2021 Dynamic Soil Properties (DSP) Guide

Contents (ctrl+click for link to section)

[1. Dynamic Soil Properties (DSP) References 2](#_Toc54249668)

[2. DSP Efforts—General Information 2](#_Toc54249669)

[3. Generalized DSP Project ID Hierarchy 4](#_Toc54249670)

[4. DSP Data Collection Effort Decision Tree 5](#_Toc54249671)

[5. New Project Type: Repeated Measures 6](#_Toc54249672)

[6. Examples of DSP Data Collection Efforts 6](#_Toc54249673)

[Appendix A: DSP Effort Planning Checklist 8](#_Toc54249674)

[Appendix B: DSP Work Plan Summary 9](#_Toc54249675)

[Appendix C: DSP Work Plan Development Guide 10](#_Toc54249676)

[Appendix D: Field Prep Checklist for Intermediate & Intensive Tier Efforts 19](#_Toc54249677)

[Appendix E: Sampling Checklist—Intensive Tier Efforts 20](#_Toc54249678)

[Appendix F: DSP Sample Collection Plan—Intensive Tier 21](#_Toc54249679)

[Appendix G: Sample Depth Decision Tree 25](#_Toc54249680)

[Appendix H: Sampling Depth Examples 26](#_Toc54249681)

[Appendix I: Land Use and Management Questionnaire 27](#_Toc54249682)

[Appendix J: Frequently Asked Questions 36](#_Toc54249683)

# 1. Dynamic Soil Properties (DSP) References

Link to DSP References: <https://new.cloudvault.usda.gov/index.php/s/HB84Lw7EkKAyMC7>

The references are titled with the year published. The more recent references supersede older references. Please start with the most recent references, including the *2021 DSP Guide* and *2021 DSP Tiers and NASIS Guide.xlsx*. Older publications (such as the *2008 Soil Change Guide*) are included to provide solid background information, prompt good project ideas, and serve as useful references.

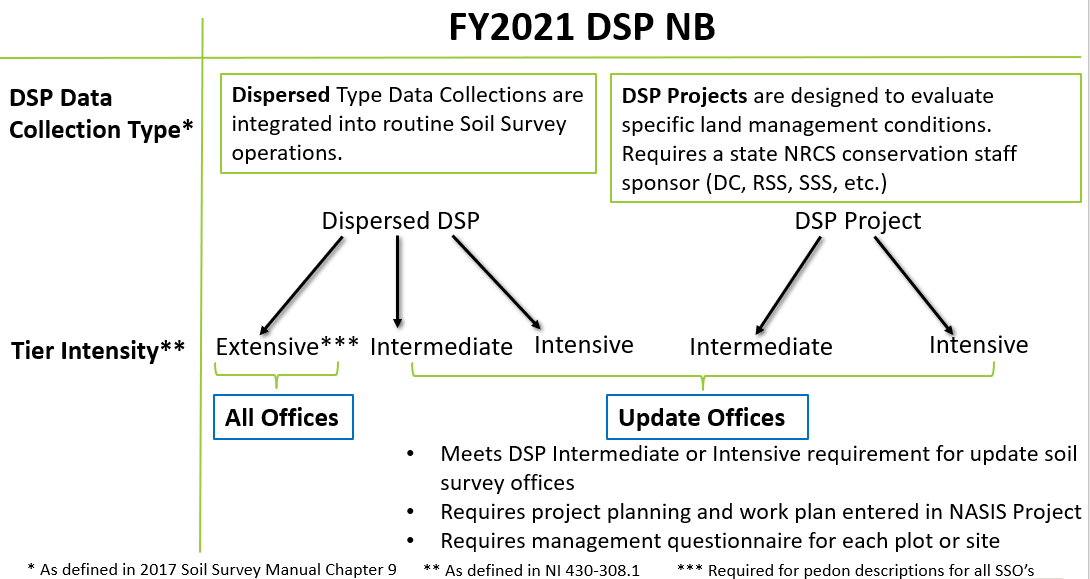
# 2. DSP Efforts—General Information

The 2017 edition of the *Soil Survey Manual* (SSM) describes DSPs in Chapter 9 and is an important resource for DSP planning. Starting in FY–20, DSP efforts were incorporated as standard operations for soil survey offices (SSOs). While DSP efforts are not new, they are relatively new to many SSOs and Soil and Plant Science Division (SPSD) staff. As staff work through the DSP process, please provide feedback and suggestions for improving the DSP guidance and processes. Just as the SSM was not finalized the second year of soil survey, guidance for DSP projects evolves.

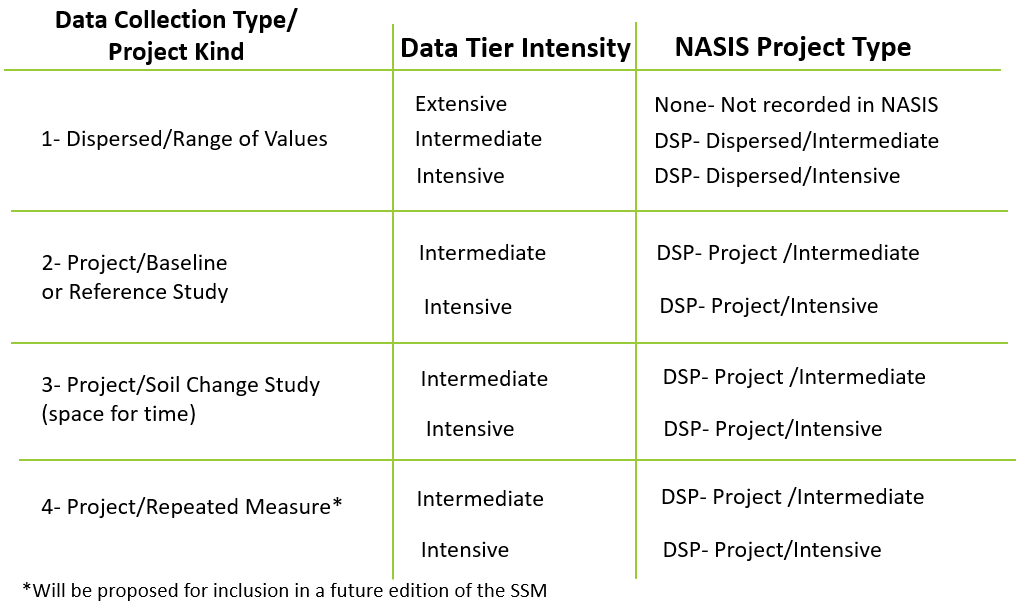
The Chapter 9 of the 2017 SSM identifies DSP data collections types as “dispersed” or “DSP projects.” Dispersed type data collections are integrated into routine soil survey operations. DSP projects are designed to evaluate specific land management conditions. Tier intensities are defined in National Instruction 430-308.1 and include extensive, intermediate, and intensive tiers. Each higher tier includes the tiers below. All SSOs are required to collect extensive tier measures as part of all pedon descriptions. Update offices (offices not conducting initial mapping) are also required to complete one intermediate or intensive tier effort per year. See Tables 1 and 2 below for more details.

The NASIS project types for DSP data collection efforts areDSP—Dispersed/Intermediate, DSP—Dispersed/Intensive, DSP—Project/Intermediate, and DSP—Project/Intensive.

**Table 1.—DSP Efforts**

****

**Table 2.—DSP Data Collection Type and Project Kind**



# 3. Generalized DSP Project ID Hierarchy

* **Project**
  + **Soil** (Optional–Used when multiple soils are sampled in a project)
    - **Condition** **being compared** (condition, land use, ecological state, or management system)
      * **Region** (Optional—Used to stratify by geographic feature)
        + **Plot replicates** (independent site, fields, or locations)

