

Chapter 27: Soil Data Viewer Rule and Report Manager 3.0 User Guide

Web Soil Survey Rule And Report Manager						
Reports	Interps	SDV Rules	SDV Map Legends	SDV Folders	Service Check	About
<p>Rule and Report Manager replaces the SDV Rule Manager and the SDM Report Manager</p> <ul style="list-style-type: none">• <u>Reports</u> Design and test the Soil Reports on published data for use in Web Soil Survey.• <u>Interps</u> Design and test Property scripts to be used in reports. Generating interpretations from the published data is not supported at this time.• <u>SDV Rules</u> Configure soil interpretations and soil properties for use in the Soil Data Explorer of Web Soil Survey.• <u>SDV Map Legends</u> Define the color ramp and options for each type of soil map.• <u>SDV Folders</u> Define the categories for organizing soil interpretations and properties into folders for display in Web Soil Survey.• <u>Service Check</u> Verify that the report service is working. The service is used by Web Soil Survey to run soil reports, and by the WSS Rule and Report Manager to test reports.						

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WSS Report and Rule Manager Application

Introduction

The purpose of the WSS Report and Rule Manager (WSSRRM) application is to allow the State Soil Scientist to develop a suite of Web Soil Survey (WSS) manuscript reports and WSS and Soil Data Viewer (SDV) thematic maps tailored to the needs of the state. WSS is an official government publication web portal and all reports and maps are subject to a technical and English review before being made available to the public. The two primary tools are the Report Manager and the SDV Rule Manager.

The WSSRRM is used by those responsible for:

- Designing or modifying the national WSS reports for soil properties or soil interpretations
- Designing or modifying the national SDV/WSS thematic maps for soil properties or soil interpretations
- Creating state specialized reports and thematic maps
- Performing special analysis that involve generating maps, reports, or interpretations over an area that crosses soil survey area boundaries.

The Reports application allows authorized users to create and edit official publication reports for the WSS. The reports work very much like the reports in NASIS. The reports provide a method to present the data, but do not have any effect on the data itself. Interpretations presented in the report are not created, but retrieved from the Soil Data Mart to appear in a report. Reports created in the Report Manager take place in a safe work area that does not affect the WSS web site. Reports are organized by the folder in which they are assigned. Ownership is assigned to the report and discussed in more detail below. Once written, and tested, a report is then presented for certification.

The SDV Rules application allows authorized users to create and edit official publication Soil Data Viewer rules and other Soil Data Viewer related entities (folders, map legends). A Soil Data Viewer rule (SDV rule) is a set of information that enables the Soil Data Viewer application to be able to aggregate a soil property or a soil interpretation to the map unit level, and create a corresponding thematic map. SDV Rules are organized by the folder assigned and the NASIS site that owns the interpretation. Ownership is assigned to the rule and discussed in more detail below.

The National Soil Survey Center will perform a final technical quality review before publishing the report or rule on the Web Soil Survey (WSS). The WSS is an official government publication web portal and therefore all reports will have a technical and an English review prior to presenting for certification.

Logging in to the WSSRRM

A State Soil Scientist or Regional Director will designate individuals to manage reports for their area. The Soils Hotline is responsible for setting up user authorities in the WSSRRM. Access to the WSSRRM is controlled by the eAuthentication login. The <https://wssrulereportmanager.sc.egov.usda.gov/> URL first screen is the login page, where the user enters the eAuth login. Standard eAuth features, such as handling a password change or a forgotten password, are available from this page.

Permissions in the WSSRRM are controlled by the NASIS groups. Each report and each component of an interpretation is assigned to a NASIS group. Members of that group can edit the report or rule. WSSRRM will allow a user to change the group that owns an object. When a report or rule is copied and pasted, or a new object is created, ownership is assigned to the user's default NASIS group.

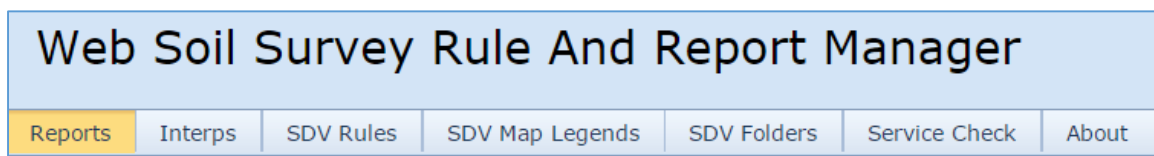
Basic operation of the WSSRRM

The Report Manager screen as shown below contains three major frames. The navigation tabs (on top), the navigation panel (on left), and the editor panel (on right):



Navigation Tabs

The WSSRRM is organized by 'type' identified as 'Reports', 'Interps', 'SDV Rules', 'SDV Map Legends', 'SDV Folders', 'Service Check', and 'About'.



