DESIGN AND IMPLEMENTATION ACTIVITY

Nutrient Management

DEFINITION

Design the rate, source, placement, and timing of plant nutrients and soil amendments while reducing environmental impacts. Implementation requirements for Conservation Practice Standard (CPS) 590 Nutrient Management along with other supporting conservation practices are developed.

Nutrient management plans are documents of record, establishing how nutrients will be managed including the Rate, Source, Placement and Timing of plan nutrients for plant production while addressing identified resource concerns including the offsite movement of nutrients. These plans are prepared in collaboration with producer and/or landowner and designed to help the producer implement and maintain an effective plan for the application of nutrients from available sources.

CRITERIA

General Requirements

A Design and Implementation Activity (DIA) is the planning and designing of a single practice or any combination of structural, vegetative, or land management practices and management activities to treat one or more resource concerns.

The DIA 157 Nutrient Management documents the verification of the client's conservation plan, and the development of the implementation requirements or plans and specifications for each planned conservation practice. The DIA addresses site identified resource concerns, crops grown, crop rotation(s), times and types of tillage practices, and other supporting conservation practices that are implemented to improve or protect air, soil and water resources. This activity includes one or more conservation practices to address nutrient application and potential loss pathways for nitrogen and phosphorus.

The DIA 157 must be developed by a Technical Service Provider (TSP) who meets NRCS Nutrient Management Plan certification requirements.

The Technical Service Provider (TSP) will maintain an ongoing record of DIA related discussions with the client. Any correspondence between the TSP and the client related to the development of the DIA is included in the record submitted to the client.

The TSP will complete Implementation Requirements for vegetative and land management practices as outlined in each state adopted Conservation Practice Standard (CPS) and Statement of Work (SOW) found in the Natural Resource Conservation Service (NRCS) Field Office Technical Guide for the state in which the practices are being implemented.

The TSP may use any of the Conservation Practice Documents, such as Implementation Requirement Sheets, Job Sheets, templates, etc. located in the state's Field Office Technical Guide.

The activity will meet the NRCS planning criteria for one or more of the following resource concerns:

- Nutrients in Surface Water, non-point sources
- Nutrients in Groundwater, non-point sources and point sources
- Plant Health and Productivity
- Reduce emissions of objectionable odors, particulate matter (PM) and PM precursors, greenhouse gases (GHG), and ozone precursors
- Soil organic matter depletion
- Soil Erosion

The activity will meet the state adopted NRCS Conservation Practice Standards (CPS) and Statements of Work (SOW) for Nutrient Management Code 590 and all other nonstructural CPS that facilitate soil erosion control or reduce the risk of nutrient transport to surface water or groundwater that are included in the client's conservation plan.

Technical Requirements

Nutrient Management requirements:

Nutrient Management plans must comply with all technical criteria contained in the state approved Nutrient Management (590) Conservation Practice Standard, and address the use and management of all nutrients applied on agricultural lands from any available nutrient source (animal manure, wastewater, commercial fertilizers, crop residues, legume credits, irrigation water, organic by-products, etc.).

All nutrient rates (except for precision rate applications), sources, placement, and timing are to be specific (linear) for the crop, field, and year. The narrative method may be used for the precision rate calculations as it is impractical to describe actual rates for every unique grid cell/management unit.

Soil and tissue testing and analysis

The nutrient management plan shall be based on current soil test results in accordance with land grant university (LGU) guidance, or industry practice when recognized by the LGU.

Note: Soil tests shall be no older than 2-years when developing new nutrient management plans.

Manure, organic by-product, and biosolids testing and analysis

Manure, organic by-products, and biosolids shall be collected, prepared, stored, and shipped following LGU guidance or industry practice when recognized by the LGU.

Note: Should manure tests not be available yet, the use output and analyses from similar operations in the geographical area or "book values" recognized by the NRCS may be used if they accurately estimate nutrient output from the proposed operation or use.

Risk Assessments for Land Treatment on all fields where nutrients are applied:

Land treatment conservation practices planned for the fields where nutrients are applied can be found in the NRCS Conservation Plan. Resource assessments used to refine the nutrient management are included in the DIA 157 Nutrient Management plan. Nitrogen Leaching and Phosphorus Risk Assessments must be completed for each field. Wind and water soil erosion estimates from WEPS and RUSLE2 may be in the client case folder. If no resource assessment documents are found, complete the assessment for each field.

- Nitrogen Leaching Risk Assessment:

  Complete an NRCS-approved nutrient risk assessment for N on all fields where nutrient management is planned unless the State NRCS, in cooperation with State water quality control authorities, has determined specific conditions where N leaching is not a risk to water quality, including drinking water.

- Phosphorus Risk Assessment

  Complete an NRCS-approved nutrient risk assessment for Phosphorus when any of the following conditions are met—
  - P application rate exceeds LGU fertility rate guidelines for the planned crop(s).
  - The planned area is within a P-impaired watershed.
  - The site-specific conditions equating to low risk of P loss have not been determined by the NRCS in cooperation with the State water quality control authority.

  Note: Any fields excluded from a P risk assessment must have a documented agronomic need for P, based on soil test P and LGU nutrient recommendations.