**Pedon** **replicates** (individual pedons within plots)

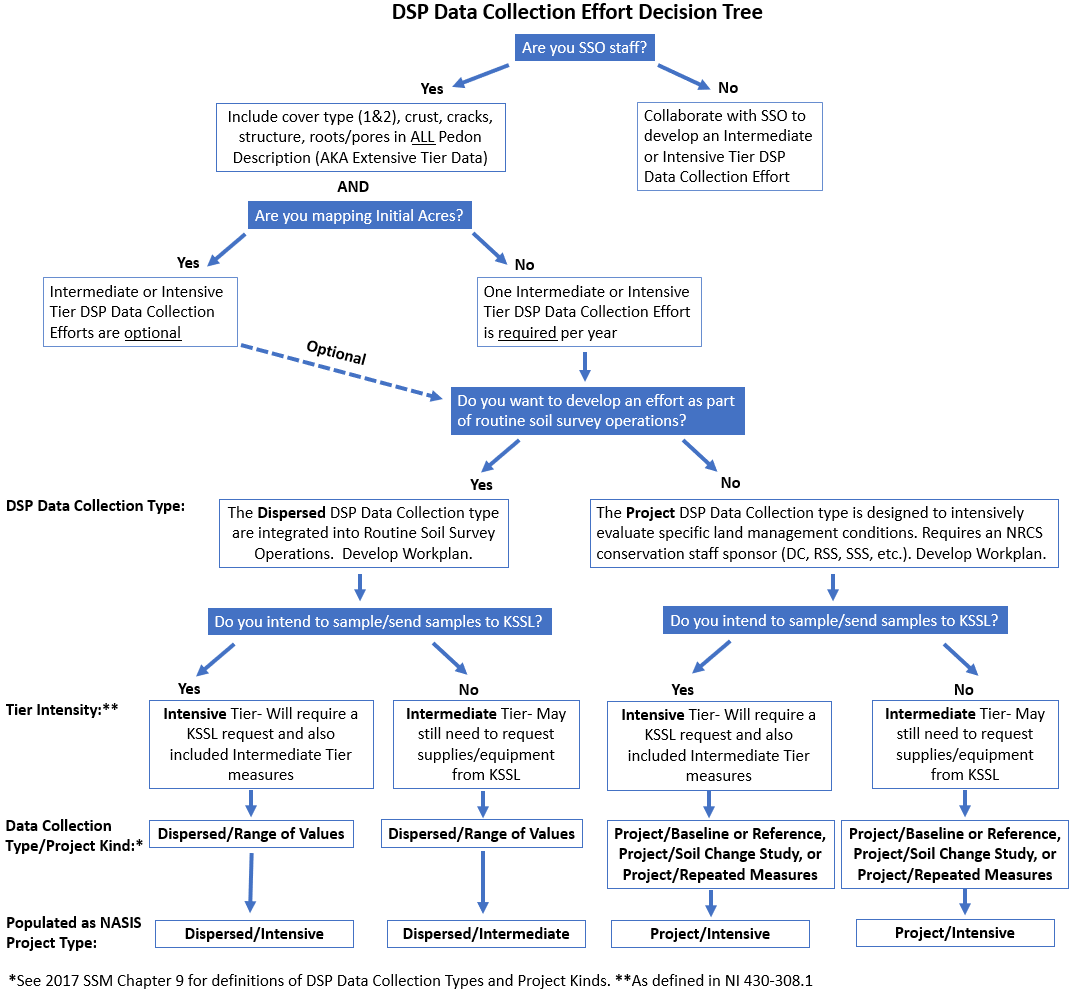
**Samples**

See Appendices G & H for details on depths

* + Soil (optional): 1-character symbol to represent each soil. Used when multiple soils are sampled.
  + Condition: 1 or 2 characters that indicate the land use, land cover, or management system being evaluated.
  + Region (optional): 1 or 2 characters that indicate a geographic or situational stratification or difference within the project conditions (e.g., N and S for northern and southern extent of a soil series or L and H for low and high topography).
  + Plot replicate: 1 or 2 numeric digits that indicate an independent plot that is separate from other plots in that condition or region.
  + Examples:
* Without region or soil: R1 and C1. The first rangeland and cropland plot replicates from the DSP SD2012 Central Rangeland project.
* With region: PA1 and PG1. The first pasture plot on the Atlantic Coast and the first pasture plot on the Gulf Coast.
* With soil: A-P1 and M-P1. Soil A and soil M in the first pasture plot or site.
* With region and soil: A-PA1 and M-PG1. Soil A in the first Atlantic Coast pasture plot and soil M in the first Gulf Coast pasture plot.

# 4. DSP Data Collection Effort Decision Tree

**Table 3**.—Decision Tree for DSP Efforts



# 5. New Project Type: Repeated Measures

The goal of this type of project is to assess changes in dynamic soil properties resulting from application of different management practices and/or systems with time. Less often, repeated measures can document changes or recovery following a natural disturbance. Unlike the soil-change-study project type (space-for-time substitution), repeated-measures projects evaluate the effects of management changes in one location with time. Repeated sampling for DSPs occurs as determined by project staff, but 2–5 years and beyond are basic recommendations. Project sampling requirements follow those of the tier established for the project (intermediate or intensive). If the sampling or plot replication requirements are not met, the assistance provided by MLRA office staff is designated as technical soil services (TSS) and the request may be considered a conservation practice evaluation (CPE). SSOs are encouraged to develop full DSP projects based on local opportunities and conservation needs.

# 6. Examples of DSP Data Collection Efforts

1. *Dispersed/Range of Values/Intermediate*: An SSO in Nebraska developed a dispersed/intermediate NASIS project to collect intermediate tier DSP data on three major components that occur in a catena across the MLRA. They are investigating the range in epipedon thickness and Ksat across conditions in this catena. They were already completing pedon descriptions as part of routine soil survey operations for this update project; so, they thoroughly documented management information at each location observed. Samples were collected and measurements were made from five locations (with all soils present). The measurements were made in the field and the SSO lab. The data was populated in NASIS.
2. *Dispersed/Range of Values/Intensive*: An SSO in Texas developed a dispersed/intensive NASIS project to collect intensive tier DSP data on major components across the MLRA. They were already completing pedon descriptions as part of routine soil survey operations and need wanted laboratory data to confirm their findings. In order to capture both rangeland and cropland systems, six DSP plots were established. Samples were collected and measurements were made from one central and two satellite pedons at each plot. The intermediate tier measurements were made in the field and the SSO lab with data populated in NASIS. Samples were collected and shipped to KSSL for the intensive tier.
3. *Project/Baseline or Reference Study/Intermediate*: An SSO in Georgia developed a Project/Intermediate NASIS project to collect baseline data on a forested reference state. One soil in the reference state (and identified in the ESD’s state and transition model) was investigated at the intermediate tier. The ecological site specialist collected vegetation data and soil scientists completed descriptions and measurements and collected samples for analysis in the SSO lab. In this example, there were three plots total. The intermediate tier measurements were made in the field and the SSO lab. The data was populated in NASIS.
4. *Project/Baseline or Reference Study/Intensive*: An SSO in Minnesota has been asked to document soil properties in typical conservation systems in the area before a new conservation system is applied at a demonstration farm. They developed a project/intensive NASIS project to collect baseline data. They identified an important soil on the demo farm for one intensive plot; and they found four additional plots across the MLRA with similar initial systems. This project investigated one soil and on management system at the intensive tier. Samples were collected and measurements were made from five locations and management information was carefully documented. The intermediate tier measurements were made in the field and SSO lab with data populated in NASIS. At each plot/location, samples from one main and three satellite pedons were collected and shipped to KSSL for the intensive tier measurements.
5. *Project/Soil Change Study/Intermediate*: An SSO in Vermont developed a soil change study for one soil with three different crop management histories. Samples were collected and measurements are made from three locations for each land use or management system under evaluation for each soil. In this example, there were nine plots total. The intermediate tier measurements were made in the field and the SSO lab. The data is populated in NASIS
6. *Project/Soil Change Study/Intensive*: An SSO developed a soil change study for one forest soil with three different management and burn histories. There is one soil and three different management and burn histories. Samples are collected and measurements are made for three locations for each land use or management system under evaluation for each soil. In this example, there are nine plots total. The intermediate tier measurements were made in the field and the SSO lab. The data was populated in NASIS. Samples were collected and shipped to KSSL for the intensive tier measurements.
7. *Project/Repeated Measures Study/Intermediate*: An SSO was contacted by state staff interested in assessing the effects of new management practices on soil function on grazing land in the area. There is one soil (or similar soils), and the same conservation practices are planned on several ranches in the area. Three landowners are interested in learning about the effects on their ranches and allow sampling during certain times of the year. Repeated sampling is planned for three years after initial sampling. Continued measurements can be made if the state and landowners are interested. In this example, there are three plots total. The intermediate tier measurements are made in the field and the SSO lab. The data is populated in NASIS.
8. *Project/Repeated Measures Study/Intensive*: An SSO was contacted by state staff interested in assessing the effects on soil function of changing to a soil health management system on cropland in an area. There was one soil (or similar soils), and the same conservation practices are planned on several farms in the area. Three landowners were interested in learning about the effects on their farms and allowed sampling during certain times of the year. Repeated sampling is planned for 5 years after initial sampling. Continued measurements can be made if the state and landowners are interested. In this example, there are three plots total. The intermediate tier measurements are made in the field and the SSO lab. The data was populated in NASIS. Samples are collected and shipped to KSSL for the intensive tier measurements.
9. *Technical Soil Services* (standalone request): A producer is interested in implementing soil health practices and obtaining DSP data over time. Conservation and MLRA SSO staff work with the producer to develop a sampling design and frequency plan for the next 5 to 10 years. Intermediate tier DSP data is collected according to this plan. This example does not qualify as a DSP project because the required number of replicates is not met or full characterization sampling is not planned. Integration of repeated measures into other DSP project types can supplement one-time measurements where possible and be beneficial to producers and project goals. Although this is not a DSP project, it does gather important DSP data. Use the yellow tag if submitting samples to KSSL, and populate a DSP plot ID in the NASIS Site Table.
10. *Characterization Pits*: A characterization pedon, will be sampled following the DSP protocols. A central pedon and two satellite pedons are sampled for full characterization and DSP measurements. Although this is not a DSP project, it does gather important DSP data. Use the yellow tag when submitting the samples to KSSL, and populate a DSP plot ID in the NASIS Site Table.

# Appendix A: DSP Effort Planning Checklist

Extensive Tier Efforts (All SSO Pedon Descriptions):

* Review the *2021 DSP Tiers and NASIS Guide.xlsx.*
* Read references for earth cover kind level 1 and 2, cracks, crusts, structure, roots, and pores.
* Collect extensive tier data for each pedon description.
* Enter extensive tier measures in NASIS for each pedon description.

Intermediate Tier and Intensive Tier Efforts:

* Review DSP references at <https://new.cloudvault.usda.gov/index.php/s/HB84Lw7EkKAyMC7>.
* Determine data collection type for the effort (**Dispersed** or **Project**).
* If **Project**, visit with conservation staff (field office, SSS, RSS, AC) to identify and prioritize projects

that address a locally relevant conservation question.

* If **Project**, identify state/local NRCS conservation staff project sponsor.
* If **Dispersed**, work with SPSD staff to identify opportunities to integrate DSP data collection within

routine soil survey operations.