- **Reports:** Design and test the soil reports for Web Soil Survey publication.
- **Interps:** Design and test property scripts used in WSS reports. *Generating SDM interpretations from the published data is not supported at this time.*
- **SDV Rules:** Configure soil interpretations and soil properties for use in Soil Data Viewer and Web Soil Survey.
- **SDV Map Legends:** Define the color ramp and options for each type of soil map.
- **SDV Folders:** Define the categories for organizing reports, interpretations, and properties into the SDV and WSS displayed folders.
- **Service Check:** Verify that the report service is working. The service is used by Web Soil Survey to run soil reports, and by the WSS Rule and Report Manager to test reports.

Navigation Panel

The left panel is used for navigation. For each 'type' there is a set of folders for the general categories. Within each category folder is a list of reports or a set of folders for NASIS Sites (reports do not use the NASIS Site folders).



Editor Panel

The editor panel displays the object that has been opened. Only one 'object' of a type (report or SDV rule) is presented in the editor panel at any given time. The object, be it a specific report or a specific SDV rule, is opened into the Editor panel by clicking on its name in the navigation panel. Each time the user clicks on a different object the current object in the edit panel is replaced. Make sure all edits are saved before changing to a new type.

The navigation tabs identifies the 'type' of the opened object ('Reports' type).



Reports Menu Bar

The actions in the menus may become active or inactive depending on the type that is in use. When viewing the type 'Reports', the following menu options appear:

- **New:** Create a new object based on the type, in this case a report. Fill in a name and other required information, then save it.
- **Save:** Save the object which is currently active in the editor panel.
- **Save As:** Save the object which is currently active in the editor panel as a new object with a new name.
- **Close:** Close the object which is currently active in the editor panel.
- **Delete:** Delete the existing object which is currently active in the editor panel.
- **Certification:** submit the report for certification (screen image has 'approved')
- **Restore:** restore object which is currently active in the editor panel to production object
- **Run:** run the object which is currently active in the editor panel
- **Set AOI:** allows user to establish a specific AOI for testing

Web Soil Survey Rule And Report Manager

ReportsInterpsSDV RulesSDV Map LegendsSDV FoldersService CheckAbout

Reports

- AOI Inventory
- Building Site Development
- Construction Materials
- Disaster Recovery Planning
 - AWM - Large Animal Disposal, Pit**
- Land Classifications
- Land Management
- Recreational Development
- Sanitary Facilities
- Soil Chemical Properties
- Soil Erosion
- Soil Physical Properties
- Soil Qualities and Features
- Vegetative Productivity
- Waste Management
- Water Features
- Water Management
- Wildlife Management

NewSaveSave As NewCloseDeleteApproveRestoreRunSet AOI

GeneralUsageReportDocumentationInterpretationsEdit Notes

Name:*AWM - Large Animal Disposal, Pit

Title:AWM - Large Animal Disposal, Pit

Report Header Note:

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. The table shows only the five most limiting features for any given soil. The soil may have additional limitations.]

Mapunit Selection Required?:☒

Use Include Minor Soils Option?:☒

Uses Interpretations?:☒

Folder:*Disaster Recovery Planning

NASIS Group:*NSSC Pangaea / Standard Reports

Status

Certification Pending: No

Date Approved:3/27/2014 3:54:00 AM

Last Updated Date:3/27/2014 3:54:00 AM

Last Updated By:Finnell, Paul R.

Record ID:309

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(Version 3.0, March 2016)

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SDV Rules Menu Bar

When viewing the type 'SDV Rules', the following menu options appear:

- **New:** Create a new object (SDV rule) based on the type. Fill in a name and information, then save it.
- **Save:** Save the object which is currently active in the editor panel.
- **Save As:** Save the object which is currently active in the editor panel as a new object with a new name.
- **Close:** Close the object which is currently active in the editor panel.
- **Delete:** Delete the existing object which is currently active in the editor panel.
- **Certification:** submit the rule for certification (screen image has 'Approve')

The screenshot displays the 'Web Soil Survey Rule And Report Manager' application. The top navigation bar includes 'Reports', 'Interps', 'SDV Rules' (selected), 'SDV Map Legends', 'SDV Folders', 'Service Check', and 'About'. The left sidebar shows a tree view of 'SDV Rules' categories, with 'NSSC Pangaea' expanded to show 'Catastrophic Mortality, Large Animal Disposal, Pit'. The main panel has a menu bar with 'New', 'Save', 'Save As New', 'Close', 'Delete', and 'Approve'. Below this is a tabbed interface with 'General', 'Processing Options', 'Folder / Land Uses', 'Map Legend', and 'Edit Notes'. The 'General' tab is active, showing the 'Interpretation' section with 'NASIS Site: NSSC Pangaea', 'Interpretation: DHS - Catastrophic Mortality, Large Animal Disposal, Pit', and 'Interpretation Design: limitation'. The 'Rule Name:*' field contains 'Catastrophic Mortality, Large Animal Disposal, Pit'. The 'Rule Description:*' field contains a detailed description of the disposal method. The 'Default Result Column Name:*' field contains 'AnDspPit'. The 'Available in Basic Mode?:' checkbox is checked. The 'Status' section shows 'Review Requested?: No', 'Ready to Distribute?: Yes', 'Date Last Updated: 5/4/2009 5:03:06 AM', and 'Record ID: 232'.

