production do not excessively contribute to negative odor impacts.

**Analysis within CART:**

Each PLU for the crop, pasture, associated agricultural land, and farmstead land uses will default to a not assessed status for this component. The Planner may identify an Odor resource concern for this component based on site specific conditions. A threshold value of 50 will be set.

If there is no confinement-based livestock production at the PLU, this component is not applicable. Otherwise, the existing condition questions will set the existing condition score as seen in Table 137.

Table 137*: Odor from Confined Animal Activities*

Note: Has the client previously applied any practices or techniques to address previous odor observed issues?

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Minimal potential for odor | 51 | Neither the Planner or client has observed any odor issues related to confinement-based livestock production at the PLU or practices and techniques to address the previous odor and observed issues have been applied and documented. |
| Moderate potential for odor | 26 | The client has previously applied some practices or techniques to address the previous odor observed issues, and the applied practices or techniques have been documented. |
| Significant potential for odor | 1 | The client has not previously applied practices or techniques to address the previous odor observed issues. |

Conservation Practices and Activities related to reducing odor emissions from confinement-based livestock production are determined based on an analysis of the PLU using the National Air Quality Site Assessment Tool (NAQSAT – [http://naqsat.tamu.edu](http://naqsat.tamu.edu/)) and the USDA/EPA Agricultural Air Quality Conservation Measures Guide for Poultry and Livestock Production and are added to the existing condition to determine the state of the planned management system.

## **Emissions of Airborne Reactive Nitrogen (Airborne Nitrogen)**

### Component 1: Reactive Nitrogen – Open Burning

**Description:** Emissions of airborne reactive nitrogen (NH3 and NOx) can negatively impact atmospheric chemistry, cause unwanted fertilization via deposition in sensitive ecosystems, and degrade regional visibility.

**Objective:**  Emissions of airborne reactive nitrogen from prescribed fire do not excessively contribute to negative atmospheric and/or ecosystem impacts.

**Analysis within CART:**

Each PLU for all land uses will default to a not assessed status for this component. A threshold value of 50 will be set, and the following existing condition questions will be triggered:

Table 138*: Are you using fire for management?*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 0 |
| Yes - basic smoke management practices are implemented | 51 |
| Yes - basic smoke management practices are NOT implemented | 1 |

If less than 100% of all prescribed fire events at the PLU are conducted according to a prescribed burn plan that includes Basic Smoke Management Practices, apply Prescribed Burning (338) to develop, implement, and follow a prescribed burn plan that includes Basic Smoke Management Practices for all prescribed fire events. Additional practices may be necessary to support Prescribed Burning (338).

### Component 2: Reactive Nitrogen – Nitrogen Fertilizer

**Description:** Emissions of airborne reactive nitrogen from nitrogen fertilizer application do not excessively contribute to negative atmospheric and/or ecosystem impacts.

**Analysis within CART:**

Each PLU for the crop, pasture, forest, and associated agricultural land land uses will default to a not assessed status for this component. The Planner may identify an Airborne Reactive Nitrogen resource concern for this component based on site specific conditions. A threshold value will be set at 50.

If nitrogen fertilizers are not applied at the PLU, this component is not applicable. Otherwise, the existing condition questions will set the existing condition score as seen in **Error! Reference source not found.**.

Table 139*: NRCS-approved Nutrient Management Plan applied*

Note: Are all nitrogen fertilizers applied at the PLU according to an NRCS-approved nutrient management plan that specifically addresses nitrogen?

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Not assessed | -1 |  |
| Not applicable | 0 |  |
| Yes | 51 | All nitrogen fertilizers are applied at the PLU according to an NRCS-approved nutrient management plan. |
| No | 1 | There is no NRCS-approved nutrient management plan. |

If there is no NRCS-approved nutrient management plan that specifically addresses nitrogen for the PLU, apply Nutrient Management (590) to develop such a plan.

### Component 3: Reactive Nitrogen – Confined Animal Activities

**Description:** Emissions of airborne reactive nitrogen from confinement-based animal production do not excessively contribute to negative atmospheric and/or ecosystem impacts.

**Analysis within CART:**

Each PLU for the farmstead land use will default to a not assessed status for this component. The Planner may identify a Reactive Nitrogen concern for this component based on site specific conditions. A threshold value will be set at 50.

If there is no confinement-based livestock production at the PLU, this component is not applicable. Otherwise, the existing condition questions will set the existing condition score.

Table 140: *Manures, Biosolids, Compost, or Other Soil Amendment and Pathogen Sources*

Note: Are they stockpiled or stored on the PLU?

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not applicable | 0 |
| Not assessed | -1 |
| Only solid material storage - contained | 41 |
| Only solid material storage - not contained | 1 |
| Liquid or mixed manure storage - contained | 41 |
| Liquid or mixed manure storage - not contained | 1 |

If an Airborne Reactive Nitrogen resource concern is determined to exist based on this analysis of the PLU, Conservation Practices and Activities related to reducing ammonia emissions from confinement-based livestock or poultry production are determined based on an alternative scenario analysis of the PLU using the National Air Quality Site Assessment Tool (NAQSAT – [http://naqsat.tamu.edu](http://naqsat.tamu.edu/)) and the USDA/EPA Agricultural Air Quality Conservation Measures Guide for Poultry and Livestock Production and are added to the benchmark condition to determine the state of the planned management system.

Table 141*: Feed Management Plan or Strategy to Manage Nitrogen Excretion*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Score | Reference for Assessment Condition |
| Feed management plan | 10 | The client can certify that a feed management plan or strategy is in place to manage nitrogen excretion. |
| No feed management plan | 1 | A feed management plan or strategy to manage nitrogen excretion is not being implemented at the PLU. |

# **Plants**

## **Plant Productivity and Health**

### Component: Plant Productivity and Health

**Description:** Improper fertility, management, or plants not adapted to site negatively impact plant productivity, vigor, quality, or some combination of these.

**Objective:** Improve poor plant productivity and health.

**Analysis within CART:**

The planner will identify this resource concern based on site-specific conditions using technically completed land health and management assessment methods. The threshold and existing condition questions will set the existing score by land use as identified below in Table 142*:*  and Table 143*:* .

**Crop:**

Each PLU for crop will have a threshold value of 50 set and a benchmark condition set of questions.

Table 142*: Crop Plant Productivity*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| High | 51 | 100% of potential Crop yield based on soil, climate, and fertility (10 yr. avg. or county avg.) |
| Good | 40 | >75% of potential Crop yield based on soil, climate, and fertility (10 yr. avg.) |
| Fair | 10 | >50% of potential Crop yield based on soil, climate, and fertility (10 yr. avg.) |
| Low | 5 | >20% of potential Crop yield based on soil, climate, and fertility (10 yr. avg.) |
| Poor | 1 | ≤20% of potential Crop yield based on soil, climate, and fertility (10 yr. avg.) |

Table 143*: Crop Plant Health*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Plants are healthy | 30 |
| Evidence of nutrient deficiency is minimal | 20 |
| Evidence of both nutrient deficiency and disease | 5 |
| Evidence of plant health damage | 1 |

**Pasture:**

Each PLU for Pasture will have a threshold value of 50 set and a benchmark condition set of questions as seen in Table 144*:* and Table 145*:* .

Table 144*: Pasture Plant Cover*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| Not assessed | -1 |  |
| High | 30 | More than 95% live (nondormant) leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Good | 20 | 80-95% live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground. |
| Fair | 10 | 65-80% live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground. |
| Low | 5 | 40-65% is live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Poor | 1 | Less than 40% is live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground. |

Table 145*: Pasture Plant Vigor*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| Not assessed | -1 |  |
| High | 30 | Rapid recovery of desirable forage. All healthy green forage. |
| Good | 20 | Good recovery of desirable forage. Light green and dark green forage present. |
| Fair | 10 | Adequate recovery of desirable forage. Yellowish and dark green areas due to manure and urine patches. |
| Low | 5 | Some recovery. Yellowish green forage, or moderately or slight stunting of desirable forage |
| Poor | 0 | No plant recovery after grazing/harvest. Pale, yellow or brown, or severe stunting of desirable forage |

**Range**

Table 146*: Range Plant Vigor*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None to Slight | 30 | None or slight mortality and/or dying plants or plant parts concentrated in one or more functional or structural groups **or** plant vigor and capability to produce seed or vegetative tillers within one or more functional or structural groups is not reduced or within expected. |
| Slight to Moderate | 20 | Occasional mortality and/or dying plants or plant parts concentrated in one or more functional or structural groups **or** plant vigor and capability to produce seed or vegetative tillers within one or more functional or structural groups is slightly to moderately reduced. |
| Moderate | 10 | Moderate mortality and/or dying plants or plant parts concentrated in one or more functional or structural groups **or** plant vigor and capability to produce seed or vegetative tillers within one or more functional or structural groups is moderately reduced. |
| Moderate to Extreme | 5 | Widespread mortality and/or dying plants or plant parts concentrated in one or more functional or structural groups **or** plant vigor and capability to produce seed or vegetative tillers within one or more functional or structural groups is greatly reduced. |
| Extreme | 0 | Extensive mortality and/or dying plants or plant parts concentrated in one or more functional or structural groups **or** plant vigor and capability to produce seed or vegetative tillers within one or more functional or structural groups is extremely reduced. |

Table 147*: Range Plant Productivity*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None to Slight | 30 | >80% of potential total annual production based on ecological site, accounting for recent weather. |
| Slight to Moderate | 20 | 61 - 80% of potential total annual production based on ecological site conditions, accounting for recent weather |
| Moderate | 10 | >41 - 60% of potential total annual production based on ecological site conditions, accounting for recent weather |
| Moderate to Extreme | 5 | >21 - 40% of potential total annual production based on ecological site conditions, accounting for recent weather |
| Extreme | 1 | <20% of potential total annual production based on ecological site conditions, accounting for recent weather |

**Forest:**

Each PLU for forest will have a threshold value of 50 set and a benchmark condition set of questions as identified in *Table 148*: and Table 149*:* .