* Determine intensity tier for effort (**Intermediate** or **Intensive**) as defined by NI 430-308.1 and referenced in *2021 DSP Tiers and NASIS Guide.xlsx.*
* Determine data collection type/project kind as defined by the *2017 SSM, Ch. 9,* and the *2021 DSP*

*Guide.*

1–Dispersed/Range of Values

2–Project/Baseline or Reference Study

3–Project/Soil Change Study (space for time)

4–Project/Repeated Measures Study

* Develop work plan using Appendices B and C in the *2021 DSP Guide.*
* Request review of work plan by tech team and management team.
* If **Project**, discuss DSP project with MLRA tech team to gather and consolidate each sponsor’s needs. Present to management team for review and approval.
* Identify locations, and line up landowner permissions. The conservation sponsor may be able to help.
* Consider the distribution of the plots across the landform to ensure that the resulting data represents the largest extent possible.
* For all intensive and intermediate tier efforts, enter NASIS project and description. See the *2021 DSP Tiers and NASIS Guide.xlsx* for details.
* Submit request for assistance (RFA) to NSSC for KSSL sampling, supplies, and any equipment (e.g., Amoozemeters, POX-C/Active C kit, etc.)
* If optional lab analyses from private labs are planned, obtain three cost estimates and request funding.
* Determine sampling timeframe and personnel. Discuss with supervisor and conservation sponsor who can assist with sampling

# Appendix B: DSP Work Plan Summary

**Please copy this DSP work plan summary (page below) into the description field for this project in the NASIS Project Table.**

**DSP Work Plan Summary**

**General Information**

|  |  |
| --- | --- |
| Date project developed: |  |
| NASIS user project ID: |  |
| NASIS user project name: |  |
| ESD IDs: |  |
| Project discussed with and approved by MLRA tech team (Yes/No; include details if needed) |  |
| Project sampling dates: |  |

**DSP Projects Details**

|  |  |
| --- | --- |
| DSP data collection type/project kind (dispersed/range of values;  project/baseline or reference study; project/soil change study-space for time; or project/repeated measures): |  |
| DSP tier intensity (intermediate or intensive): |  |
| DSP plot configuration (example: “main pedon with 2 satellites”): |  |

**Key Contacts Project and Collaborators**

|  |  |  |  |
| --- | --- | --- | --- |
| **Role** | **Name** | **Email address** | **Phone number** |
| Project lead: |  |  |  |
| SSO lead (if different from above): |  |  |  |
| KSSL lab liaison: |  |  |  |
| State sponsor (i.e. STC, SSS, RSS, AC, DC): |  |  |  |
| Local conservation lead (i.e. district conservationist): |  |  |  |
| Other key project partners: |  |  |  |

**Background narrative and project justification:**

**Project objective** (include key soil properties and/or relationships to be evaluated)**:**

**Project deliverables** (consider ecological sites/states, soils, management systems, conservation practices represented)**:**

**Project methodology and design** (DSP plot, DSP with satellite samples, TUD locations, etc.)**:**

**Describe ecological site, soil, or other entity (e.g., landscape) to be evaluated:**

# Appendix C: DSP Work Plan Development Guide

Use this DSP work plan development guideto document planning decisions for all intermediate and intensive tier DSP projects. Such decisions are related to the questions of where, what, when, why, and how many to sample. This development guide can then be summarized in the *2021 DSP Guide,* Appendix B: DSP Work Plan Summary, and copied into the project table in NASIS.

Refer to other DSP references at <https://new.cloudvault.usda.gov/index.php/s/HB84Lw7EkKAyMC7>.

Example answers are blue.

**Project Title**

Title should reflect DSP project labeling and NASIS project ID.

DSP SD 2012 Central Rangeland

**Project Sponsor and Objective**

DSP projects are required as part of each region’s MLRA project portfolio. DSP projects should be sponsored by local agency needs. For instance, an area resource soil scientist may request that soil health reference values be collected on a suite of important soils. The project plan should meet the needs of the sponsor and enhance regular soil survey activities. DSP projects are categorized into tiers by the intensity and amount of data collected. For more information, click the link to the DSP project guidance at the top of this page. All DSP projects have completed NASIS records as deliverables. Record any additional deliverable expected by the project sponsor.

**Project Sponsor:**

State Conservationist and Resource Soil Scientists – Kansas

**Project Objective:**

Evaluate DSPs and soil health indicators for a major soil series component on multiple land uses including soil health management systems to answer a question from the state soil scientist.

**Deliverables**

Include ecological sites, states, soils, and management systems represented.

NASIS Project Completed

Report of mean and range of soil health indicators by soil and land management system (used by state soil scientist to make recommendations)

**Other deliverables (describe):**

Photos of landscape and soil profiles (linked to data collected) for use in public affairs material.

**Project Scope**

Project scope is intended to capture the extent of the project, including the soils and ecological sites to which any results should apply. Refer to the 2021 DSP Guide; the 2017 Soil Survey Manual, Chapter 9; or the 2008 Soil Change Guide for guidance on structuring a DSP project.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NASIS project name** | Western Kansas Tableland DSP | | | |
| **Prepared by soil scientist:** | JC Remley | | **Date:** 10/01/2018 |  |
| **SS update?** No |  | Benchmark soil study? Yes | **Ecological site inventory?** Yes |  |
| **Collaborators :**  Conservation District | |  | | |
| **Sampling dates (mm/dd/yyyy** to **mm/dd/yyyy):**  10/22/2018 to 10/26/2018 | | |  | |

**Project Design**

Capture the way in which sampling and data collection will meet project objectives. Include targeted ecological sites, landscapes, and individual soils. If sampling a catena, list all soils to be targeted within each portion of the landscape. Conceptualize variations in plot- and pedon-collection based on landscape and soil features. DSP projects should capture both the temporal and spatial variability of soil properties across the project. “Plot” is a term used to indicate independent locations. Each plot should represent the landform and a single land use or management system type. The typical plot size is 10 x 10 m. SSO staff need to use professional judgement when determining plot size and distance between main and satellite pedons to capture the landform and to adequately capture variability.

**Describe ecological site, soil, or landscape to be captured:**

Include block diagrams, state-and-transition models, schematics, et cetera to convey concepts as necessary.

**Targeted and Similar Soils**

|  |  |
| --- | --- |
| List all soils that will be targeted for sampling as part of this project. | |
| **Major component phase** | **Classification** |
| Keith Silt Loam | Fine-silty, mixed, superactive, mesic Aridic Argiustolls |
|  |  |
| Project design should capture links between targeted soils and ecological sites and landforms. | |

|  |  |  |
| --- | --- | --- |
| For each target soil, list all similar soils that may also be considered for sampling and list nearest probable inclusion and adjacent major component. | | |
| **Component** | **Similar Soils** | **Classification** |
| Keith | None |  |
|  |  |
|  |  |
|  |  |  |
| **Component** | **Inclusions** | **Classification** |
| Keith | Pleasant | Fine, smectitic, mesic Torrertic Argiustolls |
|  |  |
|  |  |
| **Component** | **Adjacent Map Unit Major Component** | **Classification** |
| Keith | Ulysses silt loam 3 to 6 percent slopes | Fine-silty, mixed, superactive, mesic Torriorthentic Haplustolls |
|  |  |
|  |  |

**General Information about Targeted Soils**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Surface texture(s)** | | **Slope percent (range)** | **Aspect(s)** | | | **Elevation (range)** | |
| Silt loam | | 0 to 1 | 0 | | | 1250 | |
| **Landform** | Plains, summit | | | | | | |
| **Will rock fragments interfere with sampling soil cores?** | | | | No | **At what depths?** | |  |
| **Instructions about what to exclude (e.g., a certain landform, aspects)** | | | | | | | |
| **Insert block diagram illustrating landforms to be sampled or excluded (optional).** | | | | | | | |

**Describe Conditions Selected**

Conditions refer to individual ecological state, management systems, or other land use classification that would cause a difference in important soil properties. This portion refers to the idealized conditions represented.

Describe conditions selected, and discuss rationale. For each condition to be sampled, describe repeating patterns within the plant community or management system that may impact sampling. Patterns that commonly occur at the field-to-plot scale include (among other features): intermingled patches of vegetation, such as shrub or intershrub patches; row and furrow; and periglacial patterned ground.

**Describe reference condition (including any patterns that may impact sampling design):**

Restored mid-grass prairie

**Describe alternate conditions chosen and why (including any patterns that may impact sampling design):**

Corn-soybean: Soil health management system (no tillage and cover crops in rotation)

Corn-soybean: No-tillage system

Corn-soybean: Conventional tillage system

**Include state-and-transition models or other schematics that describe project conditions:**

For crop system - under development within ES and EDIT guidance (include as available).

**Targeted Conditions**

|  |  |  |  |
| --- | --- | --- | --- |
| For each target condition, list specific ecological site states, conditions, and management systems that will be included. These are the actual conditions that are acceptable from sampling. | | | |
| **Target Condition** | **Included**  **state, phase, management system, etc.** | **Practices, vegetation included** |
| Corn-soybean: Soil health management system |  | Follow soil health management system tillage recommendations. |
|  | Any combination of corn and soybeans for more than 5 years with cover crops included more than 50% of years. |
|  |  |
|  |  |
| **Target Condition** | **Included**  **state, phase, management system, etc.** | **Practices, vegetation included** |
| Corn-soybean: No-tillage system |  | Any combination of corn and soybeans for more than 5 years. |
|  | All fields that have had no tillage for more than 10 years. |
|  |  |
| **Target Condition** | **Included**  **state, phase, management system, etc.** | **Practices, vegetation included** |
| Corn-soybean: Conventional tillage system |  | Any combination of corn and soybeans for more than 5 years. |
|  | Chisel plow |
|  | Ridge till |

**Location of Project Area**

Identify the targeted area that includes all potential sampling areas (and thus is the area to which the results of the project are relevant).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **MLRA number** | 72 | **Land Resource Region (LRR) or Common Resource Area (CRA)** |  | |
| **Crop management zone** | | | |  |
| **Other designation name** | |  | **Other designation number** |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **State** | **County** | **FIPS county code** | **Soil survey area symbol** | **Soil survey area name** | **Part of update project** |
| KS | Sheridan | 179 | 1623 | Sheridan Soil Survey | no |

**Selected Soil Map Units**

Identify selected units in the project area that contain the target soil map unit component phase. These will be used for selecting sampling locations and spatial extrapolation of results.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Map unit ID** | **Map unit name** | **Acres of MU** | **Percent component phase in MU** | **Acres of component phase** |
|  |  |  |  |  |
|  |  |  |  |  |
| **Acres of target soil map unit component phase within study area (also size of target area):** | | | |  |

**Sampling Design**

**Estimated sources of spatial variability**

For each of three scales (regional, landscape, and site) complete the following: (A) Describe features that are likely sources of variability; (B) describe the degree to which each feature is presumed to affect soil property variability; (C) state conclusions about the need to address these sources in the sampling design; and (D) identify any special instructions for sampling design or sampling procedures.