Reports

The Report type is designed for the state soil scientist to create a suite of manuscript reports tailored to the needs of the state. The report type contains copies of those reports found on WSS. The WSSRRM provides a safe work environment that will not affect the public web site. This provides the ability to modify a report, edit, and test it against actual SDM data, and verify the output as it would look on WSS. The user has the ability to create a new report by copying an existing report and modifying it to suit the local needs.

Reports can be used completely within the WSSRRM for data analysis tasks. A basic report script can be written that queries the data mart database and displays a simple table of data. When a report is run, the results are written to a file in the C:\Temp directory on the workstation and displayed in a browser window. A table in HTML or XML format is easily imported directly to a spreadsheet or database, providing a crude data export capability.

There are 6 tabs to be visited during report creation:

General

- **Name:** This required field is the name of the report
- **Title:** This will become the report title the user reads
- **Report Header Note:** The note seen below the report title
- **Mapunit Selection Required:** Allows the user to run the report with an AOI of specific map units
- **Use Include Minor Soils Option?:** Allows the user to choose the inclusion of minor components
- **Uses Interpretations?:** Identifies if the report will be using stored interpretations
- **Folder:** The folder the report will be assigned
- **NASIS Group:** The NASIS site and group that will own the report
- **Status:** Identifies the certification status of the current report

The screenshot shows the 'General' tab of a report creation form. The form has six tabs: General, Usage, Report, Documentation, Interpretations, and Edit Notes. The 'General' tab is active. The form contains the following fields and options:

- Name:** AWM - Large Animal Disposal, Pit
- Title:** AWM - Large Animal Disposal, Pit
- Report Header Note:** [Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. The table shows only the five most limiting features for any given soil. The soil may have additional limitations.]
- Mapunit Selection Required?:** ☒
- Use Include Minor Soils Option?:** ☒
- Uses Interpretations?:** ☒
- Folder:** Disaster Recovery Planning
- NASIS Group:** NSSC Pangaea / Standard Reports
- Status:**
 - Certification Pending: No
 - Date Approved: 3/27/2014 3:54:00 AM
 - Last Updated Date: 2/1/2016 11:07:52 AM
 - Last Updated By: Finnell, Paul R.
 - Record ID: 309

Usage

- **National Report:** checked if it is a national report, unchecked if the report is developed as a state report
- **Exclude from WSS Soils Reports Tab?:** Used to remove an existing report from the WSS reports
- **States not using this report:** This is an interactive column that is dependent on the national report radio button. If National is checked, then specific states can be checked to identify those not using the report. Contrary, if National is not checked, this field will allow the user to identify the states “using” the specific report.
- **Use Categories:** Identify those categories where the report is to be made available.

General Usage Report Documentation Interpretations Edit Notes

National Report?: ☒

Exclude From WSS Soils Reports Tab?: ☐

States not using this report:

- ☐ Alabama
- ☐ Alaska
- ☐ American Samoa
- ☐ Arizona
- ☐ Arkansas
- ☐ California
- ☐ Colorado

Use Categories:

- ☒ Cropland
- ☐ Forestland
- ☐ Hayland/Pastureland
- ☐ Horticulture
- ☐ Rangeland
- ☐ Recreation
- ☐ Urban Uses

Report

The report script has specific standards that must be followed. They can utilize many of the NASIS report scripting conventions. But, they must follow the Soil Data Mart database structure and must conform to the DocBook XML platform as described in the document [Conventions for Soil Data Mart Reports](#). This is necessary in order for the report to be available for the WSS customized manuscript.

Help documents for script writing is found on the NSSC, Soil Survey, Tools, NASIS Documents, NASIS 6.0 Training Materials, web page.