Table 148: Assessment of Individual Tree Vigor (Health) Within a Forest Stand or Management Unit

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None to Slight | 40 | Proportion of dead and dying trees or reproductive capability of species relative to the ecological site is <10% |
| Slight to Moderate | 30 | Proportion of dead and dying trees or reproductive capability of species relative to the ecological site is <20% |
| Moderate | 10 | Proportion of dead and dying trees or reproductive capability of species relative to the ecological site is <40% |
| Moderate to Extreme | 5 | Proportion of dead and dying trees or reproductive capability of species relative to the ecological site is <60% |
| Extreme | 1 | Proportion of dead and dying trees or reproductive capability of species relative to the ecological site is reduced >80% |

Table 149*: Assessment of Individual Tree Productivity Within a Forest Stand or Management Unit*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None to Slight | 30 | >80% of mean annual increment (MAI) potential production based on locally relevant FIA data |
| Slight to Moderate | 20 | >60% of MAI potential production based on locally relevant FIA data |
| Moderate | 10 | >40% of MAI potential production based on locally relevant FIA data |
| Moderate to Extreme | 5 | >20% of MAI potential production based on locally relevant FIA data |
| Extreme | 1 | <10% of MAI potential production based on locally relevant FIA data |

**All other land uses:**

Each PLU for other will have a threshold value of 50 set and a benchmark condition set of questions as identified in *Table 150:* .

Table 150: Other Land Uses

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| High | 50 | No significant plant productivity or health related concern exists on this PLU |
| Good | 30 | Some productivity or plant health concerns exist |
| Poor | 0 | Severe lack of health and productivity for plants in the PLU |

## **Plant Structure and Composition**

### Component: Plant Structure and Composition

**Description:** Plant communities have insufficient composition and structure to achieve ecological functions and management objectives. This includes degradation of wetland habitat, targeted ecosystems, or unique plant communities.

**Objective:** Maintain or restore ecological function and stop or reduce degradation to threshold levels or less for the plant communities being evaluated.

**Analysis within CART:**

The planner will identify this resource concern based on site-specific conditions using technically completed land health and management assessment methods. The threshold and existing condition questions will set the existing score by land use as identified below.

**Pasture**

Each PLU for pasture will have a threshold value of 50 set and a benchmark condition set of questions.

Table 151: Pasture Plant Cover

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| High | 40 | More than 95% live (nondormant) leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Good | 30 | 80-95% live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Fair | 10 | 65-80% live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Low | 5 | 40-65% is live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground |
| Poor | 1 | Less than 40% is live leaf canopy. Remaining is either dead standing material, undesirable, or bare ground. |

Table 152: Pasture Plant Diversity

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| High | 30 | 4 or more dominant desirable species representing 3 functional groups |
| Good | 20 | 4 dominant desirable species representing 2 functional groups |
| Fair | 10 | 3 dominant desirable species representing 1 functional group |
| Low | 5 | 2 dominant desirable species representing 1 functional group |
| Poor | 1 | 1 dominant desirable species representing 1 functional group |

**Range**

Each PLU for range will have a threshold value of 50 set and a benchmark condition set of questions.

Table 153: Range Plant Structure and Composition

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None to Slight | 60 | Interpreting Indicators of Rangeland Health (IIRH) biotic integrity attribute rating of none to slight |
| Slight to Moderate | 51 | IIRH biotic integrity attribute rating of slight to moderate |
| Moderate | 20 | IIRH biotic integrity attribute rating of moderate |
| Moderate to Extreme | 10 | IIRH biotic integrity attribute rating of moderate to extreme |
| Extreme | 1 | IIRH biotic integrity attribute rating is extreme to total. |

**Forest**

Each PLU for forest will have a threshold value of 50 set and a benchmark condition set of questions.

Table 154: Forest Community Quality

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None to  Slight | 60 | Is density, composition, and age structure >80% of the expected ecological site or other documentation that demonstrates representative plant community? |
| Slight to Moderate | 51 | Is density, composition, and age structure >60% of the expected ecological site or other documentation that demonstrates representative plant community? |
| Moderate | 20 | Is density, composition, and age structure >40% of the expected ecological site or other documentation that demonstrates representative plant community? |
| Moderate to Extreme | 10 | Is density, composition, and age structure >20% of the expected ecological site or other documentation that demonstrates representative plant community? |
| Extreme | 1 | Is density, composition, and age structure <10% of the expected ecological site or other documentation that demonstrates representative plant community? |

**All other land uses (other than crop)**

Each PLU for other will have a threshold value of 50 set and a benchmark condition set of questions.

Table 155: *Plant Structure and Composition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| Meets | 51 | The plant community supports the intended land use, client objectives, and the ecological processes are functional. |
| Does not meet | 0 | The plant community does not support the intended land use, client objectives, and the ecological processes are not functional. |

## **Plant Pest Pressure**

### Components: Plant Pest Pressure, Chemical Resistance, and Invasive Species

**Description:** Excessive pest damage to plants including that from undesirable plants, diseases, animals, soil borne pathogens, and nematodes. This concern addresses plant, animal, and insect species, including invasive species.

**Objective:** Reduce pest pressure on plants.

**Analysis within CART:**

The planner will identify this resource concern based on site-specific conditions using technically completed land health and management assessment tools. A threshold value of 50 will be set and existing condition questions will be triggered. The existing condition question will set the existing score.

**Crop: NRCS policy may exclude funding options on crops**

Table 156: Plant Pest Pressure Existing Condition

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Invasive plants, weeds, insects, animals, and diseases are not a problem | 60 |
| Invasive plants, weeds, insects, animals, and diseases are managed according to a pest management plan that is designed to manage the development of pest resistance and maintain acceptable crop quantity and quality | 51 |
| |  | | --- | | Pest resistance is not managed and weeds, insects, animals, and diseases limit crop quantity or quality beyond tolerable limits | | 1 |

**Pasture**

Table 157: Plant Pest Pressure Existing Condition

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Invasive plants, weeds, insects, animals, and diseases are not a problem | 60 |
| Invasive plants, weeds, insects, animals, and diseases are managed according to a pest management plan that is designed to manage the development of pest resistance and maintain acceptable forage quantity and quality | 51 |
| |  | | --- | | Pest resistance is not managed and invasive plants, weeds, insects, animals, and diseases limit forage quantity or quality beyond the economic threshold limits | | 1 |

**Range**

Table 158*: Plant Pest Pressure Existing Condition*

|  |  |
| --- | --- |
| Existing Condition | Existing Condition Points |
| Invasive plants, weeds, insects, animals, and diseases are not a problem | 60 |
| Invasive plants, weeds, insects, animals, and diseases are managed according to a pest management plan that addresses pest resistance and maintains acceptable forage quantity and quality. | 51 |
| Pest resistance is not managed and weeds, insects, animals, and diseases limit forage quantity or quality beyond the economic threshold limits | 1 |

**Forest**

Table 159: Plant Pest Pressure Existing Condition

|  |  |
| --- | --- |
| Existing Condition | Existing Condition Points |
| Invasive plants, trees or shrubs, weeds, insects, animals, and diseases are not a problem | 60 |
| Invasive plants, trees or shrubs, weeds, insects, animals, and diseases are managed according to a pest management plan that addresses pest resistance and maintains acceptable quantity and quality of trees | 51 |
| Pest resistance is not managed and invasive plants, trees or shrubs, weeds, insects, animals, and diseases limit quantity or quality of trees beyond the economic threshold limits | 1 |

**Associated Ag. Land & Farmstead**

Table 160: Plant Pest Pressure Existing Condition

|  |  |
| --- | --- |
| Existing Condition | Existing Condition Points |
| Invasive plants, weeds, insects, animals, and diseases are not a problem | 60 |
| Invasive plants, weeds, insects, animals, and diseases are managed according to a pest management plan that addresses pest resistance and maintains desired uses | 51 |
| Pest resistance is not managed and invasive plants, weeds, insects, animals, and diseases limit desired uses | 1 |

## **Wildfire Hazard from Biomass Accumulation**

### Component: Wildfire Hazard from Biomass Accumulation

**Description:** The kinds and amounts of plant biomass create wildfire hazards that pose risks to human safety, structures, plants, animals, and air resources.

**Objective:** Reduce biomass accumulation and the risk of wildfire hazard.

**Analysis within CART:**

The planner will identify this resource concern based on site-specific conditions using technically completed land health and management assessment methods. Each PLU for all land uses will default to a “not assessed” status for wildfire hazard. A threshold value of 50 will be set and existing condition question will be triggered. The existing condition questions will set the existing score as seen in Table 161: and Table 162*:* .

**All land uses except Forest**

Table 161: Assessment of Risk and Hazard of Wildfire (within All Land Uses Except Forest)

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Accumulation of plant biomass is being managed to reduce the potential risk of wildfire | 60 |
| The potential for wildfire hazard from biomass accumulation exists, but site resources are not at a risk or value level to require fire management | 51 |
| The potential for wildfire hazard from biomass accumulation exists | 30 |
| Significant wildfire hazard from biomass accumulation exists | 1 |

**Forest**

Table 162: Assessment of Risk and Hazard of Wildfire within a Forest Stand Land Use

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for assessment condition |
| None to Slight | 60 | Does the local climate and geography support infrequent fire (300 + years), **and** does the forest condition (surface fuels, and vertical and horizontal continuity) support the ignition and propagation of an active crown fire on <10% of the stand or management unit |
| Slight to Moderate | 51 | Does the local climate and geography support moderately infrequent fire (200 - 300 years), **and** does the forest condition (surface fuels, and vertical and horizontal continuity) support the ignition and propagation of an active crown fire on <20% of the stand or management unit |
| Moderate | 20 | Does the local climate and geography support moderately frequent fire (100 - 200 years), **and** does the forest condition (surface fuels, and vertical and horizontal continuity) support the ignition and propagation of an active crown fire on <50% of the stand or management unit |
| Moderate to Extreme | 10 | Does the local climate and geography support infrequent fire (30 -100 years), **and** does the forest condition (surface fuels, and vertical and horizontal continuity) support the ignition and propagation of an active crown fire on <60% of the stand or management unit |
| Extreme | 1 | Does the local climate and geography support frequent fire (<30 years), **and** does the forest condition (surface fuels, and vertical and horizontal continuity) support the ignition and propagation of an active crown fire on >80% of the stand or management unit |

# **Animals**

## **Terrestrial Habitat for Wildlife and Invertebrates**

### Component: Terrestrial Habitat for Wildlife and Invertebrates

**Description:** Improper historic or current management of natural resources results in inadequate quantity and quality of food, water, cover or shelter resources, habitat continuity, or some combination of these for terrestrial wildlife.

**Objective:** Increase quantity and quality of food, water, cover or shelter, habitat continuity, or some combination of these for terrestrial wildlife.

**Analysis within CART:**

Each PLU with an attributed land use will trigger a web service to determine if the PLU is located within a priority terrestrial habitat area (e.g., Working Lands for Wildlife, Threatened/Endangered Species range and/or critical habitat (USFWS ECOS), NatureServe National Species Dataset). A default threshold value of 50 will be set. This value is equivalent to planning criteria of 0.5 on the default 0 to 100 scale used in CART condition points.