|  |  |  |
| --- | --- | --- |
| **Regional-Scale Sources of Variability** | | |
| **(A)**  **Environmental features** | **(A)**  **Range**  **(across all polygons in a project area)** | **(B)**  **Describe effect** |
| **Elevation** | 1250 | None |
| **Temperature** | Mesic |  |
| **Precipitation** | Ustic |  |
| **Wind** |  |  |
| **Other** |  |  |
|  |  |  |
| **(C) Conclusions** | The following features may be sources of variability within the target population of soil: Minimal impacts from aspect | |
| **(D) Special sampling instructions** | 1. Plots will be distributed throughout the target area to capture this variation.  2. OR, the study area will be restricted as follows (e.g., exclude high-elevation polygons): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |

|  |  |  |
| --- | --- | --- |
| **Landscape-Scale Sources of Variability** | | |
| **(A)**  **Local physiographic features** | **(A)**  **Range**  **(within individual polygons)** | **(B)**  **Describe effect** |
| **Landform component** | Summit | None |
| **Aspect** | 0 |  |
| **Slope percent** | <3 | Degree of slope will vary by plot |
| **Slope shape** | Convex | None |
| **Other** |  |  |
|  |  |  |
| **(C) Conclusions** | The following features may be sources of variability within individual polygons:  Slope | |
| **(D) Special sampling instructions** | 1. Plots will not include atypical features (e.g., north aspect)  Slope >3% will be avoided  2. Sampling design  **will / will not**  (circle one) include extra sample in stratified sampling to more precisely capture the variability at this scale. If stratified sampling is used, establish separate plots on each of the following strata (e.g., shoulder, backslope): \_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. | |

|  |  |
| --- | --- |
| **Site (within plot) sources of variability** | |
| **(A)**  **Pattern feature**  **(within individual plots)** | **(B)**  **Kind and degree of effect** |
| Shrub and intershrub patches |  |
| Grass patches |  |
| Compaction in trails or wheel tracks |  |
| Variable stand vigor or plant density |  |
| Gopher activity |  |
| Plant species/functional group effects |  |
| Planted or natural regeneration |  |
| Slash piles |  |
| Microtopography |  |
| Row and furrow | Properties may vary based on distance from crop row |
| Terraces, waterways |  |
| Other |  |
|  |  |
| **(C) Conclusions** | The following site-scale patterns or features can be detected without digging a hole and may be sources of soil property variability on plots:  Rows and furrows |
| **(D) Special sampling instructions** | 1. Sampling design  **will / will not** (circle one) include stratified sampling to more precisely capture the variability at this scale. If stratified sampling is used, stratify soil sample collection within the plot according to (e.g., shrub and intershrub):  Pedons will always be sampled midway between current cash crop rows to mitigate variability encountered.    2. If other features are encountered during sampling, notations will be made on field datasheets.  Relocate unsuitable soil sample locations. These locations include creeks, rock outcrop, and soil inclusions.  Pedons will be selected to avoid wheel tracks or physical structures (including grass waterways).  If a soil sample location falls on one of these unsuitable locations, move 2 m in a random direction until a suitable location is found. |

**Planned Replication and DSP Identification**

See the 2021 DSP Tier and NASIS Guide.xlsx spreadsheet for guidance on creating pedon and sample IDs for NASIS and laboratory submission.

Once the project design has been conceptualized, the sampling design captures the “where” portion of the project plan. IDs are given to each condition for labeling of plots and pedons in NASIS and for summarizing data collected for collaborators.

|  |  |  |  |
| --- | --- | --- | --- |
| **Target soil** | **Soil ID (one or two characters)** | **Target condition** | **Condition ID (one or two characters)** |
| ex. Alpha | A | Reference – Shortgrass Prairie | SP |
| Keith | K | Restored Prairie | RP |
| Keith | K | Soil Health System | SH |
| Keith | K | No-till | NT |
| Keith | K | Conventional Till | CT |

**Site replication**

To properly evaluate DSPs, observations and samples are needed from multiple locations on the landscape. A DSP project should have at least three sites for each soil-condition combination. Each independent location may have multiple soils. It is good, but not necessary, to have multiple conditions present at each site.

This table is intended for organizing and planning; NASIS records should be populated after sampling is completed. The location should be general, but GPS locations can be included if known. Specific locations will be entered into NASIS at the time of sampling.

|  |  |  |  |
| --- | --- | --- | --- |
| **Site (number)** | **Location**  **(general proposed)** | **Target soils present** | **Target conditions present** |
| 1 | Sheridan Co.; McD farm | Keith | RP, SH |
| 2 | Sheridan Co.; Roger farm | Keith | SH, NT |
| 3 | Sheridan Co.; NE corner | Keith | NT |
| 4 | Sheridan Co.; McD north | Keith | NT, CT |
| 5 | Sheridan Co.; SW | Keith | CT |
| 6 | Sheridan Co.; SW | Keith | CT |

**Plot and pedon replication**

Within each site, vegetation and individual pedons are arranged in plots. Typically, there is one plot per site. Plots are identified by both the soil and condition and thus can be nested within sites. DSP plot ID and plot configuration can be populated alongside the appropriate UserSiteID and UserPedonID. This population allows other users to query pedons by plot and plots by pedons. For further guidance, see the 2021 DSP Tier and NASIS Guide.xlsx and the 2021 DSP guide.

Examples are given for multiple levels of replication across conditions for one project.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Site No.** | **Soil ID** | **Condition ID** | **DSP plot ID** | **Pedon No.** | **User pedon/site ID** |
| 1 | K | RP | K-RP-1 | 1 | S2004WA027009 |
| 1 | K | RP | K-RP-1 | 2 | S2004WA027010A |
| 1 | K | RP | K-RP-1 | 3 | S2004WA027011B |
| 1 | K | SH | K-SH-1 | 1 | S2004WA027012 |
| 1 | K | SH | K-SH-1 | 2 | S2004WA027013A |
| 1 | K | SH | K-SH-1 | 3 | S2004WA027014B |
| 2 | K | SH | K-SH-2 | 1 | S2004WA027015 |
| 2 | K | SH | K-SH-2 | 2 | S2004WA027016A |
| 2 | K | SH | K-SH-2 | 3 | S2004WA027017B |
| 2 | K | NT | K-NT-2 | 1 | S2004WA027018 |
| 2 | K | NT | K-NT-2 | 2 | S2004WA027019A |
| 2 | K | NT | K-NT-2 | 3 | S2004WA027020B |
| 3 | K | NT | K-NT-3 | 1 | S2004WA027021 |
| 3 | K | NT | K-NT-3 | 2 | S2004WA027022A |
| 3 | K | NT | K-NT-3 | 3 | S2004WA027023B |
| 3 | K | NT | K-SH-3 | 1 | S2004WA027024 |
| 3 | K | NT | K-SH-3 | 2 | S2004WA027025A |
| 3 | K | NT | K-SH-3 | 3 | S2004WA027026B |

More information is at <https://new.cloudvault.usda.gov/index.php/s/HB84Lw7EkKAyMC7>.

# Appendix D: Field Prep Checklist for Intermediate & Intensive Tier Efforts

* Review the *2021 DSP Guide,* Appendix B: DSP Work Plan Summary, and Appendix C: DSP Work Plan Development Guide) to confirm the project objective, deliverables, project methodology/design, and location identification (DSP Plot ID) and the plan for data collection and sampling.
* Review *2021 DSP Tiers and NASIS Guide.xlsx* and any other DSP references as a refresher.
* Reference the Materials tab of the *2021 DSP Tiers and NASIS Guide.xlsx* and finalize the KSSL equipment requested by the NSSC RFA process. Do you still need the requested amoozemeters, POXC/Active C kit, or other supplies and equipment?
* For intensive tier (KSSL and other lab measures), determine the number of main pedons and satellite

pedons to be sampled. Finalize the number tags, pint containers, clod boxes, hair nets, large sampling bags, Ziplocs for Db, and other supplies and equipment being requested.

* At a minimum of 30 days prior to sampling, email KSSL staff Michelle Etmund ([michelle.etmund@usda.gov](mailto:michelle.etmund@usda.gov)) and Amber Kenjar (amber.kenjar@usda.gov) to provide the shipping address and to finalize the needed supplies and equipment. Copy (cc) your lab liaison and your supervisor. This request should also have been made previously through the NSSC RFA process.
* Coordinate with conservation sponsor and other partners.
* Confirm landowner permissions and access.
* Visit field locations to confirm that the intended soils, land use, and management are present.
* Finalize sampling schedule, staff assistance, and roles.
* Develop a sampling collection plan (see *2021 DSP Guide,* Appendix F: DSP Sample Collection Plan) to share with sampling team. Include pedon locations, sample depths, sample types, and labeling instructions.
* Print forms (e.g., SOI–232, Land Use and Management Questionnaire for each site and plot, etc.)

# Appendix E: Sampling Checklist—Intensive Tier Efforts

Intensive sampling requires an extra level of planning and coordination that other intensities do not. Use the previously developed work plan (*2021 DSP Guide,* Appendix B: DSP Work Plan Summary, and Appendix C: DSP Work Plan Development Guide), the information in *2021 DSP Tiers and NASIS Guide.xlsx,* and *2021 DSP Guide,* Appendix F: DSP Sample Collection Plan.

* Enter required information in NASIS (see *2021 DSP Tiers and NASIS Guide.xlsx*).
* Review *2021 DSP Guide,* Appendix E: Sampling Checklist, and Appendix F: DSP Sample Connection Plan, on developing a sample collection plan.
* Review criteria for determining the sampling depths in the *2021 DSP Guide,* Appendix G: Sampling Depth Decision Tree.
* Remember that pedons will be described by genetic horizon and the depths in the pedon description in NASIS should match the genetic horizons. For subsampled horizons, the Pedon Horizon Sample Table needs to be populated with the sampling depths.
* Coordinate shipping with KSSL by emailing Michelle Etmund ([michelle.etmund@usda.gov](mailto:michelle.etmund@usda.gov)) and Amber Kenjar ([amber.kenjar@usda.gov](mailto:amber.kenjar@usda.gov)).

For each pedon: In addition to the samples for the intermediate tier analyses in the SSO lab, collect the following four sampling types for KSSL.