General Usage Report Documentation Interpretations Edit Notes

```
#PARAMETER areasymp PROMPT "Enter Survey Area Symbol" CHAR.
#PARAMETER mukeys PROMPT "Or List of Mapunit Keys" MULTIPLE CHAR.
#PARAMETER includeminor PROMPT "Include minor soils?" BOOLEAN.
#PARAMETER useNationalMapunits PROMPT "Display national mapunit symbols?" BOOLEAN.

#
# Generic report script for interpretations
#
# To use this script, make a copy of this report and give it an appropriate name.
# On the Interpretations tab, choose the interpretations you want to include.
# On the Home tab, modify the title and report head note for the selected interpretations.
# On the Usage tab, select the states that will use the report.
#

# The query picks the interpretations using the script property INTERP_NAME, which
# selects the interpretations shown on the Interpretations tab.

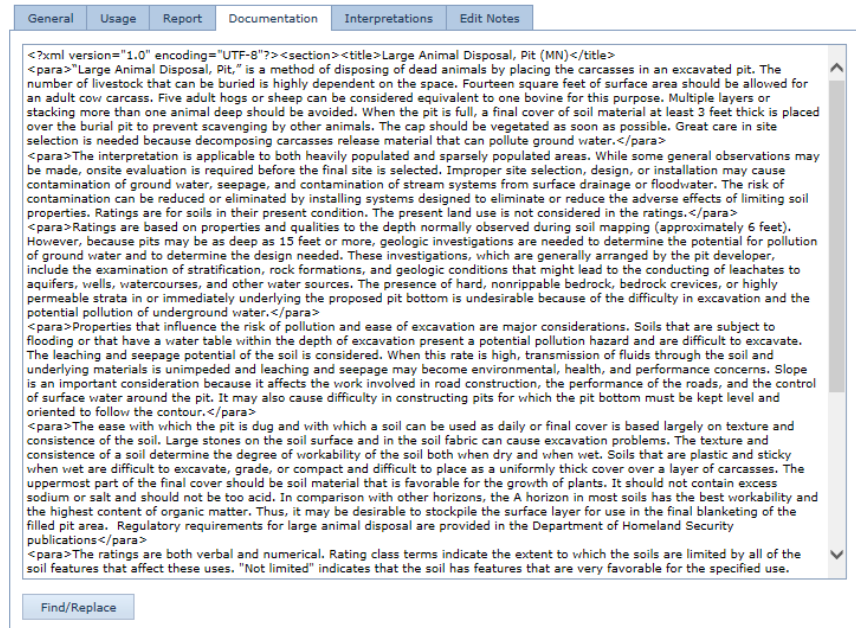
EXEC SQL select areaname, legend.lkey, musym, museq, muname, mapunit.mukey, nationalmusym,
compname, compct_r, component.cokey, localphase, mrulename, interphrc,
rule_depth, rulename, seqnum iseq, interphr, complnd
FROM legend, mapunit, outer (component, outer cointerp)
WHERE join legend to mapunit and
join mapunit to component and
join component to cointerp and
mrulename in (SCRIPT(INTERP_NAME))
and rule_depth < 2
and ( majcompflag = "Yes" OR 1 = includeminor )
and ( areasymp=areasymp OR mapunit.mukey in (mukeys) )
ORDER BY case when useNationalMapunits =0 then areaname else nationalmusym end,
museq, compct_r desc, compname, component.cokey, mrulename, seqnum;
AGGREGATE ROWS mapunit.mukey, compct_r, compname, component.cokey
COLUMN interphrc NONE, interphr NONE, rule_depth NONE
CROSSTAB mrulename VALUES ( SCRIPT(INTERP_NAME) )
CELLS interphrc, interphr, rule_depth;

# Pick up script properties for report title, head note, column headings and style sheet
```

Find/Replace

Description

The WSS is an official government publication site and all reports will document the material presented in the report. The scripting uses standard html/xml convention for report DocBook formatting. Property reports will include the description of each data field presented and Interpretation reports will include a complete description of the interpretation. Documentation will be reviewed by an English editor for compliance before submitted to the NSSC for approval.



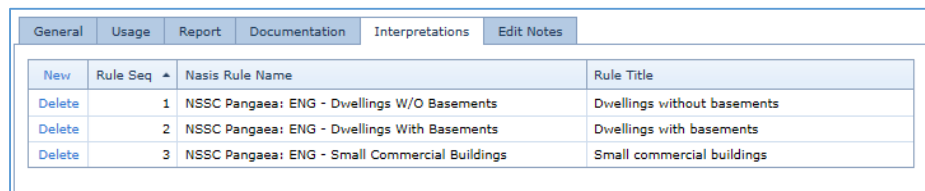
General Usage Report Documentation Interpretations Edit Notes