The planner may identify this resource concern based on site-specific conditions, client input, or both. A threshold value of 50 will be set and the existing condition question will be triggered. The existing condition question will set the existing condition points.

The planner will first select the Assessment method used to evaluate terrestrial habitat conditions on the PLU.

Table 163: Assessment Method

|  |  |
| --- | --- |
| Answer | Description/comments |
| Working Lands for Wildlife Guide | Go to Terrestrial Habitat Existing Condition |
| State Wildlife Habitat Evaluation Guide (WHEG) or other external State approved assessment | Go to Terrestrial Habitat Existing Condition |
| National Land Use Assessment | Go to Land Use Assessments below |
| Not Assessed | 0 |

NOTE: If a state developed WHEG or other external assessment developed by a state is used to assess habitat, then preliminary assessment land use questions are bypassed (i.e., they don't need to be answered), and the corresponding answer for Terrestrial Habitat Existing Condition should be selected for the external assessment.

Table 164: Terrestrial Habitat Existing Condition

|  |  |  |
| --- | --- | --- |
| Answer | Description/comments | Existing Condition Points |
| Excellent | Habitat quality is defined as *excellent* for the priority species. WHEG range 0.7 to 1.0 | 70 |
| Good | Habitat quality is defined as *good* for the priority species. WHEG range 0.5 to <0.7 | 50 |
| Fair | Habitat quality is defined as *fair* for the priority species. WHEG range 0.3 to <0.5 | 30 |
| Poor | Habitat quality is defined as *poor* for the priority species. WHEG range 0.1 to <0.3 | 10 |
| Absent | Habitat indicated by the web service is not actually present on the PLU. Because habitat is absent, resource concern identified by the web service does not apply. | NA |

**Preliminary Terrestrial Habitat Assessment Questions by Land use**

Land uses refer to those officially defined by NRCS. See NRCS Circular 180-14-1 (10/01/2013).

These preliminary land use assessments can be used if a State WHEG or other state approved wildlife evaluation is not used. For questions related to terminology or applicability to your State pertaining to these preliminary land use assessments, please see your State supplemental guidance.

Table 165: *Crop (Annual and Mixed) + (Perennial) Preliminary Assessment Questions and Answer Choices*

|  |  |  |
| --- | --- | --- |
| Question | Crop (Annual and Mixed) + (Perennial) Preliminary Assessment Questions and Answer Choices | Existing Condition Points |
|  | Is the cropland flooded annually (or as approved by State) to provide habitat for wetland wildlife, target species, or both? |  |
| a. Yes |  |
| b. No |  |
| If Yes to Question #1, continue below | | |
|  | Is surface water present sufficient in duration and depth for target species?  Instructions: Calculate by considering consecutive days of planned surface water present.  Dependable artificial water must guarantee water for the time period indicated. Natural precipitation must have >60% probability of flooding and must flood ≥33% of field, otherwise select No for Question #1. Critical months of flooding are determined by State biologist. |  |
| 1. Yes | 33 |
| 1. No | 0 |
|  | What is the frequency of the flooding or inundation?  Instructions: Must flood a minimum of 33% of the field, otherwise select No for Question #1. |  |
| 1. <2 out of 3 years. | 7 |
| 1. 2 out of 3 years with dependable artificial water or precipitation driven flooding on C or D soils. | 17 |
| 1. Annually with dependable artificial water or precipitation driven flooding on C or D soils. | 33 |
|  | What is the size of the flooded area or inundation? |  |
| 1. ≤33% of the field. | 7 |
| 1. >33 and ≤50% of the field. | 17 |
| 1. >50 and ≤75% of the field. | 27 |
| 1. >75% of the field. | 34 |
| If No to Question #1, continue below | | |
|  | What is the composition of Non-Cropland Habitat Elements (NCHE)?  Instructions: NCHE are habitat elements associated with crop fields, such as field borders, odd areas, windbreaks, wetlands, brushy draws, hedgerows, seeps, riparian areas, vegetated ditches, native vegetated communities, rare and declining habitats, and center pivot corners, occurring within the field **or** directly adjacent to the cropland field, such as CRP, woodlands, and riparian areas. Undesirable species already defined by states. |  |
| Herbaceous cover with >75% undesirable species. | 0 |
| Herbaceous cover > 50% of introduced species with low wildlife value. | 2 |
| Cover composed > 50% of native plants; some structural or functional groups (e.g., warm season tall grasses, warm season mid-grasses, warm season short grasses, cool season mid-grasses, perennial forbs, shrubs, and trees) expected for the site are missing; number of species are fewer than expected for the ecological site or site potential. | 6 |
| Herbaceous cover either native herbaceous vegetation or introduced species with high wildlife value, such as those often included in wildlife seed mixes. | 8 |
| Cover is composed of >75% of all structural or functional groups (e.g., warm season grasses, cool season grasses, perennial forbs, shrubs, and trees) expected for the site; number of species in each group closely matches that expected for the ecological site or site potential. | 11 |
|  | What amount of NCHE is within **or** directly adjacent to the field?  Instructions: Each of these elements must be wildlife friendly as determined by the State biologist. Eligible NCHE must be under the control of the applicant and ≥30 feet wide and ≥0.1 acre.  NCHE must meet state quality standards for wildlife habitat as defined by the NRCS State biologist with guidance from the State wildlife agency. |  |
| 1. ≤1% of the field. | 0 |
| 1. >1% and ≤5% of the field. | 3 |
| 1. >5% and ≤10% of the field. | 9 |
| 1. >10% of the field. | 11 |
|  | What is the average width of NCHE within **or** directly adjacent to the field? |  |
| <30 feet wide. | 0 |
| ≥30 to and ≤75 feet wide. | 6 |
| >75 to and ≤120 feet wide. | 9 |
| >120 feet wide. | 11 |
|  | What is the maximum distance for 50% of the field (i.e., average distance) from the NCHE?  The distance can be estimated to either NCHE within the field **or** to NCHE in an adjacent field that is controlled by the applicant. |  |
| ≤330 feet. | 11 |
| >330 feet and ≤660 feet. | 9 |
| >660 feet and ≤1320 feet. | 6 |
| >1320 feet and ≤2640 feet. | 2 |
| >2640 feet. | 0 |
|  | What is the crop rotation?  Instructions: Fallow = cropland rested during the growing season. States may modify with NTSC concurrence. |  |
| Continuous row or truck crops with little value for wildlife (e.g., corn, sorghum, soybeans, etc.). | 0 |
| Continuous small grain. | 2 |
| Row crop - small grain (e.g., corn-soybeans-wheat) | 3 |
| Rotation includes small grains **and** forage crops (i.e., alfalfa, clover, etc.) | 6 |
| Small grain - summer fallow (does not include fallow that involves cultivation practices that reduce cover, e.g., summer plowing) | 8 |
| Contour strip cropping (include small grains and hay **or** row crops, small grains, and hay) | 11 |
|  | Is a winter food source provided? |  |
| Fall tilled; no winter food | 0 |
| No fall tillage | 1 |
| ¼ to ≤1 acre of food plot or unharvested grain per 40 acres of cropland (minimum 30 feet wide and next to noncrop cover). | 3 |
| Winter food source is not a limiting factor for targeted species | 5 |
| >1 acre of food plot or unharvested grain per 40 acres of cropland (minimum 30 feet wide and next to noncrop cover). | 6 |
| Winter cover crop or hay/forage crop >50% and <75% of field. Crop height is adequate height for the target species. | 9 |
| Winter cover crop or hay/forage crop >75% of field. Crop height is adequate height for the target species. | 11 |
|  | What is the residue or stubble management for the over-winter condition?  Instructions: Select the condition most typical for your rotation.  Wheat-fallow rotations would select from a, b, f, or g. Crops that don't leave waste grain (cotton, peanuts, etc.) would select from a, b, c. Residue or stubble management must apply to at least 50% of the field. |  |
| Fall tillage with <30% residue. | 0 |
| Fall tillage with ≥30% residue. | 1 |
| Undisturbed soybean residue or corn silage. | 2 |
| Stalks chopped or shredded, no soil disturbance or grasses or legumes in rotation. | 4 |
| Stalks gleaned by livestock, no mechanical disturbance. | 6 |
| Grain stubble or hay/forage crop left standing overwinter <8 inches. | 8 |
| Grain stubble or hay/forage crop left standing overwinter >8 inches. | 12 |
|  | If hay is part of crop rotation, what is the species composition of wildlife-unfriendly species?  Instructions: Wildlife friendly and unfriendly species are defined by the States. |  |
| Hayland composed of wildlife-unfriendly species. | 1 |
| Hayland composed of one or two wildlife-friendly species. | 3 |
| Hayland composed of three to five wildlife-friendly species. | 7 |
| Hayland composed of more than five wildlife-friendly species. | 11 |
|  | If hay is part of crop rotation, what is the harvest schedule?  Instructions: Nesting season is defined by states. Haying methods and patterns that consider wildlife needs include, but are not limited to: minimum mowing height, reduced cutting speed, flushing bars, mowing toward the outside of the field, wildlife exclusion areas, mow only during daylight. |  |
| Entire field cut during the nesting season. | 0 |
| Portions of the field cut before the nesting season with some areas excluded for wildlife or haying methods and patterns considers wildlife needs. | 2 |
| >50% of hayland unharvested until end of nesting season (as defined by State) OR hay is harvested after 80% of the nesting season is concluded and haying methods and patterns used considers wildlife needs. | 6 |
| Hay cut not more than once per year and is cut before or after the nesting season. Cuts before nesting season must be far enough in advance to allow for sufficient regrowth for target species. Consult with State biologist for adequate time windows for target species. | 8 |
| Hay cut before or after the nesting season. Haying methods and patterns considers wildlife needs. Cuts before nesting season must be far enough in advance to allow for sufficient regrowth for target species. Consult with State biologist for adequate time windows for target species. | 11 |