* + **Bulk material** is sampled from a horizon that has no known or specific volume. A bulk sample should be collected for all described samples.
* Applies to all DSP pedons (main, main/characterization, and satellite).
* Collect samples- general guidelines may need to be adapted by project with full genetic horizons and supplemental subdivisions or sampling only very thin genetic horizons
  + **Clods** are undisturbed and stabilized samples that can be used for bulk density and natural fabric determination. They are collected only for full characterization pedons.
* Applies only to full characterization pedons. Sampling is by genetic horizon.
  + **Undisturbed material** is from a sampled horizon. It is collected without disturbing the medium and fine structural units of samples from surface and A horizons.
* Applies only to A horizons. If no A horizon, then sample the surface only.
* For water stable aggregate analysis.
  + **Known volume (bulk density)** is determined for a sample obtained from a known volume of soil for each layer to a depth of 50 cm.
* Volumetric samples (core, compliant cavity) should be collected for all pedons and all layers and subsamples to a depth of at least 50 cm.
* Enter description in NASIS.
* Arrange shipping with KSSL by emailing Michelle Etmund ([michelle.etmund@usda.gov](mailto:michelle.etmund@usda.gov)) and Amber

Kenjar ([amber.kenjar@usda.gov](mailto:amber.kenjar@usda.gov)).

# Appendix F: DSP Sample Collection Plan—Intensive Tier

Intensive tier efforts (either project or dispersed data collection type) require additional planning.

Modify the information below to document what an individual sampling team needs to accomplish as part of an intensive tier effort.

Reference the DSP documents and guides at   
<https://new.cloudvault.usda.gov/index.php/s/HB84Lw7EkKAyMC7>.

Reference the *2014 KSSL Shipping Procedures* at  
<http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1267302&ext=pdf>.

Reference the *KSSL* *Submission Spreadsheets* at  
<http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=nrcs142p2_052597&ext=zip>.

Use previously developed work plan from *2021 DSP Guide,* Appendix B: DSP Work Plan Summary, and Appendix C: DSP Work Plan Development Guide.

**Before and After Sampling**

Refer to *2021 DSP Tiers and NASIS Guide.xlsx,* which includes information on where and how measures need to be recorded in NASIS.

**Materials** (See the materials tab in the *2021 DSP Tiers and NASIS Guide.xlsx*):

Draft list of tools/equipment and consumables needed here.

**DSP plot and pedon locations**:

Plot 1 DSP plot ID:\_\_\_\_\_\_\_\_\_\_\_

Location description:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Main pedon: Lat/Long \_\_\_\_\_\_\_\_\_\_\_\_/ \_\_\_\_\_\_\_\_\_\_\_\_\_

User pedon ID/User site ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Satellite pedon 1: Lat/Long \_\_\_\_\_\_\_\_\_\_\_\_/ \_\_\_\_\_\_\_\_\_\_\_\_\_

User pedon ID/User site ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Satellite pedon 2: Lat/Long \_\_\_\_\_\_\_\_\_\_\_\_/ \_\_\_\_\_\_\_\_\_\_\_\_\_

User pedon ID/User site ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Add other satellites as needed

Plot 2 DSP Plot ID:\_\_\_\_\_\_\_\_\_\_\_

Location description:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Main pedon: Lat/Long \_\_\_\_\_\_\_\_\_\_\_\_/ \_\_\_\_\_\_\_\_\_\_\_\_\_

User pedon ID/User site ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Satellite pedon 1: Lat/Long \_\_\_\_\_\_\_\_\_\_\_\_/ \_\_\_\_\_\_\_\_\_\_\_\_\_

User pedon ID/User site ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Satellite pedon 2: Lat/Long \_\_\_\_\_\_\_\_\_\_\_\_/ \_\_\_\_\_\_\_\_\_\_\_\_\_

User pedon ID/User site ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Add other satellites as needed

Plot 3 DSP Plot ID:\_\_\_\_\_\_\_\_\_\_\_

Location description:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Main pedon: Lat/Long \_\_\_\_\_\_\_\_\_\_\_\_/ \_\_\_\_\_\_\_\_\_\_\_\_\_

User pedon ID/User site ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Satellite pedon 1: Lat/Long \_\_\_\_\_\_\_\_\_\_\_\_/ \_\_\_\_\_\_\_\_\_\_\_\_\_

User pedon ID/User site ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Satellite pedon 2: Lat/Long \_\_\_\_\_\_\_\_\_\_\_\_/ \_\_\_\_\_\_\_\_\_\_\_\_\_

User pedon ID/User site ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Add other satellites as needed

Add additional plots as needed.

**At each plot:**

Land use and management questionnaires to be completed by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Pictures to be taken by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Amoozemeter readings to be completed by:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Flag locations. Be careful not to disturb sample collection areas, which will be used for Ksat and infiltration,

Plot # DSP plot ID: \_\_\_\_\_\_\_\_\_\_\_

Pedon 1 (Circle: Main/Satellite): Lat/Long \_\_\_\_\_\_\_\_\_\_\_\_/ \_\_\_\_\_\_\_\_\_\_\_\_\_

User pedon ID/User site ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Description of flagged location: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which 3-4 layers per pedon will be measured: \_\_\_\_\_\_\_\_\_\_\_\_\_

Number of replicates per pedon/layer (min. of 2)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Add additional pedons as needed

**At each pedon location:**

1. Site description to be completed by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Includes ecological site ID and community phase, vegetation measurements, and local or national Soil Health Assessment.

1. Surface properties to be completed by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Includes infiltration, stability kit (optional).

1. Pedon to be described by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Includes soil temperature, soil moisture, bulk density

1. Characterization pit (minimum of 1 main pedon per soil and per land use/management): >200cm (or restrictive layer).
2. Main: at least 100 cm, obtain soil ID.
3. Satellite: at least 50 cm, probable soil ID (given relation to main).
4. Sample collection and organization to be completed by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Gather proper materials.
6. Prepare to label tags, bags, and any other containers with identical information.

|  |
| --- |
|  |
| *DSP sample tag used to submit samples to KSSL for DSP analysis.* |

1. Sampling for each pedon: Collect a sample for the intermediate tier analyses in the SSO lab **AND** the following four sampling types for KSSL.
   * **Bulk material** is sampled from a horizon that has no known or specific volume. All described samples should have a bulk sample collected, including:

* Applies to all DSP pedons (main, main/full characterization, and satellite).
* Collect samples (See Appendices G & H for details on depths).
* Sample all material or record the portion of the sample included in the bag (estimated weight or volume minus coarse fragments).
* Bag samples in large KSSL sampling bags, roll the top, and staple on yellow DSP tag. Label both bag and tag. For more details, see *2014 KSSL Shipping Procedures Document* (<http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1267302&ext=pdf>).
  + **Clods** are undisturbed and stabilized samples that can be used for bulk density and natural fabric determination. They are collected only for full characterization pedons.
* Applies only to full characterization pedons. Sampling is by genetic horizon.
* Three clods per layer.
* Clod samples are dipped in saran, which allows for the collection of bulk density and water retention information. Clods should be collected from at least 1 main pedon per soil and land use/management system (same as full characterization pedon). Prepare samples, box in clod boxes, label, and ship according to the *2021 DSP Guide* and the *2014 KSSL Shipping Procedures Guide* (<http://www.nrcs.usda.gov/wps/PA_NRCSConsumption/download?cid=stelprdb1267302&ext=pdf>).
  + **Undisturbed material** is from a sampled horizon. It is collected without disturbing the medium and fine structural unit of samples from surface and A horizons.
* Applies only to A horizons. If no A horizon, then sample the surface only.
* Only one sample per sampled layer.
* Place sample into a rigid container, such as the cardboard pint container provided by KSSL.
* Label container the same as bulk sample bags. Use a Sharpie or equivalent.
* Break peds and clods no more than needed to fit in container.
* Do not shake or disrupt during transport.
* If not shipping immediately, remove lid and allow to air dry.
* For shipping, fill any unfilled space in container with newspaper or other breathable packing material.
* Securely fasten lid; e.g., with tape. Put container in a secondary shipping container provided by KSSL; e.g., a clod box and plastic bag.
  + **Known volume (bulk density)** is determined for a sample obtained from a known volume of soil for each layer to a depth of 50 cm.
* Volumetric samples should be collected for all pedons and all layers to a depth of at least 50 cm.
* Use established core or compliant cavity methods.
* Carefully place ALL material from the volumetric sample in a labeled Ziploc bag.
* Record volume measurement BOTH on the bag and for entry into NASIS.
* Seal Ziploc bag carefully, and place all samples from each pedon in a secondary large sample bag (the same bags used for bulk samples). Staple the large sample bags, and use a yellow DSP tag. Circle “Bulk Density” as the sample type.
  + Refer to the *2021 DSP Tiers and NASIS Guide.xlsx,* which includes information on which samples need to be collected and when, where, and how to collect them.
* Samples should be kept cool and shipped as soon as possible.
* Consider air drying samples if they must be stored prior to shipping and analyses.
* Pedon descriptions must be entered in NASIS before samples are submitted to the lab. Descriptions should be complete site characterizations, including parent material, earth cover kind, geomorphic setting, et cetera. The processing and analysis of samples begins after the NASIS data is transferred into the KSSL Laboratory Information Management System (LIMS) database. See KSSL links in this Appendix.
* Sample shipping should be arranged directly with a KSSL contact. Forms and information must be submitted in the boxes with the samples. Forms and information must also be submitted electronically to the lab contact (Scarlett Murphy at [scarlett.murphy@usda.gov](mailto:scarlett.murphy@usda.gov)), KSSL processing work leader (Michelle Etmund at michelle.etmund@usda.gov), soil survey region liaison (<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053896> ), and supervisor. This dual submission ensures the samples are quickly and correctly catalogued and logged into the LIMS system when the shipment arrives. See the links at beginning of this Appendix.

# Appendix G: Sample Depth Decision Tree

**NOTE:** Development and application of a sample depth decision tree require professional judgement.

The sample depths should reflect genetic horizons. Thick horizons should be subdivided to provide sufficient detail of dynamic soil properties with depth. Ideally, samples from an A horizon are from layers that are approximately 5 cm thick. The general guidelines (0-5 cm, 5-10 cm, 10 cm to bottom of genetic horizon, and all other genetic horizons) should be adapted so samples are congruent with genetic horizon breaks.