<?xml version="1.0" encoding="UTF-8"?><section><title>Large Animal Disposal, Pit (MN)</title>
<para>"Large Animal Disposal, Pit," is a method of disposing of dead animals by placing the carcasses in an excavated pit. The number of livestock that can be buried is highly dependent on the space. Fourteen square feet of surface area should be allowed for an adult cow carcass. Five adult hogs or sheep can be considered equivalent to one bovine for this purpose. Multiple layers or stacking more than one animal deep should be avoided. When the pit is full, a final cover of soil material at least 3 feet thick is placed over the burial pit to prevent scavenging by other animals. The cap should be vegetated as soon as possible. Great care in site selection is needed because decomposing carcasses release material that can pollute ground water.</para>
<para>The interpretation is applicable to both heavily populated and sparsely populated areas. While some general observations may be made, onsite evaluation is required before the final site is selected. Improper site selection, design, or installation may cause contamination of ground water, seepage, and contamination of stream systems from surface drainage or floodwater. The risk of contamination can be reduced or eliminated by installing systems designed to eliminate or reduce the adverse effects of limiting soil properties. Ratings are for soils in their present condition. The present land use is not considered in the ratings.</para>
<para>Ratings are based on properties and qualities to the depth normally observed during soil mapping (approximately 6 feet). However, because pits may be as deep as 15 feet or more, geologic investigations are needed to determine the potential for pollution of ground water and to determine the design needed. These investigations, which are generally arranged by the pit developer, include the examination of stratification, rock formations, and geologic conditions that might lead to the conducting of leachates to aquifers, wells, watercourses, and other water sources. The presence of hard, nonrippable bedrock, bedrock crevices, or highly permeable strata in or immediately underlying the proposed pit bottom is undesirable because of the difficulty in excavation and the potential pollution of underground water.</para>
<para>Properties that influence the risk of pollution and ease of excavation are major considerations. Soils that are subject to flooding or that have a water table within the depth of excavation present a potential pollution hazard and are difficult to excavate. The leaching and seepage potential of the soil is considered. When this rate is high, transmission of fluids through the soil and underlying materials is unimpeded and leaching and seepage may become environmental, health, and performance concerns. Slope is an important consideration because it affects the work involved in road construction, the performance of the roads, and the control of surface water around the pit. It may also cause difficulty in constructing pits for which the pit bottom must be kept level and oriented to follow the contour.</para>
<para>The ease with which the pit is dug and with which a soil can be used as daily or final cover is based largely on texture and consistency of the soil. Large stones on the soil surface and in the soil fabric can cause excavation problems. The texture and consistency of a soil determine the degree of workability of the soil both when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and difficult to place as a uniformly thick cover over a layer of carcasses. The uppermost part of the final cover should be soil material that is favorable for the growth of plants. It should not contain excess sodium or salt and should not be too acid. In comparison with other horizons, the A horizon in most soils has the best workability and the highest content of organic matter. Thus, it may be desirable to stockpile the surface layer for use in the final blanketing of the filled pit area. Regulatory requirements for large animal disposal are provided in the Department of Homeland Security publications</para>
<para>The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. "Not limited" indicates that the soil has features that are very favorable for the specified use.

Find/Replace

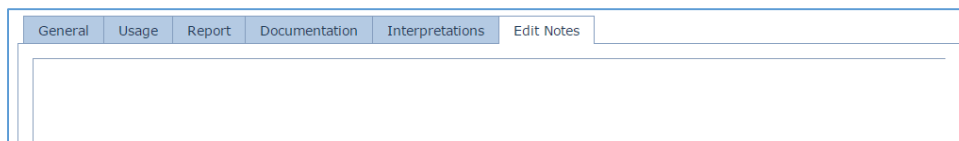
Interpretations

Interpretation reports are easily created by simply using an existing interpretation report, saving as a new report, then changing the interpretation (s) identified in the Interpretations tab. This is a choice list field where the user can select the appropriate interpretation. Unfortunately, the choice fields are fixed width and this creates an issue when trying to identify the state coded interpretations.



New	Rule Seq	Nasis Rule Name	Rule Title
Delete	1	NSSC Pangaea: ENG - Dwellings W/O Basements	Dwellings without basements
Delete	2	NSSC Pangaea: ENG - Dwellings With Basements	Dwellings with basements
Delete	3	NSSC Pangaea: ENG - Small Commercial Buildings	Small commercial buildings

Edit Notes

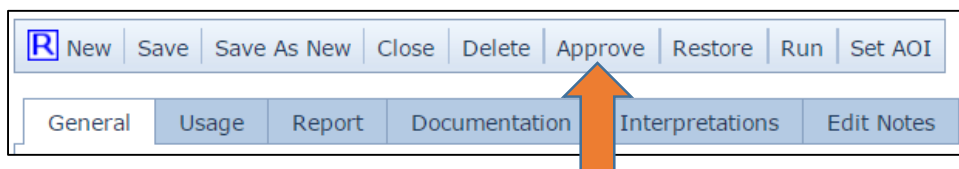


General Usage Report Documentation Interpretations Edit Notes

The edit notes is a new feature with this release and allows the user to document changes to the report.

Submit for Certification

When a WSS report has been tested to satisfaction, request that it be moved to the public side by clicking the **Submit for Certification** button on the menu tabs. (User screen will state 'Submit')



New Save Save As New Close Delete Approve Restore Run Set AOI

General Usage Report Documentation Interpretations Edit Notes

This creates an email to the National Soil Survey Center (NSSC) to request a quality review. Use the 'Edit Notes' to identify the report purpose and history. For a state specific report, update the Usage tab in the report to indicate which states and use categories will have access to the report. After testing, NSSC will move the report to the public SDM site and it will become available on the WSS the next day.