Table 166: *Pasture Preliminary Assessment Questions and Answer Choices*

|  |  |  |
| --- | --- | --- |
| Question | Pasture Preliminary Assessment Questions and Answer Choices | Existing Condition Points |
|  | What is the species composition of the pasture?  Instructions: Pasture **and** Non-Pasture Habitat Elements (NPHE)- Non-pastureland cover such as field borders, odd areas, windbreaks, wetlands, brushy draws, hedgerows, seeps, riparian areas, and center pivot corners that occur within the field. Or, NPHE that occurs directly adjacent to the pasture, such as CRP, woodlands, and riparian areas. Wildlife-friendly and unfriendly species are defined by the States. |  |
| 1. Composed of wildlife-unfriendly species. | 0 |
| 1. Composed of wildlife-unfriendly grass with >33% legume cover. | 6 |
| 1. Composed of a mixture of one to three wildlife-friendly grasses and a legume. | 14 |
| 1. Composed of >3 wildlife-friendly grasses and legumes or forbs. | 20 |
|  | What is the grazing management?  Instructions: If managing for species of concern, consult with the State biologist. Exceptions can be made to answer descriptions at discretion of State biologist.  Light grazing (16-35% use): Key forage plants lightly to moderately used. Practically no use of low-value forage plants.  Moderate grazing (36-65% use): Key forage plants are used ≤ 50% for the season of grazing and the ecological site pasture state involved. Some use of low-value forage plants. All fully accessible areas are grazed; some trampling damage may be evident.  Heavy grazing (66-80% use): Key forage plants closely cropped. Low-value forage plants generally being grazed. Trampling damage is widespread in accessible areas. |  |
| All forage is closely grazed, livestock trails are numerous and trampling damage is widespread. | 0 |
| Light to moderate grazing over the entire field. Little evidence of trails. | 6 |
| Livestock are rotated through less than four paddocks based on minimum forage height and condition for wildlife (defined by State biologist). | 14 |
| Livestock are rotated through four or more paddocks based on minimum forage height and condition for wildlife (defined by State biologist); one paddock is not grazed (unless part of a Prescribed Grazing plan) or hayed until after nesting season. | 20 |
|  | What is the species composition of NPHE within or directly adjacent to the field (e.g., not mowed, grazed, burned, spayed, etc.) during nesting season?  Instructions: NPHE areas must be ≥30 feet wide and ≥0.1 acre in area.  NPHE includes paddocks not grazed during the nesting season. NPHE must be under the control of the applicant and must meet State quality standards for wildlife habitat as defined by the NRCS State biologist with guidance from the State wildlife agency. |  |
| 1. Herbaceous or woody cover with >75% undesirable species. | 0 |
| 1. Herbaceous or woody cover primarily of introduced species. | 3 |
| 1. Herbaceous or woody cover either native herbaceous vegetation or introduced species with high wildlife value, such as those often included in wildlife seed mixes. | 8 |
| 1. Cover composed primarily of native plants; some structural or functional groups (e.g., warm season tall grasses, warm season mid-grasses, warm season short grasses, cool season mid-grasses, perennial forbs, shrubs, and trees) expected for the site are missing; number of species are fewer than expected for the ecological site. | 11 |
| 1. Cover is composed of all structural or functional groups (e.g., warm season tall grasses, warm season mid-grasses, warm season short grasses, cool season mid-grasses, perennial forbs, shrubs, and trees) expected for the site; number of species in each group closely matches that expected for the ecological site. | 15 |
|  | What is the amount of NPHE within or directly adjacent to the field?  Instructions: NPHE areas must be ≥30 feet wide and ≥0.1 acre in area. |  |
| 1. ≤1% of the field. | 0 |
| 1. >1 and ≤5% of the field. | 5 |
| 1. >5 and ≤10% of the field. | 12 |
| 1. >10% of the field. | 15 |
|  | What is the width of NPHE within **or** directly adjacent to the field?  Instructions: Minimum patch size ≥0.1 acre. |  |
| 1. <30 feet wide. | 0 |
| 1. ≥30 to and ≤75 feet wide. | 5 |
| 1. >75 to and ≤120 feet wide. | 12 |
| 1. >120 feet wide. | 15 |
|  | What is the maximum distance for 50% of the field (i.e., average distance) from the NPHE?  Instructions: The distance can be estimated to either NPHE within the field **or** to NPHE in a directly adjacent field that is controlled by the applicant. |  |
| 1. ≤330 feet. | 15 |
| 1. >330 feet and ≤660 feet. | 12 |
| 1. >660 feet and ≤1320 feet. | 8 |
| 1. >1320 feet and ≤2640 feet. | 3 |
| 1. >2640 feet. | 0 |

Table 167: Range Preliminary Assessment Questions and Answer Choices

|  |  |  |
| --- | --- | --- |
| Question | Range Preliminary Assessment Questions and Answer Choices | Existing Condition Points |
|  | What is the species composition of the rangeland??  Instructions: Plant group types (e.g., structural and functional groups) are suites or groups of plant species that are grouped together because they share similarities, such as shoot or root structure, photosynthetic pathways, nitrogen-fixing ability, life cycle, etc. Examples include cool-season tall grasses, cool-season midgrasses, warm-season tall grasses, warm season midgrasses, warm season short grasses, annual grasses, perennial forbs, biennial forbs, annual forbs, shrubs, half-shrubs, deciduous trees, evergreen trees, cacti, yucca/yucca-like plants, succulent forbs, and leafy forbs (National Range and Pasture Handbook, p.3.1-13). Invasive or noxious species may not be used to represent a plant group type or structural type. |  |
| 1. Number of plant group types (structural or functional groups) <25% of ecological potential, relative dominance of structural or functional groups has been dramatically altered, number of species within structural or functional groups dramatically reduced, or some combination of these. | 2 |
| 1. Number of plant group types (structural or functional groups) represents 25-50% of potential, one dominant group and/or one or more subdominant group replaced by structural or functional groups not expected for the site, number of species within structural or functional groups has been significantly reduced, or some combination of these. | 5 |
| 1. Number of plant group types (structural or functional groups) represents 51 to 75%, one or more subdominant structural or functional groups replaced by structural or functional groups not expected for the site, the number of species within the structural or functional groups has been moderately reduced, or some combination of these. | 15 |
| 1. Number of plant group types (structural or functional groups) (e.g., warm season tall grasses, warm season midgrasses, warm season short grasses, cool season midgrasses, perennial forbs, and shrubs) represents >75% of site potential and number of species in each group closely match that expected for the ecological site. | 20 |
|  | What is the grazing management?  Instructions: If managing for species of concern, consult with the State biologist. Exceptions can be made to answer descriptions at discretion of State biologist.  Light grazing (16-35% use): Key forage plants lightly to moderately used. Practically no use of low-value forage plants. Most of accessible range shows grazing.  Moderate grazing (36-65% use): Key forage plants are used ≤ 50% for the season of grazing and range sites involved. Some use of low-value forage plants. All fully accessible areas are grazed; some trampling damage may be evident.  Heavy grazing (66-80% use): Key forage plants closely cropped. Low-value forage plants generally being grazed. Trampling damage is widespread in accessible areas. |  |
| The unit is heavily to severely grazed.  No over winter cover. | 0 |
| The unit is moderately grazed without ungrazed or lightly grazed patches.  Standing grass or forb cover is only seasonally available. | 5 |
| The unit is moderately grazed with some ungrazed or lightly grazed patches.  Standing grass or forb cover is present during the winter and through the reproductive season. | 12 |
| The unit is ungrazed or lightly grazed with numerous ungrazed areas creating a patchy appearance. Standing grass or forb cover is present during the winter and through the reproductive season (for example, 5-8 inch height of grass or forb cover is maintained on mid to tall grasses through winter and reproductive seasons). | 20 |
|  | What percentage of fence does not meet the State’s wildlife friendly criteria (for example ref. Montana Fish, Wildlife & Parks, A Landowner's Guide to Wildlife Friendly Fences: How to Build Fence with Wildlife in Mind, 2008; Wyoming Game & Fish Department, Fencing Guidelines for Wildlife, 2004)? |  |
| 1. ≤25%. | 0 |
| 1. >25 and ≤50%. | 5 |
| 1. >50% and ≤75%. | 7 |
| 1. >75%. | 9 |
|  | What percentage of artificial water sources provide for safe access and escape for wildlife, provide year-round water, and are free of hazards for aerial drinking wildlife (e.g., bats, swallows, etc., ref. BCI Wildlife Water Handbook, 2007)?  Instructions: Use only if applicable for the area. |  |
| 1. Artificial watering sources are not applicable for the area. | 8 |
| 1. ≤25%. | 0 |
| 1. >25 and ≤50%. | 4 |
| 1. >50% and ≤75%. | 8 |
| 1. >75%. | 11 |
|  | What is the degree of woody species management? |  |
| 1. Woody species are not managed for wildlife. There is an evident browse line or brush is totally eliminated with brush control measures. | 0 |
| 1. Woody species are managed so that populations are consistent with the desired ecological state or beneficial to targeted wildlife species. There is absence of a browse line, although hedging on key browse plants may be observed. Brush is only partially eliminated with brush control measures. | 13 |
| 1. Woody species are managed so that populations are consistent with the desired ecological state/ESDs or targeted wildlife species. There is absence of a browse line or hedging on key browse plants. If brush is controlled, it is done only partially in patterns that fit the landscape with wildlife considerations. | 20 |
|  | What is the proportion of invasive or noxious plants (as determined by state lists)? |  |
| 1. ≤5% of the site has invasive or noxious plants that appear controlled. | 20 |
| 1. >5 and ≤20% of the site has invasive or noxious plants that appear controlled. | 13 |
| 1. >20% of the site has invasive or noxious plants. | 0 |

Table 168: *Forest Preliminary Assessment Questions and Answer Choices*

|  |  |  |
| --- | --- | --- |
| Question | Forest Preliminary Assessment Questions and Answer Choices | Existing Condition Points |
|  | Do you have a forest or woodland management plan that contains prescriptions for a target species?  Instructions: History of past or current forest or woodland management. |  |
| 1. Yes | 15 |
| 1. No | 0 |
|  | Based on land resource inventory data (soil survey, ESD, historical research, etc.), are trees within the forest stand native and likely to have historically existed on site? |  |
| Yes | 15 |
| No | 0 |
|  | Does your forest stand or woodlands type, extent, and management provide sufficient habitat for target wildlife or pollinators?  Instructions: Guidance on sufficient habitat for target wildlife or pollinators set by State biologist. |  |
| Yes | 15 |
| No | 0 |
|  | Are invasive plants, insects, or diseases (as determined by State lists) managed and not contributing to the degradation of the forest or woodland habitat such that it negatively impacts target wildlife or pollinator species? |  |
| Yes | 15 |
| No | 0 |
|  | What is the percent cover of native shrubs, vines and herbaceous plants combined, within the understory? |  |
| >90% | 10 |
| >75% and ≤90% | 8 |
| >50% and ≤75% | 6 |
| >25% and ≤50% | 4 |
| >10% and ≤25% | 2 |
| ≤10% | 0 |
|  | What is the extent and management of invasive plant species? |  |
| No invasive plants identified, no damage/infestation. | 15 |
| ≤15%, active management. | 11 |
| ≤15%, no active management. | 8 |
| >15%, active management. | 5 |
| >15%, no active management. | 0 |
|  | Are livestock present in the forested area? |  |
| 1. No | 15 |
| 1. Yes, livestock are being utilized to maintain or enhance wildlife habitat according to a Prescribed Grazing Plan. | 15 |
| 1. Yes, livestock are used to maintain wildlife habitat. | 6 |
| 1. Yes, grazing management plan absent and grazing is not done to manage for wildlife. | -15 |

**Associated**

Unless a State WHEG has been developed, Associated Ag Lands is not being assessed by preliminary assessment questions for wildlife potential at this time due to the diversity of this land use. This land use should still be subject to filtering or prepopulating done by geoprocessing operations of spatial datasets.