1. **If an O horizon is above mineral material:**
   1. Sample O horizons separately.
2. **Mineral soil** (at 0 cm or directly below an O horizon):

Choose one of the following options:

* 1. If mineral surface horizon <7 cm thick, then
     1. Collect sample of surface horizon
     2. Collect sample from bottom of surface horizon to 10 cm or genetic break
  2. If mineral surface horizon 8–10 cm thick, then
     1. Collect sample of upper 5 cm of horizon (for example, 0–5 cm)
     2. Sample from 5 cm to genetic horizon break
     3. Collect samples by genetic horizons to bottom of description (>50 cm, >100 cm, or >200 cm depending on if pedon is satellite, main, or main/characterization)
  3. If mineral surface horizon 10–13 cm thick, then
     1. Collect sample from the upper 5 cm as a separate layer (for example, 0–5 cm)
     2. Collect sample from 5–10 cm or genetic horizon.
     3. Collect samples by genetic horizons to bottom of description (>50 cm, >100 cm, or >200 cm depending on if pedon is satellite, main, or main/characterization)
  4. If mineral surface horizon >13 cm thick, then
     1. Collect sample from the upper 5 cm as a separate layer (for example, 0–5 cm)
     2. Collect next 5 cm as a separate layer (for example, 5–10 cm)
     3. Collect next sample from 10 cm to bottom of horizon
     4. Collect samples from genetic horizons to bottom of description (>50 cm, >100 cm, or >200 cm depending on if pedon is satellite, main, or main/characterization)

# Appendix H: Sampling Depth Examples

**Example 1**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Genetic horizons** | | **Intermediate tier** | **Intensive tier** | | | |
| **Field sample collected for SSO lab analysis** | **Clod sample (for main/ characterization only)** | **Undisturbed (for KSSL water stable aggregates)** | **Bulk samples** | **Known-volume samples (KSSL Db)** |
| **Hz** | **Depth** | **Depth** | **Depth** | **Depth** | **Depth** | **Depth** |
| Ap1 | 0-4 cm | 0-4 cm | 0-4 cm | 0-4 cm | 0-4 cm | 0-4 cm |
| Ap2 | 4-12 cm | 4-12 cm | 4-12 cm | 4-12 cm | 4-12 cm | 4-12 cm |
| A | 12-18cm | 12-18 cm | 12-18 cm | 12-18 cm | 12-18 cm | 12-18 cm |
| Bk1 | 18-31 cm | 18-31 cm | 18-31 cm | N/A: only A horizon was sampled | 18-31 cm | 18-31 cm |
| Bk2 | 31-60 cm | 31-60 cm \* | 31-60 cm | 31-60 cm \* | 31-60 cm \* |
| Bt1 | 60-95 cm | 60-95 cm | 60-95 cm | 60-95 cm | 60-95 cm |
| Bt2 | 95-200 cm | 95-145 cm\*\* | 95-145 cm | 95-145 cm\*\* | 95-145 cm\*\* |
| 145-200 cm\*\*\* | 145-200 cm | 145-200 cm\*\*\* | 145-200 cm\*\*\* |

**Example 2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Genetic horizons** | | **Intermediate tier** | **Intensive tier** | | | |
| **Field sample collected for SSO lab analysis** | **Clod sample (for main/ characterization only)** | **Undisturbed (for KSSL water stable aggregates)** | **Bulk samples** | **Known-volume samples (KSSL Db)** |
| **Hz** | **Depth** | **Depth** | **Depth** | **Depth** | **Depth** | **Depth** |
| A | 0-25 cm | 0-5 cm | 0-25 cm | 0-5 cm | 0-5 cm | 0-5 cm |
| 5-10 cm | 5-10 cm | 5-10 cm | 5-10 cm |
| 10-25 cm | 10-25 cm | 10-25 cm | 10-25 cm |
| Btk | 25-60 cm | 25-60 cm \* | 25-60 cm | N/A: only A horizon was sampled | 25-60 cm \* | 25-60 cm \* |
| Bt1 | 61-95 cm | 60-95 cm | 60-95 cm | 60-95 cm | 60-95 cm |
| BC | 95-200 cm | 95-145 cm\*\* | 95-145 cm | 95-145 cm\*\* | 95-145 cm\*\* |
| 145-200 cm\*\*\* | 145-200 cm | 145-200 cm\*\*\* | 145-200 cm\*\*\* |

**Example 3**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Genetic horizons** | | **Intermediate tier** | **Intensive tier** | | | | |
| **Field sample collected for SSO lab analysis** | **Clod sample (for main/ characterization only)** | **Undisturbed (for KSSL water stable aggregates)** | **Bulk samples** | | **Known-volume samples (KSSL Db)** |
| **Hz** | **Depth** | **Depth** | **Depth** | **Depth** | **Depth** | | **Depth** |
| Ap1 | 0-6 cm | 0-6 cm | 0-6 cm | 0-6 cm | | 0-6 cm | 0-6 cm |
| Ap2 | 6-24 cm | 6-10 cm | 6-10 cm | 6-10 cm | | 6-10 cm | 6-10 cm |
|  |  | 10-24 cm | 10-24 cm | 10-24 cm | | 10-24 cm | 10-24 cm |
| AB | 24-30 cm | 24-30 cm | 24-30 cm | 24-30 cm | | 24-30 cm | 24-30 cm |
| Bk1 | 30-43 cm | 30-43 cm | 30-43 cm | N/A: only A horizon was sampled | | 30-43 cm | 30-43 cm |
| Bk2 | 43-65 cm\* | 43-65 cm\* | 43-65 cm\* | 43-65 cm\* | 43-65 cm\* |
| BC | 65-95 cm | 65-95 cm | 65-95 cm | 65-95 cm | 65-95 cm |
| R | 95+ cm |  |  |  |  |

**\*** For satellite pedons, sample to 50 cm or greater as needed for probable soil identification.

**\*\*** For main pedons, sample to 100 cm or greater as needed for positive soil identification.

**\*\*\*** For main/characterization pedons, sample to >200 cm for full characterization pit.

# Appendix I: Land Use and Management Questionnaire

Land use and management information provides the context that makes DSP data valuable. Complete a questionnaire for all sites as part of intermediate and intensive DSP Efforts.

This data will be incorporated into a future NASIS model. In the meantime, **copy the questions and the answers into the NASIS Site Text Table**.

**Site Information**:

**User site ID/User pedon ID** (should be the same):

**DSP plot ID**:

1. What dominant erosion or deposition category best describes the site?
2. Sheet/rill erosion (even-loss of soil or small channels of soil loss)
3. Ephemeral gully and/or gully erosion (small ephemeral gullies that can be filled or tilled annually or large channels)
4. Gully/streambank erosion (large channels or actively eroding streambanks)
5. Wind scouring (removal of surface material by wind)
6. Roadway/Skid-trail/Heavy equipment/Other anthropogenic (erosion and deposition on or next to disturbed pathways)
7. Wind deposition
8. Water deposition
9. None (no apparent erosion or deposition)
10. What is the dominant land use?
11. **Crop** (Land used primarily for the production and harvest of annual or perennial field, forage,

food, fiber, horticultural, orchard, vineyard, or energy crops.)

1. **Forest** (Land on which the historic and/or introduced vegetation is predominantly tree cover managed for the production of wood products or non-timber forest products.)
2. **Range** (Land on which the historic and/or introduced vegetation is predominantly grasses, grasslike plants, forbs, or shrubs managed as natural ecosystem. Rangeland may include natural

grasslands, savannas, shrublands, tundra, alpine communities, marshes, and meadows.)

1. **Pasture** (Land on which introduced or domesticated native forage species are used

primarily for the production of livestock. Pastures receive periodic renovation and cultural

treatments, such as tillage, fertilization, mowing, weed control, and, in places, irrigation. Pastures are

not in rotation with crops.)

1. **Developed land** (Land occupied by buildings and related facilities used for residences,

commercial sites, public highways, and airports and by open spaces associated with towns and cities, including urban agriculture and community gardens.)

1. **Water** (Geographic area whose dominant characteristic is open water or permanent ice or snow.)
2. **Associated agriculture lands** (Land associated with farms and ranches but not

purposefully managed for food, forage, or fiber. Typically, this land is associated with nearby

production or conservation lands. It can include incidental areas, such as idle center pivot

corners, odd areas, ditches, watercourses, riparian areas, field edges, and seasonal and permanent

wetlands.)

1. **Other** (Land that is barren, sandy, rocky, or impacted by the extraction of natural resources, such as minerals, gravel, sand, coal, shale, rock, oil, and natural gas)
2. For all applicable land uses, please complete the following charts for the last 5 years:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | Fertility Test Conducted (Yes/No) | Nitrogen (N) Applied According to Test (Yes/No) | Phosphorus (P2O5) Applied According to Test (Yes/No) | Potassium (K2O) Applied According to Test (Yes/No) |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Year | Nitrogen (N) Application Rate | Nitrogen (N) Units (e.g. pounds/acre) | Phosphorus (P2O5) Applied According to Test (Yes/No) | Phosphorus (P2O5) Units (e.g. pounds/acre) | Potassium (K2O) Applied According to Test (Yes/No) | Potassium (K2O) Units (e.g. pounds/acre) |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Herbicide Applied (Yes/No) | Fungicide Applied (Yes/No) | Insecticide Applied (Yes/No) |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

1. Complete the questionnaire below for the applicable land uses.

**Crop Management**

1. Is cropping (removal of plant material) done on this site? Yes/No
2. How many years has the current (or a similar) management system been in place?
3. 0 to 5 years
4. 6 to 10 years
5. 11 to 15 years
6. 16 to 25 years
7. More than 25 years
8. Unknown
9. Is the site or field organic or managed as an organic system? Yes/No
10. Which dominate management system best describes the operation?
11. Conventional tillage
12. Strip tillage
13. No-till
14. Continuous cover (e.g., hay)
15. Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
16. Which best describes the most commonly used tillage?
17. Pre-plant tillage deeper than 4 inches (a system with deep pre-plant tillage)
18. Post-harvest deeper than 4 inches (a system that does not include deep pre-plant tillage but does include deep post-harvest tillage)
19. Both pre-plant and post-harvest tillage
20. Ridge, mulch, or other conservation tillage
21. No tillage
22. Unknown
23. Check all field scale practices on site.
24. Terracing
25. Drainage (ditch, tile, or other subsurface)
26. Land leveling
27. Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
28. Is the field irrigated? Yes/No
29. If irrigated, what type best describes the irrigation?
30. Flood
31. Furrow
32. Gated pipe
33. Sprinkler (Center pivot, side roll, other)
34. Drip
35. Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
36. If irrigated, what best describes the water source for the irrigation?
37. Surface water
38. Well water
39. Other
40. What organic materials are applied?
41. Animal manure
42. Green manure
43. None
44. Other organic material amendments. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
45. Never
46. Unknown
47. How long is the typical crop rotation (years)? \_\_\_\_\_\_\_\_\_
48. List the crop rotation and years grown (include prevented plant and no crops only for the last 5 years).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | Month planted | Crop species in rotation (include cover crops) | Cover crop (Yes/No) | Cover crop seeding method (Interseeded with crop, post harvesting crop, or season-long cover crop) | Prevented plant/No crops (Yes/No) |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