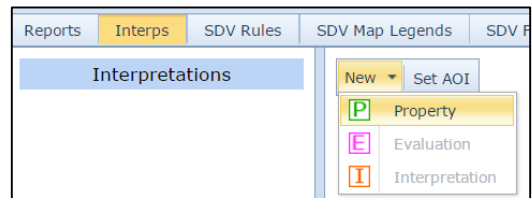
The quality review will check that the report does everything necessary to work in the SDM and WSS as described in the document [Conventions for Soil Data Mart Reports](#), including:

- *Verify a parenthetical state code suffix for state specific reports and interpretations. All reports/interpretations that are not national in perspective are required to include as a suffix: "<report/interpretation name><space>(two letter state code)".*
- *Accepts the standard parameters, such as the survey area and map unit symbols, with the correct parameter names.*
- *Produces output that conforms to the DocBook XML standard.*
- *Uses the defined attributes for XML elements to guide the description formatting process.*
- *Information in the Usage tab is filled in correctly. If it's a state report, the National Report check box must be clear, and one or more states must be checked as using the report. The boxes for the appropriate use categories for Web Soil Survey must also be checked.*
- *If the report uses stored (exported) interpretations, its script should be an unmodified copy of an existing interpretation report. The Report Interpretations tab must be updated to identify interpretations included in the report.*
- *The 'Documentation' tab material has completed a technical review and an English review.*

Interpretations

Interpretation properties that are written in NASIS are compatible for use in DERIVE statement in WSSRM report scripting. Use of a 'NASIS' Property can assist in writing subquery report scripts. The Interpretations tab allows for Properties to be used in WSSRRM reports.

Select the New button to open the dialog box.



Populate all dialog box fields. The same rules follow NASIS population guidelines for the Default Values, Minimum, Maximum, Unit of Measure, Modality and Data Type.

Properties work exactly the same in NASIS and SDM, but some properties may not work correctly. For the most part, properties use data from the Component table and its child tables, which have essentially the same structure in NASIS and SDM. This means that most queries work without change. If a property accesses tables or columns that are not in SDM its script will have to be modified. Also, columns that contain codes in NASIS are decoded in SDM, so the CODENAME function is not used. This affects some property scripts.

Once created, the Property is available for use in WSS Reports as a DERIVE scripting method of a subquery.

SDV Rules

An “SDV rule” should not be confused with a “NASIS rule”. In NASIS, a dynamically generated fuzzy logic soil interpretation is composed of a hierarchy of three components, NASIS properties, NASIS evaluations and NASIS rules. A soil interpretation is identified by the top most NASIS rule in this hierarchy. The name of this top most NASIS rule, NASIS rule name, is equivalent to the soil interpretation name. In this document, the term “rule” will never appear by itself. It will always appear either as “SDV rule” or “NASIS rule”. In the Soil Data Viewer Rule Manager application, the label “Rule” does sometimes appear by itself. Within the context of the SDV Rule Manager application, the lone label “Rule” always refers to an SDV rule.

Introduction

The SDV Rule is the product that displays a WSS/SDV thematic property or interpretation map. The only item that a State Soil Scientist will have to deal with is adding and maintaining SDV rules for state developed soil interpretations, owned by the corresponding regional office site, which the SSS has exported to the Soil Data Mart. To add a new SDV rule for a limitation, suitability, or class soil interpretation:

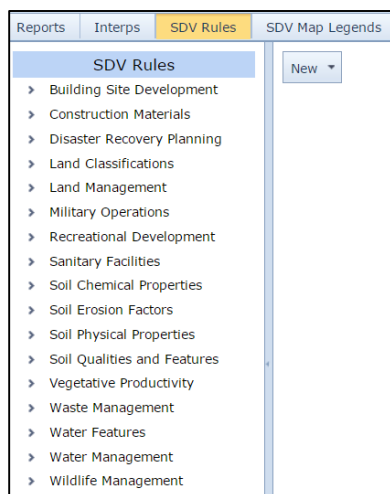
1. Select the soil interpretation for which a new SDV rule should be added.
2. Specify a name for the corresponding SDV rule.
3. Create a description for the corresponding SDV rule.
4. Specify a default result column name.
5. Assign the corresponding SDV rule to a folder.
6. Select any specific land uses for which the corresponding SDV rule should be available in Web Soil Survey.
7. Submit the newly added SDV rule for review.

Everything other than step 3 can be done in a minute or two. The description is usually the same description written for the corresponding report.

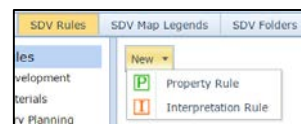
A little more work and knowledge is required to add a new SDV rule for a ‘class’ soil interpretation, but not much. Those with national soil data quality responsibilities need to understand the majority of this guide.

Soil Attributes, client Soil Data Viewer and Web Soil Survey

The SDV rules, folders and map legends managed by this application are shared by client Soil Data Viewer and Web Soil Survey. Which SDV rules appear in which folders does not vary between these two applications, and in both applications, all soil property SDV rules are always available, but a soil interpretation SDV rule is only available if the corresponding soil interpretation is present in the exported soil data for the current area of interest. Which SDV rules and folders are available and visible at any given moment can vary between client Soil Data Viewer and Web Soil Survey.