**Farmstead**

Unless a State WHEG has been developed, Farmstead is not being assessed by preliminary assessment questions for wildlife potential at this time due to the diversity of this land use. This land use should still be subject to filtering or prepopulating done by geoprocessing operations of spatial datasets.

## **Aquatic Habitat for Fish and Other Organisms**

### Component: Aquatic Habitat for Fish and Other Organisms

**Description:** Improper management of natural resources results in inadequate quantity and quality of food, water, cover or shelter resources, habitat continuity, or some combination of these for aquatic wildlife.

**Objective:** Increase quantity and quality of food, water, cover or shelter resources, habitat continuity, or some combination of these for aquatic wildlife.

**Analysis within CART:**

A web service will be used to determine if a water body is located within the PLU, and to determine if the PLU is located within or contains a priority aquatic habitat area (eg., Threatened/Endangered Species (USFWS ECOS, NOAA NMFS Endangered Species Act Critical Habitat), Essential Fish Habitat, Section 303(d) of the Clean Water Act for temperature and sediment, NatureServe National Species Dataset), and a default threshold value of 50 will be set.

The planner may identify this resource concern based on site-specific conditions, client input, or both. Preliminary assessment questions below will be answered based on the applicable waterbodies within the PLU. NOTE: If SVAP2 (or other state approved assessment protocol) has already been run on the PLU and the evaluation scores the property as Excellent, Good, Fair, or Poor, points shall be assigned per Table 169 and Preliminary Questions listed below may be bypassed (i.e., they do not need to be answered).

Table 169*: Aquatic Habitat Existing Condition*

|  |  |  |
| --- | --- | --- |
| Answer | Existing Condition Points | Reference for Assessment Condition |
| Excellent | 70 | Habitat quality is defined as *excellent* for the priority species. (SVAP 9-10, WHEG range 0.7 to 1.0, or other state approved assessment) |
| Good | 51 | Habitat quality is defined as *good* for the priority species. (SVAP 7-8.9, WHEG range 0.5 to <0.7, or other state approved assessment) |
| Fair | 30 | Habitat quality is defined as *fair* for the priority species. (SVAP 5-6.9, WHEG range 0.3 to <0.5, or other state approved assessment) |
| Poor | 10 | Habitat quality is defined as *poor* for the priority species. (SVAP <5, WHEG range 0.1 to <0.3, or other state approved assessment) |
| Absent | NA | Habitat indicated by the web service is not actually present on the PLU. Because habitat is absent, resource concern identified by the web service does not apply. No further evaluation is needed |

Table 170*: Preliminary Aquatic Habitat Assessment Questions and Answer Choices*

|  |  |  |
| --- | --- | --- |
| Question | Aquatic Habitat Preliminary Assessment Questions and Answer Choices | Existing Condition Points |
|  | What water features are present on the PLU?  Instructions: Select all that apply. (Might be prepopulated by geoprocessing USGS NHD/NHDPlus HR geospatial dataset. Should also have a text entry box or link to/instructions to complete Conservation Assistance Notes to indicate and describe multiple water features of the same type on the PLU as well as specific on individual features of the same type so they can be distinguished in the future.) |  |
| Lake/Pond | *See Lake/Pond questions* |
| River | *See River questions* |
| Stream | *See Stream questions* |
| Wetland | *See Wetland questions* |
| ***Lake/Pond*** | | |
|  | What is the extent of the natural vegetation surrounding the lake and pond?  Instructions: For this element, “natural vegetation” means plant communities with species native to the site or introduced species that have become “naturalized” and function similarly to native species. Plant species should consist of multiple structural layers (grasses and forbs, shrubs, and trees) of different age-classes. |  |
| >75% of the perimeter of the lake/pond that is suitable for plant growth consists of at least a 33-foot-wide zone of native or natural vegetation. | 40 |
| >50% but ≤75% of the perimeter of the lake/pond that is suitable for plant growth consists of at least a 33-foot-wide zone of native or natural vegetation. | 26 |
| >10% but ≤50% of the perimeter of the lake/pond that is suitable for plant growth consists of at least a 33-foot-wide zone of native or natural vegetation. | 13 |
| ≤10% of the perimeter of the lake/pond suitable for plant growth consists of at least a 33-foot-wide zone of native or natural vegetation. | 0 |
|  | What is the quality of the riparian zone?  Instructions: This element rates the functional value of the riparian zone to protect the lake or pond from shoreline erosion and provide habitat components for fish and wildlife. Plant species should consist of multiple structural layers (e.g., grasses, forbs, shrubs, and trees). For the highest ratings, there should be no evidence of concentrated flows through the riparian zone per SVAP. |  |
| Natural and diverse riparian vegetation with composition, density, and age structure appropriate for the site, no invasive species present, and no evidence of concentrated flows. | 40 |
| Natural and diverse riparian vegetation with composition, density, and age structure appropriate for the site, invasive species present but controlled, no concentrated flows. | 26 |
| Natural vegetation present but compromised by poor management; evidence of concentrated flows; invasive species common (>40%). | 13 |
| Little or no natural vegetation in the riparian zone, >50% invasive species, and evidence of concentrated flows into the lake/pond. | 0 |
| ***River*** | | |
|  | Is water available year-round or in quality and extent to support habitat requirements for target species?  Instructions: Guidance on habitat requirements for target species set by State biologist. |  |
| 1. Yes | 17 |
| 1. Otherwise | 0 |
| ***If b) Otherwise is selected for question number 1, the following additional question should be answered.*** | | |
|  | Is the lack of water caused by offsite conditions?  Instructions: Lack of water may be due to conditions outside of control of the producer and landowner. This question is a way to note that situation. |  |
| Yes | 0 |
| No | -50 |
|  | Are there physical structures, water withdrawals, water quality, or some combination of these that restricts or prohibits movement of aquatic species?  Instructions: This will be prepopulated by a spatial dataset when available, but datasets are often unreliable at the PLU level and passage conditions must be verified on site. Coordinate with State Technical Specialist for passage requirements of local target species |  |
| 1. Yes, verified in field. | -30 |
| 1. No, verified in field. | 17 |
|  | Is natural and diverse riparian vegetation that extends at least one bankfull width onto the floodplain, with vegetation gaps not exceeding 10% of the property length present?  Instructions: Riparian vegetation must be of appropriate composition, density, and age structure appropriate to the site. |  |
| 1. Yes | 17 |
| 1. No | 0 |
| ***Stream*** | | |
|  | Are there eight or more aquatic habitat features present on the PLU stream reach?  Instructions: Aquatic habitat features include: 1) Logs &/or large wood- 2/reach; 2) Small wood accumulations- 1/reach; 3)Deep pools- 2/reach; 4) Secondary pools- 4/reach; 5) Overhanging veg- 3/reach; 6) Large boulders-3/reach if no wood, 2/reach if wood present; 7) Small boulder clusters- 3/reach; 8) Cobble riffles- 2/reach; 9) Undercut banks- 3/reach; 10) Thick root mats- 3/reach; 11) Macrophyte beds- 1/reach; 12) Off-channel habitats- 2/reach; 13) Other locally important habitat feature. From SVAP manual. |  |
| Yes | 14 |
| No | 0 |
|  | Is water available year-round or in quality and extent to support habitat requirements for target species?  Instructions: Guidance on habitat requirements for target species set by State biologist. |  |
| 1. Yes | 14 |
| 1. No | 0 |
| ***If b) No is selected for question number 2, the following additional question should be answered.*** | | |
|  | Is the lack of water caused by off-site conditions?  Instructions: Lack of water may be due to conditions outside of control of the producer and landowner. This question is a way to note that situation. |  |
| 1. Yes | 0 |
| 1. No | -50 |
|  | Are there physical structures, water withdrawals, water quality, or some combination of these that restricts or prohibits movement of aquatic species?  Instructions: (This should be prepopulated by a spatial dataset (Fish Passage Barriers (known and potential)). If detected should prompt for a requirement of verification on-site for habitat presence.) |  |
| 1. Yes, verified in field. | -30 |
| 1. No, verified in field. | 14 |
|  | Is natural and diverse riparian vegetation that extends at least one bankfull width onto the floodplain, with vegetation gaps not exceeding 10% of the property length present?  Instructions: Riparian vegetation must be of appropriate composition, density, and age structure appropriate to the site. |  |
| 1. Yes | 14 |
| 1. No | 0 |
| ***Wetland*** | | |
| 1) | What is the extent of the riparian buffer around the wetland?  Instructions: This element rates the extent of buffer around the perimeter of a wetland. Estimate the width of the vegetation zone from the edge of the wetland out to the edge of the cropland, range or forest |  |
| 1. >75% of the perimeter of the wetland is buffered by a >33-ft-wide strip of perennial vegetative cover. | 40 |
| 1. ≥50% but ≤75% of the perimeter of wetland is buffered by a >33-ft-wide strip of perennial vegetative cover. | 30 |
| 1. ≥10% but <50% of the perimeter of the wetland is buffered by a >33-ft-wide strip of perennial vegetative cover. | 20 |
| 1. <10% of the perimeter of the wetland is buffered by a ≥33-ft-wide strip of perennial vegetative cover. | 10 |
|  | What is the quality of the riparian buffer around the wetland?  Instructions: For this element, “natural vegetation” means plant communities with species native to the site or introduced species that have become “naturalized” and function similarly to native species. Plant species should consist of multiple structural layers (e.g., grasses and forbs, shrubs, and trees). |  |
| Natural and diverse riparian vegetation with composition, density, and age structure appropriate for the site. Little or no invasive species present. | 40 |
| Natural and diverse riparian vegetation with composition, density, and age structure appropriate for the site, invasive species (<30% of plant cover), and landowner is taking measures to control their spread. | 28 |
| Natural vegetation compromised by poor management; invasive species (>30% but <50% of plant cover). | 12 |
| Little or no natural vegetation. Invasive species widespread (>50 % of plant cover). | 0 |

## **Elevated Water Temperature (Water Temperature)**

### Component: Water Temperature Effects on Aquatic Habitat

**Description:** Surface water temperatures exceed State or Federal standards in downstream receiving waters.

**Objective:** To lower stream water temperature or prevent additional water temperature increases in downstream receiving waters.