1. What is the current-year crop arrangement?
2. Single crop. Only one crop is grown per year.
3. Double crop. Two crops are grown in per year in sequence strip or other mix.
4. Two or more crops are grown at the same time.
5. More than three crops are grown in sequence.
6. Unknown
7. What is the previous-year crop arrangement?
8. Single crop. Only one crop is grown per year.
9. Double crop. Two crops are grown per year in sequence strip or other mix.
10. Two or more crops are grown at the same time.
11. More than three crops are grown in sequence.
12. Unknown
13. How are cover crops terminated and in what month? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
14. Is the site contour farmed? Yes/No
15. How is stover managed? (applicable to crops harvested for grain)
16. Not applicable to system
17. Gleaned by livestock
18. Mechanically harvested or removed from the site
19. Burned
20. Not grazed or removed after grain harvest
21. Is this cropland site grazed? Yes/No
22. How many years has the site been continuously grazed? \_\_\_\_\_\_\_\_
23. If grazed, what best describes the practice?
24. Grazed instead of cutting
25. Grazed cover crop
26. Other. Please specify \_\_\_\_\_\_\_\_\_\_\_
27. If burned, what is the frequency? \_\_\_\_\_\_\_\_\_\_ and burn type? (Prescribed, intentional, wildfire)
28. What are the field scale practices?­­­­­­­­­­­­­­­­­­ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Forest Management**

1. Is this site an actively managed forest? Yes/No
2. How many years has the current (or a similar) management been in place?
3. 0 to 5 years
4. 6 to 10 years
5. 11 to 15 years
6. 16 to 25 years
7. More than 25 years
8. Unknown
9. Is the site managed for harvested timber products? Yes/No
10. What is the dominant vegetation?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
11. How many years ago was the stand last harvested? Select the approximate range, in years ago, that the site was last harvested (includes any practice that removes trees from the site).
12. 0 to 5 years
13. 6 to 10 years
14. 11 to 25 years
15. 26 to 50 years
16. More than 50 years
17. Select the growth status of the forest stand.
18. Establishment phase (seedling to sapling)
19. Growth phase (sapling to crown closure or merchantable size)
20. Established (mature, crown closure, or poles of merchantable size or greater)
21. What silvicultural harvest method was used or is in use? Select the most recent method.
22. Clearcutting (all trees removed; site open for natural or artificial regeneration)
23. Seed tree, scattered (widely-spaced trees left after cutting for natural regeneration)
24. Shelterwood (removal of trees in multiple cuttings over a period of years to control the regeneration environment)
25. Group selection (groups of trees removed; small-scale clearcutting leaving small open spaces for regeneration)
26. Single tree selection (removal of individual trees)
27. Coppicing (cutting limbs or tops of trees and leaving the stumps to regenerate)
28. No obvious method
29. What harvest and skidding method was used? Select the most recent method.
30. Hand falling & Tractor skidding (rubber-tired or tracked)
31. Hand falling & Animal skidding (horse, mule, other)
32. Hand falling & Aerial skidding (full or partial suspension of logs)
33. Mechanized falling & Tractor skidding (feller-buncher or equivalent)
34. Mechanized falling & Cut-to-length forwarder (logs fully suspended, ground-based)
35. Is the site used for emergency haying or grazing? Yes/No
36. Is there evidence of a burn (forest)? This question may best be answered by the field sampling crew. Yes/No
37. How many years ago was the most recent fire?
38. 0 to 3 years
39. 4 to 10 years
40. 11 to 25 years
41. More than 25 years
42. Unknown
43. To the best of your knowledge, what type was the most recent fire?
44. Wildfire (not intentionally set)
45. Prescribed (intentionally burned as part of a management or conservation plan)
46. To the best of your knowledge, what was the intensity or character of the most recent fire?
47. High intensity, crown fire (catastrophic, tree kill)
48. Moderate intensity, surface fire (shrubs, significant tree stand thinning)
49. Low intensity, ground or light surface fire (grass, fine fuels, minimal tree mortality)
50. None
51. What are the field scale practices?­­­­­­­­­­­­­­­­­­ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Range and Pasture Management**

1. Is the site grazed by domestic livestock? Yes/No
2. Was the site previously cropland? Yes/No
3. Is the site an easement or in the WRP? Yes/No
4. Is the site currently enrolled in CRP? Yes/No
5. How many years has the current (or a similar) management system been in place?
6. 0 to 5 years
7. 6 to 10 years
8. 11 to 15 years
9. 16 to 25 years
10. More than 25 years
11. Unknown
12. Has the site been in grass for >10 years? Yes/No
13. Has the site been used for emergency haying or grazing? Yes/No
14. Is the site both grazed and hayed? Yes/No
15. Has mechanized brush management been used on the site? Yes/No
16. What are the dominate grasses?
17. Cool season
18. Warm season
19. Mixed cool and warm season
20. What is the Land Cover Type 1? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Type 2? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
21. Native range
22. Planted pasture
23. Meadow
24. Shrubland
25. Wildlife or Wetland preserve
26. Mitigation for industrial project
27. Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
28. If pasture, have introduced species been planted to increase pasture production? Yes/No
29. If grazed, what is the stocking rate (if known)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
30. What type of livestock is grazed?
31. Cattle
32. Sheep/goats
33. Swine
34. Horses
35. Bison
36. Specialty (exotic species)
37. None
38. If the site is used for livestock grazing, what is the season of use?
39. Spring
40. Summer
41. Fall
42. Winter
43. All of above
44. What is the type of grazing?
45. Continuous grazing
46. Rotational grazing
47. Seasonal
48. Has the site been hayed? Yes/No
49. Is there evidence of a burn? This question may best be answered by the sampling crew. Yes/No
50. If yes, how long ago was the last burn?
51. 0 to 3 years
52. 4 to 10 years
53. 11 to 25 years
54. More than 25 years
55. Not Applicable
56. What type of burn was the most recent?
57. Wildfire (not intentionally set)
58. Prescribed (intentionally burned as part of a management or conservation plan)
59. None
60. How frequently does the site typically burn? Select the approximate frequency of any burns, including intentional burns and wildfires.
61. Never
62. Once per 1 to 5 years
63. Once per 6 to 10 years
64. Once per 11 to 25 years
65. More than 25 years between burns
66. What are the field scale practices?­­­­­­­­­­­­­­­­­­ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Developed Land** (includes Urban Agriculture and Community Gardens)

1. Is this site an urban garden and/or a community garden? Yes/No
2. How many years has the current (or a similar) management system been in place?
3. 0 to 5 years
4. 6 to 10 years
5. 11 to 15 years
6. 16 to 25 years
7. More than 25 years
8. Unknown
9. Is the site under a hoop house or similar structure? Yes/No
10. Are harvested plants growing in raised beds? Yes/No
11. Are the soils being amended with organic materials? Yes/No
12. If yes, which of the follow are being used?
13. Animal manure
14. Green manure
15. Bagged, retail compost
16. Municipal compost
17. Sanitary facility compost
18. Leaves, grass clippings, or food waste compost
19. Biochar
20. Ash or coal
21. Wood Chips
22. None
23. Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
24. If irrigated, what type best describes the irrigation ?
25. Flood
26. Furrow
27. Gated pipe
28. Sprinkler (Center pivot, side roll, other)
29. Drip
30. Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
31. If irrigated, what best describes the water source for irrigation?
32. Surface water
33. Well water
34. Municipal water
35. Onsite water catchment
36. Other. Please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
37. What are the field scale practices?­­­­­­­­­­­­­­­­­­ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Appendix J: Frequently Asked Questions

**What are the different the DSP data collection types?**

The dispersed DSP data collection type is integrated into routine soil survey operations and does not require a sponsor from the NRCS conservation staff. The project DSP data collection type is designed to evaluate specific land management conditions and requires an NRCS conservation staff sponsor.

**What is the difference in data tiers between the dispersed and project collection types?**

Dispersed data collection can be completed at the extensive, intermediate, or intensive levels. Project data collection can be completed at the intermediate or intensive levels. The extensive data tier intensity is now required for all soil pedon descriptions. This level includes collecting earth cover kind (level 1 and 2), soil crusts and cracks, soil structure, and roots and pores. All intermediate and intensive data collection efforts require the entry of a NASIS project into the NASIS Project Table. The intermediate intensity data tier includes data that can be collected in the field or SSO lab. Some intermediate tier measurements require equipment that must be requested from KSSL (e.g., Amoozemeters, POXC/Active C kit). See the fiscal year 2021 national bulletin *Request for National Soil Survey Center Assistance*, NB 430-20-10 SOI. The intensive DSP date tier includes sampling, KSSL analysis, and optional private lab measurements. The private lab measurements require budget approval from leadership. KSSL sampling requires a request to KSSL using the request for assistance (RFA) process (<https://forms.office.com/Pages/ResponsePage.aspx?id=5zZb7e4BvE6GfuA8-g1Gl6TUrotm_KlAinTW07qPH8FUMFQ2WE9KSDE2VDdVU1FDWFpMOU1XSTMxOSQlQCN0PWcu>).

**How can an SSO meet the requirements for update offices in the** **FY–21 DSP national bulletin?**

All update offices are expected to complete at least one DSP data collection effort per year at the intermediate or intensive DSP intensity tier. The DSP data collection can be a dispersed or project effort. A NASIS project must be entered in the NASIS Project Table for all intermediate or intensive efforts. In addition, project DSP data collection efforts require a sponsor from the state NRCS conservation staff. For intermediate or intensive tier projects, the FY–20 and FY–21 DSP national bulletins require that samples be collected and measurements made from at least three locations for each land use or management system under evaluation for each soil.