- Erosion Risk Assessment:

  Planners must use current NRCS nationally approved erosion-prediction technology to assess the risk of transporting nutrient from the field causing off-site degradation due to wind, water, and irrigation induced erosion.

The 4Rs of nutrient stewardship

The DIA 157 Nutrient Management shall document the management techniques for nutrients based on the 4Rs of nutrient stewardship—*apply the right nutrient source at the right rate at the right time in the right place*—to improve nutrient use efficiency by the crop and to reduce nutrient losses to surface and groundwater and to the atmosphere.

- Nutrient source
  Planners will choose nutrient sources which are compatible with application timing, tillage and planting system, soil properties, crop, crop rotation, soil organic content, and local

climate to minimize risk to the environment.

- Nutrient rate
  Plan nutrient application rates for N, P, and K using LGU recommendations or industry practices when recognized by the LGU. Lower-than-recommended nutrient application rates are permissible if the client's objectives are met. At a minimum, determine the rate based on crop/cropping sequence, current soil/manure test results, and NRCS-approved nutrient risk assessments. Where applicable, use realistic yield goals.

- Nutrient application timing and placement
  Consider the nutrient source, management and production system limitations, soil properties, weather conditions, drainage system, soil biology, and nutrient risk assessment to develop optimal timing of nutrients. For N, time the application as closely as practical with plant and crop uptake. For P, time planned surface application when runoff potential is low. Time the application of all nutrients to minimize potential for soil compaction.

Additional Technical Requirements to Consider

- Plan/Apply conservation practices to avoid nutrient loss and control and trap nutrients before they can leave the field(s) by surface, leaching, or subsurface drainage (e.g., tile, karst) when there is a significant risk of transport of nutrients.
- When applicable, follow proper biosecurity measures as provided in NRCS directives GM-130, Part 403, Subpart H, "Biosecurity Preparedness and Response."
- To address air quality concerns caused by odor, N, sulfur, and particulate emissions; adjust the source, timing, amount, and placement of nutrients to reduce the negative impact of these emissions on the environment and human health.
- Design the plant or crop management systems so the soil conditioning index (SCI) organic matter subfactor is positive.

DELIVERABLES

Two hard copies or an electronic copy of the plan must be developed—one for the client and one for the NRCS field office. At the client's request, the TSP can deliver NRCS's copy to the NRCS Field Office. The client's copy must include the implementation requirements or plans, specifications, operation and maintenance, and quality assurance plan, unless the client requests other documents from this section. The NRCS copy must include all items identified herein. An additional electronic copy of the plan should also be uploaded on NRCS Registry (when available).

The Nutrient Management DIA must contain the following documentation in order to be deemed complete.

- Client information (name, address, email, phone, and any additional information which would be helpful for future reference).
- Aerial site photograph(s), imagery, topography, or site map(s).

- Soil survey map of the site.
- Soil information including: soil type, surface texture, drainage class, permeability, available water capacity, depth to water table, restrictive features, and flooding and ponding frequency.
- Location of designated sensitive areas and the associated nutrient application restrictions and setbacks.
- Location of nearby residences, or other locations where humans may be present on a regular basis, that may be impacted if odors or PM are transported to those locations.
- Results of approved risk assessment tools for N, P, and erosion losses.
- Documentation establishing the application site presents a low risk for P transport to local water if P is applied in excess of crop requirement.
- Current and planned plant production sequence or crop rotation.
- All available test results (e.g. soil, water, compost, manure, organic by-product, and plant tissue sample analyses) upon which the nutrient budget and management plan are based.
- When soil P levels are increasing above an agronomic level, include a discussion of the risk associated with P accumulation and a proposed P draw-down strategy.
- Realistic yield goals for the crops (where applicable for developing the nutrient management plan).
- Nutrient recommendations for N, P, and K for the entire plant production sequence or crop rotation.
- Listing, quantification, application method and timing for all nutrient sources (including all enhanced efficiency fertilizer products) that are planned for use and documentation of all nutrient imports, exports, and onsite transfers.
- Guidance for implementation, operation and maintenance, and recordkeeping.

Variable Rate Nutrient Management Plans must also include:

- Geo-referenced field boundary and data collected that was processed and analyzed as a GIS layer or layers to generate nutrient or soil amendment recommendations per management zone. Must include site-specific yield maps using soils data, current soil test results, and a yield monitoring system with GPS receiver to correlate field location with yield.
- Nutrient recommendation guidance and recommendation equations used to convert the GIS base data layer or layers to a nutrient source material recommendation GIS layer or layers.

- After implementation, provide application records per management zone or as applied map within individual field boundaries (or electronic records) documenting source, timing, method, and rate of all nutrient or soil amendment applications.

REFERENCES

USDA Natural Resources Conservation Service. Field Office Technical Guide. https://efotg.sc.egov.usda.gov/#/

USDA Natural Resource Conservation Service National Agronomy Manual, Parts 507 and 503C. General Manual, Title 190, Part 402, Nutrient Management

USDA Natural Resource Conservation Service USDA Natural Resources Conservation Service. National TSP Website. https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/tsp/

USDA Natural Resources Conservation Service. National TSP Resources. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/technical/tsp/?cid=nrcseprd1417414

USDA Natural Resources Conservation Service. 590 Nutrient Management Practice Standard https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849