**Analysis within CART:**

Each PLU with an attributed land use will trigger a web service to determine if the PLU is located within or contains a section 303(d) of the Clean Water Act for temperature or is within an elevated water temperature priority area. If the PLU meets one of the aforementioned conditions, a threshold value of 50 will be set. A question about existing condition will be triggered and points will be assigned based on the answers seen in Table 171 **Error! Reference source not found.**.

Table 171*: Section 303(d) listing of Clean Water Act for Temperature is caused by onsite conditions*

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Yes | 1 |
| No | 30 |

Preliminary assessment questions will be asked as part of the River and Stream Preliminary Aquatic Habitat Assessments to further assess PLU existing condition. The planner may also identify this resource concern based on site-specific conditions. Conservation practices and activities are then added to the existing condition to determine the state of the management system.

Table 172*: Preliminary Elevated Water Temperature Assessment Questions*

|  |  |  |
| --- | --- | --- |
| Question | Answer | Existing Condition Points |
| Is natural and diverse riparian vegetation that extends at least one bankfull width onto the floodplain, with vegetation gaps not exceeding 10% of the property length present?  Instructions: Riparian vegetation must be of appropriate composition, density, and age structure appropriate to the site. Based on planning criteria for elevated water temperature that is conditional on SVAP elements 4 & 5 riparian area quantity and quality. | 1. Yes | 25 |
| 1. No | 0 |
| Is ≥50% of water surface shaded within the length of the stream in landowner’s property??  Instructions: Applicable to both cold-water and warm-water streams. Based on planning criteria for elevated water temperature that is conditional on SVAP element 6 canopy cover. This element is particularly sensitive to the type of stream (stream class) and fish community that is being assessed and calibration of scoring may be necessary. Planner override may be used when the specific onsite conditions dictate that a "No" answer relates to beneficial effect. | 1. Yes | 25 |
| 1. No | 0 |

## **Feed and Forage Imbalance**

### Component: Feed and Forage Imbalance

**Description:** Feed and forage quality or quantity is inadequate for nutritional needs and production goals of the kinds and classes of livestock.

**Objective:** Livestock forage, roughage, and supplemental nutritional requirements addressed.

**Analysis within CART:**

The planner will identify this resource concern based on site-specific conditions using technically completed land health and management assessment methods. A threshold value of 50 will be set and existing condition questions will be triggered. The existing condition question will set the existing score as seen in *Table 173* and *Table 174.*

Table 173: Livestock Feed and Forage Imbalance Existing Condition (All Land Uses Except Farmstead)

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 0 |
| Adequate forage supply and producer desired goals are being met | 51 |
| Inadequate forage supply and producer desired production goals are NOT being met | 1 |

Table 174: Livestock Feed and Forage Imbalance Existing Condition (Farmstead)

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 0 |
| Livestock feed, roughage, and supplemental nutritional requirements are met | 51 |
| Livestock feed, roughage, and supplemental nutritional requirements are NOT met | 1 |

## **Inadequate Livestock Shelter**

### Component: Inadequate Livestock Shelter

**Description:** Livestock lack adequate shelter from climatic conditions to maintain health or production goals.

**Objective:** Artificial or natural shelters meet animal health needs and client objectives.

**Analysis within CART:**

The planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and existing condition questions will be triggered. The existing condition question will set the existing score as seen in *Table 175*.

Table 175: Inadequate Livestock Shelter Existing Condition

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 0 |
| Livestock are adapted to local climatic conditions and do not require additional shelter | 60 |
| Livestock have adequate shelter (artificial or natural) | 51 |
| Production goals are not being met due to livestock stresses caused by local climatic conditions or lack of shelter | 20 |
| Production goals not being met due to livestock death or stresses caused by local climatic conditions or lack of shelter | 1 |

## **Inadequate Livestock Water Quantity, Quality, and Distribution**

### Component: Inadequate Livestock Water Quantity, Quality, and Distribution

**Description:** Drinking water quantity, quality, distribution, or some combination of these are insufficient to maintain health or production goals for the kinds and classes of livestock.

**Objective:** Water of acceptable quality and quantity adequately distributed to meet animal needs throughout the PLU. \***Lack** of adequate water in **any grazed portion** of the PLU creates this resource concern.

**Analysis within CART:**

The planner will identify this resource concern based on site-specific conditions. A threshold value of 50 will be set and existing condition questions will be triggered. The existing condition questions will set the existing score as seen in *Table 176*.

Table 176: Inadequate Livestock Water Existing Condition (Quality and Quantity)

|  |  |
| --- | --- |
| Answer | Existing Condition Points |
| Not assessed | -1 |
| Not applicable | 0 |
| Three livestock water factors met | 51 |
| Two livestock water factors met | 40 |
| One livestock water factor met | 20 |
| No livestock water factors met | 1 |

# **Energy**

## **Energy Efficiency of Equipment and Facilities**

### Component: Energy Efficiency of Equipment and Facilities

**Description:** Existing stationary equipment or facilities are using energy inefficiently.

**Objective:** Improve energy efficiency of stationary equipment and facilities to reduce energy use.

**Analysis within CART:**

Each PLU for all land uses will default to a “not assessed” status for energy efficiency - equipment and facilities. The planner may identify this resource concern based on site-specific conditions. The planner will have the option to identify what type of buildings are on the PLU.

Table 177*: What type of buildings are on the PLU?*

|  |
| --- |
| Answer |
| Dairy |
| Swine |
| Poultry |
| Maple |
| Greenhouse |

A threshold value of 50 will be set and existing condition question will be triggered as seen in Table 178.

Refer to appendices for an overview of CART relative to non-CART tools and methods typically used to assess and address energy resource concerns.

Table 178*: Resource Concern Risk Categories for Inefficient Energy Use - Equipment and Facilities*

Note: What is the risk of Inefficient Energy Use for Equipment and Facilities as determined by the EUI-CART Converter tool?

| Answer | Existing Condition Points | Reference for Assessment Condition |
| --- | --- | --- |
| Not assessed | -1 |  |
| Not applicable | 0 | Does not apply; no appreciable amount of supplemental energy is used for agricultural operations under typical conditions. |
| Low | 51 | Energy use is appropriately managed and the potential for a Resource Concern is negligible. The agricultural operations present a minimal risk of energy resource concerns. |
| Moderate | 40 | Energy use is controlled well.  A Resource Concern exists to a moderate degree. |
| High | 25 | Energy use is marginally controlled.  A Resource Concern exists to a high degree. |
| Severe | 15 | Energy use is poorly controlled.  A Resource Concern exists to a severe degree and merits priority. |
| Extreme | 1 | Energy use is effectively uncontrolled.  A Resource Concern exists to an extreme degree and merits elevated priority. |

*Common Energy Acronyms*

* DHW: Domestic Hot Water (generically refers to heated water – regardless of facility type – not meant for process or space heat. “Domestic” does not mean “residential,” so this doesn’t violate program rules)
* HPS: High-Pressure Sodium
* HVLS: High-Volume Low-Speed
* RHR: Refrigerant Heat Recovery
* VER: Ventilation Efficiency Ratio (typically rendered as CFM/W or CFM/HP)
* VSD: Variable Speed Drive, also Adjustable Speed Drive (ASD) & Variable Frequency Drive (VFD)

## **Energy Efficiency of Farming/Ranching Practices and Field Operations**

### Energy Efficiency of Farming/Ranching Practices and Field Operations

**Description:** Existing mobile on-farm, ranching, forestry, or field operations are using energy inefficiently.

**Objective:** Improve energy efficiency of mobile farming, ranching, forestry practices and field operations to reduce energy use.

Each PLU for all land uses will default to a “not assessed” status for energy efficiency - farming/ranching practices and field operations. The planner may identify this resource concern based on site-specific conditions. A threshold value of 80 will be set and existing condition question will be triggered. CART will present this question about existing conditions to a user as seen in Table 179.

Refer to appendices for an overview of CART relative to non-CART tools and methods typically used to assess and address energy resource concerns.

Table 179*: Energy Use Intensity for Energy Resource Concern Risk Categories for Inefficiency – Farming/Ranching Practices and Field Operations*

Note: What is the risk of Inefficient Energy Use for Farming/Ranching Practices and Field Operations as determined by the EUI-CART Converter tool?

| Answer | Existing Condition Points | Reference for Assessment Condition |
| --- | --- | --- |
| Not assessed | -1 |  |
| Not applicable | 0 | Does not apply; no appreciable amount of supplemental energy is used for agricultural operations under typical conditions. |
| Low | 51 | Energy use is appropriately managed and the potential for a Resource Concern is negligible. The agricultural operations present a minimal risk of energy resource concerns. |
| Moderate | 40 | Energy use is controlled well.  A Resource Concern exists to a moderate degree. |
| High | 25 | Energy use is marginally controlled.  A Resource Concern exists to a high degree. |
| Severe | 15 | Energy use is poorly controlled.  A Resource Concern exists to a severe degree and merits priority. |
| Extreme | 1 | Energy use is effectively uncontrolled.  A Resource Concern exists to an extreme degree and merits elevated priority. |

# **Appendices**

## **Appendix A: Acronyms**

AgEMP Agriculture Energy Management Plan

ASD Adjusted Speed Drive (see VFD, VSD)

BSMPs Basic Smoke Management Practices

Btu British Thermal Unit (normalized energy inputs)

CART Conservation Assessment Ranking Tool

CEAP Conservation Effects Assessment Program

CNMPS Conservation Nutrient Management Plans

CPPE Conservation Practice Physical Effects

EPA Environmental Protection Agency

ESD Ecological Site Description

EUI Energy Use Index/Indices

FEMA Federal Emergency Management Agency

FIRI Farm Irrigation Rating Index

IIRH Interpreting Indicators of Rangeland Health

NAQSAT National Air Quality Site Assessment Tool

NOx Nitrogen Oxides

NRCS Natural Resources Conservation Service

RHA Rangeland Health Assessment

RC Resource Concern

PCS Pasture Condition Score

PM Particulate Matter

PLU Planned Land Unit

PCS Pasture Condition Score

SSURGO NRCS published soils database

SVAP Stream Visual Assessment Protocol

T/E Threatened/Endangered Species

USDA U.S. Department of Agriculture

VOC Volatile Organic Compounds

VFD Variable Frequency Drive (see ASD, VSD)

VSD Variable Speed Drive (see ASD, VFD)

WHEG Wildlife Habitat Evaluation Guide

## **Appendix B: Glossary**

**Existing Condition:** Management activities that are existing on the site (ex. rotation and associated residue)

**Existing Practices:** Conservation practices that are already implemented and functioning on site

**Planned Practices:** Additional conservation practices that are being evaluated for implementation

**Priorities:** Other priorities to consider (ex. Critical watershed or wildlife habitat) which are used in ranking

**Threshold:** Measure of Intrinsic Site Vulnerability and amount of conservation effort to reach a “sustainable” level. Thresholds may be normalized at 50 points but are representative of NRCS planning criteria.