**Should DSP data collection efforts at the extensive tier intensity be entered into NASIS as a NASIS project?**

No. Extensive tier data should be included in all pedon descriptions and do not constitute a separate NASIS project. Only DSP data collection efforts at the intermediate and intensive tiers should be entered into NASIS.

**What information should be entered in the NASIS Project Table, Project Description Field?**

Use the *2021 DSP Guide,* Appendices B and C(DSP Work Plan Summary and Guide), to develop a work plan. Copy the work plan summary into the Project Table Description Field in NASIS.

**What are the options for using DSP to provide a conservation practice evaluation (CPE) to conservation staff?**

Dynamic soil properties can be measured on any soil, but such measurement do not necessarily meet the requirements for a DSP project. Project design and execution are flexible and depend on landowner interest and state needs. If standard DSP requirements are met (at least three replicates with main and satellite pedons for each land use/management/soil), a project qualifies as a DSP project. Assisting a state by tracking the effects of conservation practice implementation on fewer than three replicates or different depths qualifies as technical soil services (TSS). SSOs should fulfill state requests for TSS and attempt to expand state efforts into full DSP repeated measures projects.

The objectives of CPE are to evaluate the effects of conservation practice implementation on selected dynamic soil properties; build on the library of dynamic soil property data collected during other project types; and inform steps 5 and 6 (Formulate and Evaluate Alternatives) of the conservation planning process. Results provide land managers with options for land management decisions that address resource concerns. Evaluating the effects of targeted practices that address specific resource concerns (step 9) also provides site-specific results regarding system implementation for land managers who are new to soil health management.

Several factors must be considered when developing a CPE.

1. Current management and management history
2. Conservation practices to be implemented and evaluated
3. Resource concerns impacted by the implementation of those targeted conservation practices
4. Suite of dynamic soil properties to be measured
   1. Standard DSP sampling based on appropriate tier
   2. Specific DSPs related to implemented conservation practices but not included in standard sampling requirements
5. Lifespan of the conservation practices and the frequency and length of sampling (may correspond only to length of conservation plan contract)

**What is an acceptable scope for a project?**

The scope is flexible to meet the needs and procedures of soil survey, the SSO, and local conservation questions. To meet the needs of soil survey data collection, it is necessary to be able to extrapolate any data and information collected to soil survey databases and to the extent of the soils, landforms, land use, and management.

**What is the plot size and distance between the main and satellite pedons?**

The typical plot size is 10 x 10 m. SSO staff need to use professional judgement in determining plot size and distance between main and satellite pedons. The size of the field, distribution of the soil, and type of landform need to be considered. The goal is to adequately capture the variability of the soil across the landform and the management type.

**How do offices with limited staff develop DSP projects given the project requirements?**

Based on assessed needs at the local, state, or regional level, develop a project that helps address a concern involving one soil, one land use, and one management system. Three replicates would be sampled in this scenario. In subsequent years, plan more projects of the same type to capture the variability of DSP changes for other important land uses and management systems in the area.

**How do I decide on a focus for a DSP project?**

Focus on local or regional questions that are important for the use of soil information. Consider soil differences between land uses that have been observed by soil scientists and ecological site specialists and that need further investigation and documentation. Talk to state and local NRCS conservation personnel and National Cooperative Soil Survey cooperators to integrate DSP projects into current state efforts and to address shortcomings in the application of current soil data and interpretations.

**Can projects extend over time; for example, multiple years?**

Yes. Projects can extend over years. *2021 DSP Tiers and NASIS Guide.xlsx* contains informationon the naming convention for user project IDs so that multiple-year projects are linked.

**Are demonstration plots or fields appropriate for DSP projects?**

Yes. Demonstrations are appropriate for DSP projects. The project work plan should include the goal of the demonstration and any plans for repeated sampling over time. If repeated sampling measures are used, the repeated-measures project type should be considered. Determine if the repeated measures are for NRCS conservation practices or other management efforts. Also determine if the repeated measures will be a standalone or supplemental project. Pedon descriptions that include appropriate site information in NASIS must link demonstration farms to soil survey information. For this to meet the update SSO DSP requirement, samples need to be collected and measurements need to be made from at least three locations for each land use or management system under evaluation for each soil for all DSP data collection efforts at the intermediate or intensive tier intensity. Consider expanding outside the demonstration to capture a greater portion of soil and management variability and so the results can be extrapolated to the broader context of that soil and land use/management.

**Why is it important to capture the soil and management variability?**

The basic concept is that knowing the soil (or at least taxonomic classification) adds confidence to the aggregated DSP data. The data shows the potential of a particular soil under particular management. Using series concepts or taxonomic classification is a way to track DSP potentials that can then be extrapolated to series and classifications that have sparse DSP data. Knowing the management system is important because it shows the relative differences in DSPs on the same soil.

**Can a DSP project be combined with other special projects, such as digital soil mapping?**

Yes. Any time soils are observed and sampled, a DSP project can be added.

**Will SSOs use the soil quality test kit for DSP data collection efforts?**

SSOs should use the local or state assessments for the soil-health field assessment measure. These may be named a Soil Health Assessment or Soil Health Card. Some states use methods from the soil quality test kits.

**Can demo videos be developed for data collection?**

Yes. It’s a great recommendation to develop demo videos. Some existing videos that may be useful include the following.

Bulk density video: <https://www.youtube.com/watch?v=E7BSZrJ-TDw>

Amoozemeter video: <https://www.youtube.com/watch?v=1pkBUl9sdOc>

**Is there a list of field sampling equipment needed for DSP data collection efforts?**

Yes. See the *2021 DSP Tiers and NASIS Guide.xlsx*.

<https://new.cloudvault.usda.gov/index.php/s/HB84Lw7EkKAyMC7>

**Is there a list of chemicals and equipment needed by the SSO lab for intermediate tier DSP data collection efforts?**

Yes. See the *2021 DSP Tiers and NASIS Guide.xlsx*.

<https://new.cloudvault.usda.gov/index.php/s/HB84Lw7EkKAyMC7>

**Does the current NASIS model have all of the data fields necessary to store collected data?**

All KSSL data is stored in LIMS and the NCSS Characterization Database. A future NASIS data model will include the needed management information. Most other soil data is stored in NASIS with the locations. Exceptions are identified in the *2021 DSP Tiers and NASIS Guide.xlsx*.

<https://new.cloudvault.usda.gov/index.php/s/HB84Lw7EkKAyMC7>

**How do ecological site descriptions and DSP projects intersect?**

Ecological sites provide a good framework for organizing DSP data collection and information. All intermediate and intensive DSP projects should include the current ecological state and plant community information. Complete the management questionnaire (Appendix I) for each independent site and plot. When possible, collaborate with ecological site specialists to complete vegetation data collection on all DSP plots. Ideally, all DSP projects would have a reference community (the naturalized state where applicable) represented as a benchmark or control condition. Work is ongoing to link the terms used to describe ecological sites with the terms used in agronomic models and descriptors.

**What documentation is needed to show a DSP project is being conducted and then has been completed, including tables in NASIS, the workplan worksheet, the site management questionnaire, and anything else.**

The necessary references are at <https://new.cloudvault.usda.gov/index.php/s/HB84Lw7EkKAyMC7>.

**Are there existing datasheets formulated for tracking the appropriate properties?**

*2021 DSP Tiers and NASIS Guide.xlsx* is a useful reference. Datasheets have not yet been developed for tracking or importing data elements into NASIS specifically for DSP projects.

**At what level are DSP projects supposed to be evaluated?**

A project DSP data collection type can be conducted at the intermediate or intensive tier intensity as defined by NI 430-380. The file *2021 DSP Tiers and NASIS Guide.xlsx* may be helpful in understanding the differences among tiers.

<https://new.cloudvault.usda.gov/index.php/s/HB84Lw7EkKAyMC7>

**Are we expected to evaluate all properties of the project tier?**

Yes, unless you have a waiver from the National Leader for Research ([skye.wills@usda.gov](mailto:skye.wills@usda.gov)). The waiver needs to certify that no methods are applicable to the situation.

**If we are lacking chemicals, measuring equipment, and other resources, how is an SSO supposed to gather all necessary data?**

If you need field sampling equipment or lab chemicals, contact the regional office. If your SSO lab is not set up or fully functional, contact the regional office and/or request equipment and supplies from the KSSL. Use the RFA process for requests to the KSSL.

**What if our area mainly grows row crops using conventional tillage, and finding other land uses on a target soil is difficult?** You may consider a DSP range-of-values study or a DSP baseline or reference study instead. See Chapter 9 of the *Soil Survey Manual* for specifics.

**How many sites should be evaluated per land use or management?** Per NB 430-20-7 and NB 430-21-1 data is collected from at least three locations for each land use or management system under evaluation for each intermediate or intensive tier data collection effort.

**Can acres be reported for DSP?**

Yes. Discuss this topic with your supervisor.

**Can I report DSP activities as TSS hours?**

Sometimes. DSP data collection efforts can range from routine soil survey activities to TSS. If the effort is TSS; yes, TSS hours can be reported.

**A district conservationist is working with a producer and would like an onsite soil evaluation. It was decided to follow the DSP protocols, and the intermediate tier measure was collected for that site. How should this information be entered into NASIS?**

This is a great example of TSS and should not be entered into the NASIS Project Table. However, the pedon and site information should still be entered in NASIS following the guidance in *2021 DSP Tiers and NASIS Guide.xlsx*. A DSP plot ID must be entered in the NASIS Site Table because this is one of the easiest ways to query pedons with DSP data. Although this is not a DSP project, the DSP data may be useful supplemental data in the future.

**Can I request assistance for the field data collection?** Yes. Collaborating with state conservation staff is a great way to get additional local assistance. DSP sampling days are wonderful on-the-job training for conservation staff, especially new planners. In addition, you can work with your regional director to determine if additional SPSD staff may be able to assist. If assistance from KSSL is needed, request this assistance using the NSSC RFA process.