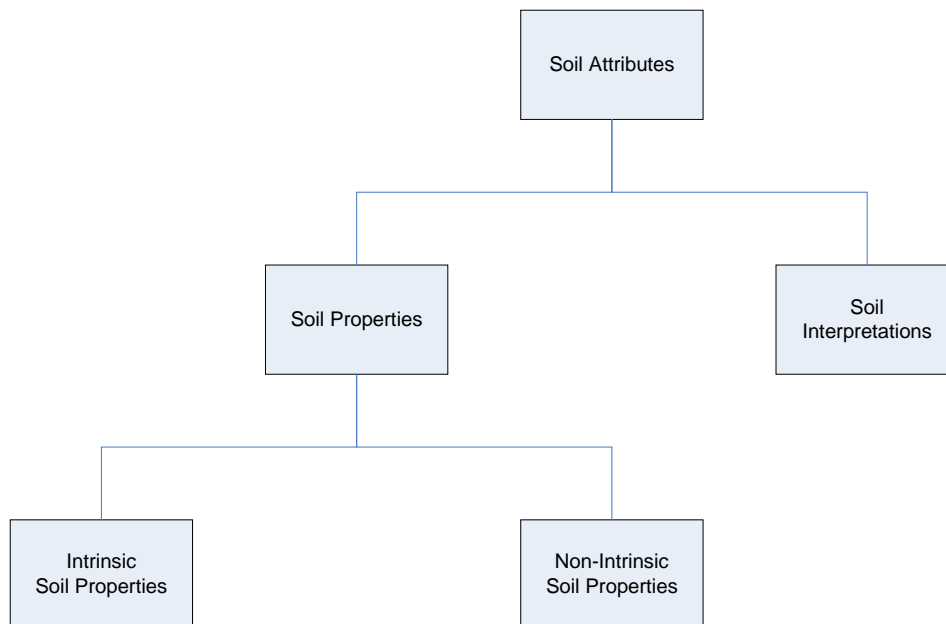


To understand how things differ between client Soil Data Viewer and Web Soil Survey, there is a need to establish some definitions. Soil attributes can be divided into two broad categories, soil properties and soil interpretations. A soil interpretation, as far as Soil Data Viewer is concerned, corresponds to a NASIS fuzzy logic soil interpretation (Dwellings with Basements). A soil property is any soil attribute that is not a NASIS fuzzy logic soil interpretation (clay content). Although there are many SDV rule attributes in common between a soil property SDV rule and a soil interpretation SDV rule, there are enough attributes that differ that data entry

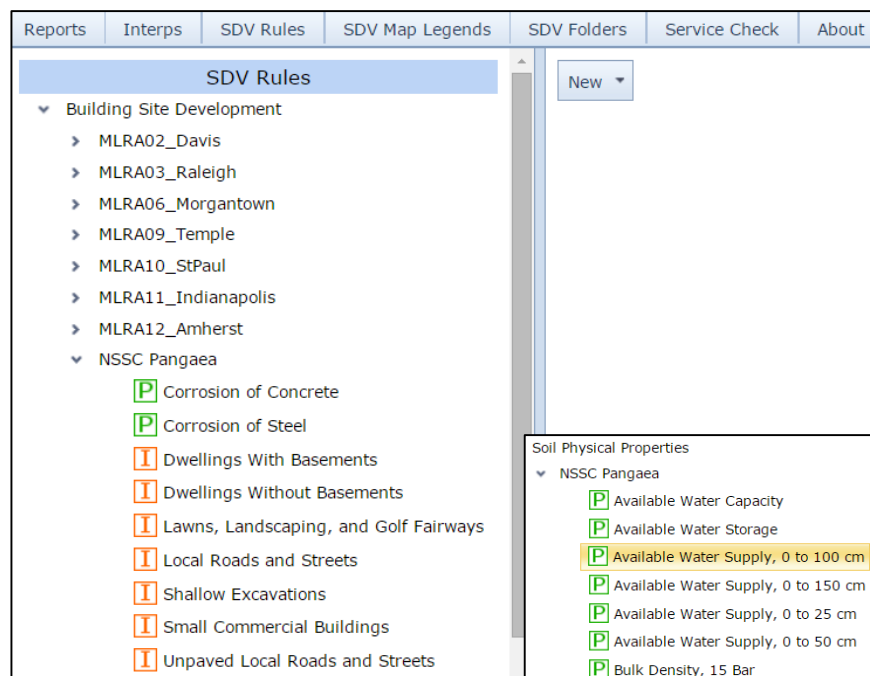


for a soil property SDV rule is discussed separately from data entry for a soil interpretation SDV rule.

Soil properties themselves can be divided into two broad categories, intrinsic soil properties and non-intrinsic soil properties. Intrinsic soil properties are those empirical soil properties that are not based on any other soil properties (very fine sand content). Non-intrinsic soil properties tend to be derived from multiple intrinsic soil properties (Kfactor). Non-intrinsic soil properties tend to be interpretive in nature. Examples of non-intrinsic soil properties include Farmland Classification, T Factor and Wind Erodibility Group.