**Question:**  A text sentence or geospatial expression used to elicit a result equal to an associated choice.

**Answer Choice:** The outcome of a question that results in the assignment of points for assessment or ranking.

**Points:** The assigned credit assigned to each choice of a question.

## **Appendix C: CART Soil Data Access Web Services**

Link to view documentation:<https://jneme910.github.io/CART/>

## **Appendix D.1: CART energy module and interaction with off-CART tools**

CART v1 provides a limited analysis of energy resource concerns and possible practices to mitigate negative benchmark conditions. CART v1 operates within a comprehensive, streamlined methodology to perform these parts of the nine-step planning process at a high cut:

* Step 1, Identify Problems & Opportunities
* Step 2, Determine Objectives
* Step 3, Inventory Resources
* Step 4, Analyze Resources
* Step 6, Evaluate Alternatives
* Step 7, Make Decisions

Future versions of CART are expected to incorporate many of functions initially provided by off-CART tools. See Table 180 for a summary of actions that a planner (or NRCS partner) will complete outside of CART compared to those embedded in CART v1. In very simple terms, the streamlined process supported by CART and the off-CART tools assists a planner with these actions:

* Estimate the energy use intensity of a client’s principal enterprises.
* Prioritize the order of follow up to address higher-risk energy resource concerns.
* Assess equipment, systems, and management decisions that determine the client’s energy use intensity.
* Identify well-proven practices, eligible for rapid contract action, to increase the energy efficiency of the client’s operations and reduce energy use.

CART will reduce the administrative burden on planners (and clients) imposed by existing protocols. CART functions will be leveraged through an expanded set of off-CART tools. Together, the revised protocols and tools will simplify nine-step planning for energy resource concerns. The full CART rollout will allow NRCS planners to more quickly and effectively deliver energy conservation based on customer need and interest.

See appendix D.4 for step-by-step process to assess energy using CART and off-CART tools.

Table 180: *Tools & Functions to Assess and Address Energy Resource Concerns*

| **Type** | **Tool / Doc.** | **Function** | **Status** | **Notes** |
| --- | --- | --- | --- | --- |
| CART v1 | Intake Module | Client & Site Data.  (Manual export to EUI / CART tool.) | In process. |  |
| Off-CART | EUI / CART Converter | Calculates enterprise energy use intensity (EUI).  Converts EUI value to an existing condition points value on a scale of 1-100.  (The planner enters this value in CART to assess risk of an energy concern.) | In process. |  |
| CART v1 | Establish Risk of Resource Concern by Client | Assess client’s risk based on existing condition point value. | In process | [1] |
| CART v1 | Identify Practices | Identifies a suite of practices to mitigate the identified energy resource concern based on various user intake data or secondary questions. | In process  (Appendix E.5 flow charts) | [2] |
| CART v1 | Rank for Funding | Per resource concern risk category: extreme-severe-high-moderate-low-none.  Modified by local priorities and other factors. |  |  |
| Off-CART | CPS 670, Lighting  CPS 672, Building Envelope | Revised practice criteria provide simplified means to implement common, straightforward energy practices. | CPD-DMS for internal review closed Jan. 30, 2018. | [3] |
| Off-CART | CPS 374, Farmstead Energy | As noted for CPS 670, 672. | In process | [3] |
| Off-CART | Title 210 - National Instruction: Part 302 – Agricultural Facility Energy Efficiency Improvements | Technical Reference:   * Tiered Approach Overview * Prescriptive Upgrades Overview * Energy Analysis Methods * Guides to Identify & Implement Upgrades * Lifecycle Cost Analysis * Glossary of Energy Terms * Exhibits   + Prescriptive Lists   (374, 670, 672)   * + Prescriptive Implementation Template   + Assessment Templates | In Process | [3, 4] |
| Off-CART | Energy Planning Criteria | Distinct indicators and threshold values for common energy-using equipment and systems simplifies early planning steps. | Initial draft submitted; awaits action on review of all Resource Concerns. |  |

Table Notes

[1] A N/A existing condition indicates that the resource of interest is not present for the identified PLU.

A N/A existing condition for energy resources is highly unusual.

Zero indicates an agricultural operation that relies entirely (or nearly so) on renewable energy inputs for all substantive activities under typical conditions.

[2] CART v1, based on resources for build and rollout, may require various aspects of the CPS list to be evaluated with off-CART tools.

[3] Timeline of core energy CPS revisions.

2019.04.15 release:

* + - 1. Draft 2 of 670 & 672 for second internal review (via CPD-DMS)
      2. Draft 1 of 374 for internal review (CPD-DMS)
      3. Draft 1 of national instruction

Note that Farm Bill mandate for a comprehensive CPS review, CART, NRCS of the Future, and various other demands may affect this timeline.

[4] The draft NI may include any conservation practice standard with a purpose clearly related to energy conservation. The NI will emphasize CPS 374, Farmstead Energy; 670, Lighting Systems; and 672, Building Envelope, on initial release.

Planners are expected to use off-CART tools and CART v1 for 60-80 percent of the NRCS client pool. Planners will continue to rely on existing methods to assist the other 20-40 percent of the client pool. Future CART releases are expected to help planners identify which, if any, PLU can or should be assessed through the legacy protocols.

## **Appendix D.2: CART Data Fields**

(As noted elsewhere, which of these components will be included in CART v1 is under review.)

Planner acquires two sets of data to assess the CART existing condition points value.

* + - 1. Energy input data, per Table 181
      2. Primary, relevant enterprises data, per Table 182

Note that an NRCS agricultural energy management plan (AgEMP) will generally include the data needed for these tables.

See appendix D.4 for a step-by-step overview of the process to assess energy concerns with CART.

Table 181: *Annual Energy Input Data Table*

| **Category [A]** | **Budget ($/yr) [B]** | **Est. Quantity (Units) [B]** | | **Type** | **Notes** |
| --- | --- | --- | --- | --- | --- |
| Diesel Fuel |  |  | gal/yr | n/a |  |
| Nitrogen Fertilizer |  |  | Lb/yr |  | [1] |
| Electricity |  |  | kWh/yr | n/a |  |
| Propane |  |  | gal/yr | n/a |  |
| Natural Gas |  |  | Varies | n/a | [2] |
| Purchases to be determined |  |  | Varies |  | [3] |
| Onsite Generation |  |  | kWh/yr |  | [4] |
| Onsite Renewable Heat |  |  | Varies |  | [5] |

Table Notes

▪ Expand rows to accommodate multiple energy resources for onsite generation, heat sources, or allocate a specific resource to two or more distinct parts of the operation (see note [A]).

▪ Take notes of contracted work (e.g., harvesting) that includes fuel used and purchased by others. That can help resolve problems with energy balance or indicate conditions that can’t be handled in CART v1.

[A] Record cases where individual electric meters, multiple propane tanks, or other energy purchases can be more closely linked to a specific part of the operation.

* Irrigation pumps, residences, farm offices, or groups of farm buildings (e.g., farm stands or stores) may have independent electric meters.
* Note where electric service meters or fuel sources (e.g., propane or diesel tank) include any residential dwellings. (The tools use this to isolate enterprise energy use from residential structures.)

[B] Estimated budget serves as a minimum data tier to proceed with CART. Estimated purchase quantities increases accuracy.

* An annual budget estimate is good enough to use the EUI-CART converter. A planner might ask, “About how much do budget for diesel every year?”
* Some producers will track actual energy purchases.
* Collect both cost and energy values when possible to reduce errors in downstream analysis.
* Three significant digits are typically adequate for budget or quantity values.
  + Two digits is fine for values below 1,000.
* Notes for CART developers:
  + Initial CART screen presents a two-column matrix of “Category” and “Est. Budget ($/yr)” entry cells.
  + An adjacent question asks something like, “Do you have data or estimates of quantities of energy purchases?”
  + If planner selects “yes” to “quantity” question, CART toggles to add these columns to the matrix: “Est. Quantity” with “(Units)” and “Type.”
  + Include marker of some kind for “Serves Residential Dwelling” indicator. (Bonus if: “Approx. Size (SF)” & “Typical Use (Mo./Yr)” entries.)
  + (Standard sanity check functions will flag entry errors.)

[1] Record use of green or animal manures if more than a marginal contributor of fertilizer. (For purposes of CART and the EUI-CART converter, consider a contribution of less than 10% from nonsynthetic fertilizers as “marginal.”)

[2] Record natural gas units of purchase that apply to the producer. The standard unit of sale varies by location. Refer to the EUI-CART Converter User Guide for further detail.

[3] Allows entries for less typical energy sources.

[4] Onsite generation is recorded to learn if renewable resources (biogas, PV, wind, hydro, etc.) and/or fossil-resources (diesel, propane, etc.) support farm operations on a regular and substantive basis.

* Infrequent use of emergency generators can be ignored.
* A planner might ask, “About how many days a year do you use the generator?”
* Further analysis may be required to resolve issues related to onsite generation.

[5] Onsite RR heat is recorded to learn if biogas, wood, solar, or other renewable resources are used to provide onsite heat. (See note [4] for methods to assess this use.)

Table 182: *Primary, Relevant Enterprises Data Table*

| **Enterprise Categories [A]** | | | | **Scale of Operation** | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Primary** | **Secondary** | **Condition** | **Value** | **Unit** | **Type** | **Notes** |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

The planner uses the data to derive the existing condition points value with the EIU-CART converter.

CART methodology establishes risk categories shown in the energy use intensity in Table 178 and Table 179.

Draft structure of underlying CART data tables are shown in Table 183 and Table 184.

Table 183: *CART Data Exported to EUI-CART Converter*

|  |  |  |
| --- | --- | --- |
| Item | Description | Intake Set |
| 1 | Unique Customer ID | Core |
| 2 | Enterprise Data | Enterprise Data |
| 3 | Energy Input Data | Energy Input Data Table |

Table 184: *Enterprise Data Fields*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | Description | Entry | Unit | Note |
| 1 | Enterprise Category | Drop-Down | N/A | Enterprise Data |
| 2 | Enterprise Subcategory | Drop-Down | N/A | Enterprise Data |
| 3 | Scale (Size Basis) | Value | Varies | Energy Input Data |
| 4 | Scale (Production Basis) | Value | Varies |  |

CART is configured to provide SME administrator rights to create items, noted below, to maintain functions aligned with field needs.

* Enterprise category and subcategory classes.
* Associated scale (size and / or production) fields.
* Energy input data resource type fields.

Programming to support related entry fields to supplement as-yet-undefined core or primary data (whether drawn from GIS, derived from similar data set, or producer-provided) will be part of a continuous improvement strategy.

## **Appendix D.3: CART Process to Assess Energy Concerns, Step-by-Step**

1. Planner collects basic information to estimate EUI for applicable enterprises.
   1. This information is intended to be approximate, annual values based on typical, expected conditions. Typical conditions include normal weather and markets, an absence of avian flu or similar illness, or other events that disrupt usual operations. (See EUI-CART converter for other details.)
   2. Ask if the producer has a previously completed energy analysis related to the PLU you have been asked to evaluate. (The analysis may be an NRCS CAP 128, *Agricultural Energy Management Plan* or similar report from USDA-RD, an electric or natural gas utility, State energy office, conservation district, or others.)
      * The CAP 128 plan criteria require the primary energy input data needed. Other studies will typically have this data also.
      * Be aware that an acceptable analysis may be tagged with a variety of names: audit, assessment, report, etc. The scope or quality of the content cannot be reliably predicted by the title of the document.
      * Find out if the operation associated with the PLU is significantly different than when the energy analysis was done.
        + See item A.1. and confirm that any analysis reflected “typical, expected” conditions.
        + Generally, operations that remain within about 15 percent of scope or scale of production when evaluated will not require updated information.
        + Talk a bit further with the producer if, for example, the energy analysis looked at a 200-cow dairy herd that has grown by more than about 40 cows. (At a more detailed level, if the producer indicates that milk yield has changed more about 15 percent due to a change in the herd size combined with a different feed regime.)
      * Find out if the producer plans to modify operations in the near-term (next year or two) in similarly substantive way. (In order to plan for future conditions rather than the past.)
   3. If no energy study is available, or some gaps remain, ask about the producer’s approximate, annual energy inputs to complete Table 181.
      * Refer to Table 181 notes about individual electric meters, residential dwellings, and other details to record that improve the analysis of energy concerns and potential practices to address identified concerns appropriately.
   4. Ask the producer about their most important enterprises, crops, or other operations.
      * Learn about the producer’s objectives and priorities in terms of principal crops or livestock to complete Table 182.
      * As with energy input, the planner will need details at an order of magnitude to understand what matters most to the producer.
   5. Planner enters the enterprise and energy input data into CART.

The energy team proposed a modified description for energy resource concerns in August 2018.

Table 185: *Description for Energy Resource Concerns*

|  |  |  |
| --- | --- | --- |
| **Resource Concern** | **Description of Concern** | **Land Use** |
| *Energy efficiency of equipment and facilities.* | Stationary equipment or facilities are using energy inefficiently. | Any |
| *Energy efficiency of farming and ranching practices and field operations.* | Mobile equipment for on-farm, ranching, or forestry field operations are using energy inefficiently. | Cropland  Forestland  Rangeland  Pastureland  Farmsteads |

Draft language, as follows, has been considered to clarify the terms used in each description.

Stationary equipment is typically fixed in place for long-term use (many months or years). A variety of farm equipment (e.g., tractors, irrigation systems) may be moved for use in multiple locations but may be operated with a fixed position when in use. This equipment is typically kept in a fixed location for shorter-term use (many hours, days, or weeks) but falls into “equipment and facilities” for that use category relative to the farm operation.

In contrast, “mobile equipment” related to field operations refers to equipment that is not constrained to a fixed position when in use.

Which energy resource concern applies is based on the operation under review. A given piece of equipment may be evaluated for both energy concerns under different circumstances.

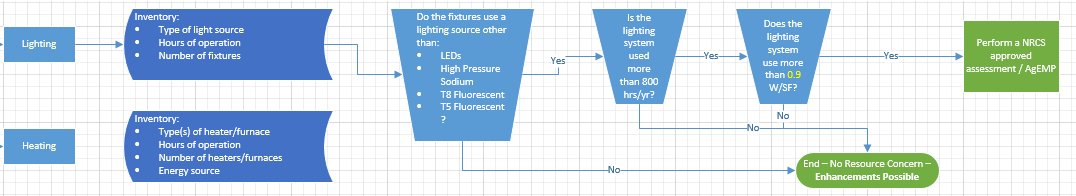
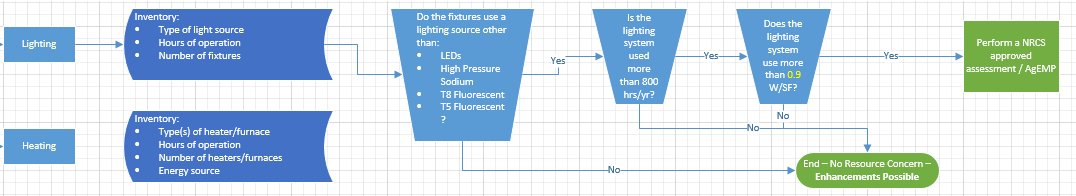
A tractor parked to drive an irrigation pump with the PTO is evaluated as “equipment and facilities.” A tractor (in motion) used to till, fertilize, harvest, etc. is evaluated as “field operations.”

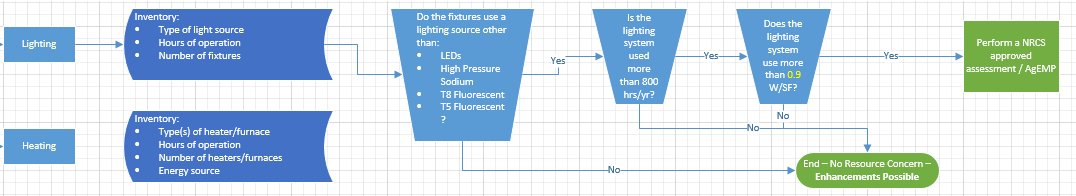
A table to designate certain equipment and applications will be included in the national instructions previously noted to accompany revised energy practices 670, 672, and 374.

## **Appendix D.4: Equipment and Systems Indicator & Threshold Flowcharts**

These flowcharts preview work-in-process to assist NRCS to more quickly and effectively identify and implement practices to address energy concerns.

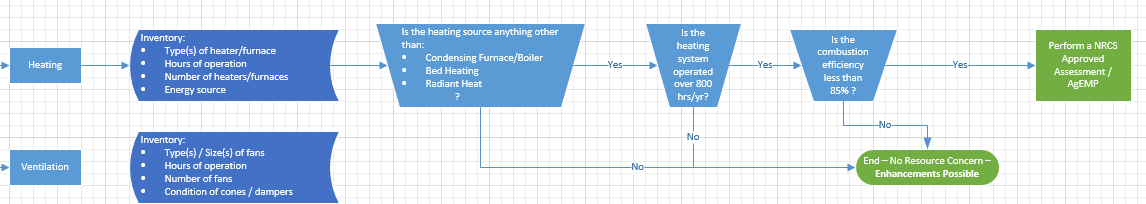
*Figure 1:* Simplified Flowchart for Lighting Systems

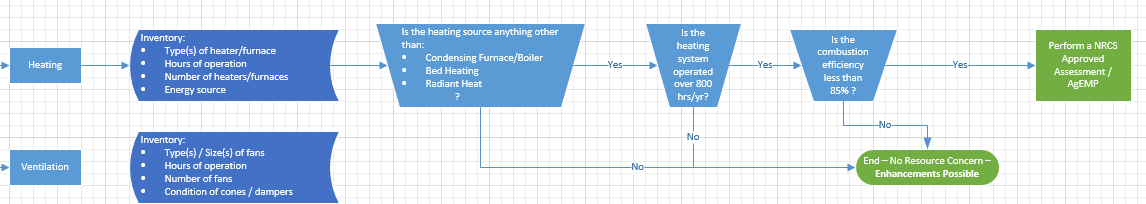
 (..) (..)

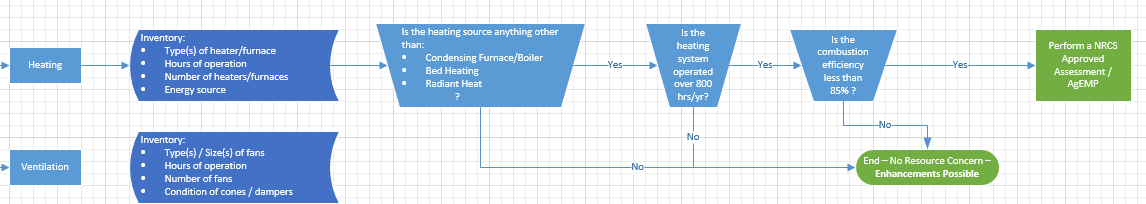


Note that significant lighting systems characteristics are based on source efficacy, power density, and control systems.

*Figure 2:* Simplified Flowchart for Heating Systems

 (..)

 (..)



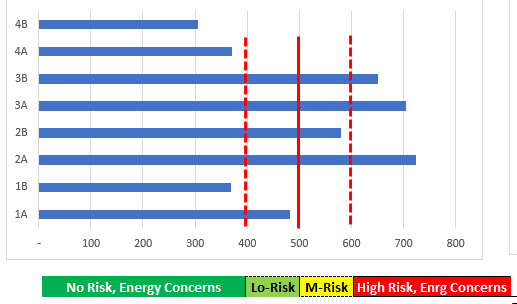
Flowcharts for ventilation, building envelope, refrigeration, and other systems are in process.

## **Appendix D.5: EUI-CART Converter Overview**

This figure is a mock-up display of EUI converter results based on preliminary existing condition point scale where lower scores indicated a lower risk and a resource concern threshold of 75.

Scale range, risk categories, and threshold value will be revised based on reviewer comments and further analysis of empirical data.

Figure 3: Example of Poultry Broiler EUI (Btu/Lb.) Quartile



Btu = British Thermal Unit (normalized energy inputs)

Lb. = Harvest weight of birds

Energy and yield data based on 12-month operation, minimum.

EUI-to-CART converter results:

400 Btu/Lb. = 75 CART existing condition point value.

500 Btu/Lb. = 50 CART existing condition point value.

600 Btu/Lb. = 25 CART existing condition point value.

EUI: Existing condition point value. Ratio varies by enterprise.