Soil Data Viewer Soil Attribute Classification Hierarchy

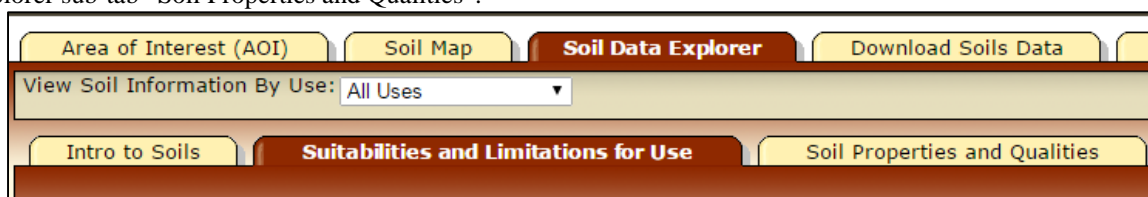


This image identifies how the folder system includes the NASIS Site and under each site, the SDV rules of either a Property or an Interpretation is organized. The Non-Intrinsic soil properties of Steel and Concrete corrosion are considered a Rule Property since they exist as a column in the Component table. The Dwellings with Basements is a Soil Interpretation that is exported from NASIS and stored in the SDM.

Contrast the two Corrosion Property Rules to the Intrinsic Soil Properties (AWC, BD) displayed in the Soil Physical Properties folder in the image to the left.

There are some differences between the client Soil Data Viewer and Web Soil Survey. In client Soil Data Viewer, all SDV rules and folders are always available on tab "Attribute Folders". In Web Soil Survey, soil interpretation SDV rules and folders and non-intrinsic soil property SDV rules and folders are available on Soil Data Explorer sub-

tab “Suitabilities and Limitations for Use”. Intrinsic soil property SDV rules and folders are available on Soil Data Explorer sub-tab “Soil Properties and Qualities”.



Both of these Soil Data Explorer sub-tabs are not visible at the same time. In other words, Web Soil Survey separates interpretive and non-interpretive soil attributes and folders, and client Soil Data Viewer does not.

The other major difference between client Soil Data Viewer and Web Soil Survey is that for interpretive soil attributes (soil interpretations and non-intrinsic soil properties), Web Soil Survey filters which SDV Rules are available at any given time by land use, and client Soil Data Viewer does not. This means that for Web Soil Survey, one must establish all necessary land use associations for any soil interpretation or non-intrinsic soil property SDV rule, prior to making that SDV rule available in Web Soil Survey. Intrinsic soil properties are considered to be independent of land use, so no such associations are required for an intrinsic soil property SDV rule.

How is “intrinsic” versus “non-intrinsic” specified? The decision was made that a folder should never contain a mixture of intrinsic soil properties and non-intrinsic soil properties and soil interpretations, so “intrinsic” was made an attribute of a folder, rather than an attribute of an SDV rule. An SDV rule is classified as intrinsic or non-intrinsic, based on its folder association, and since (1) an SDV rule must be associated with one and only one folder, and (2) soil interpretation SDV rule is not allowed to be associated with an intrinsic soil property folder, there should never be any ambiguity.

Ownership

General application authorization via USDA eAuth allows the user to select and view Soil Data Viewer related objects (SDV rule, folder, map legend), but if the user wants to add, edit and delete SDV related objects owned by a particular NASIS site, the user must be a member of group “Soil Data Viewer” for that NASIS site.

All soil ‘interpretations’ in NASIS are owned by a particular NASIS site. The soil interpretation SDV rule is owned by the same NASIS site that owns that SDV rule’s corresponding soil interpretation. The soil interpretation SDV rule ownership is inherited from the corresponding NASIS soil interpretation.

All soil ‘property’ SDV rules, folders and map legends are owned by NASIS site “NSSC Pangaea”.

The state office users will be restricted to adding and maintaining only those SDV rules for soil interpretations owned by their corresponding NASIS site(s). Users can concentrate on the sections of this user guide that discuss managing soil interpretation SDV rules. The user will still need a basic understanding of folder and map legend conventions, since every SDV rule must be associated with both a folder and a map legend.

There is nothing that prevents a user from being a member of group “Soil Data Viewer” for any NASIS site. Many state users will potentially need to be a member of group “Soil Data Viewer” for multiple NASIS sites.

Soil Property SDV Rule

Editing an Existing Soil Property SDV Rule

Only a member of group “Soil Data Viewer” for NASIS site “NSSC Pangaea” can edit an existing soil property SDV rule. To edit an existing SDV rule, first select that SDV rule. After selecting an SDV rule, an authorized user can edit that rule and save changes:

The screenshot displays the NASIS SDV Rules interface. On the left, a tree view shows the hierarchy: Reports > Interps > SDV Rules > SDV Map Legends > SDV Folders > Service Check > About. Under 'SDV Rules', the 'NSSC Pangaea' folder is expanded, showing a list of soil properties. The 'Saturated Hydraulic Conductivity (Ksat)' rule is selected. The main panel shows the 'General' tab for this rule. The 'Property' section indicates the 'Property Field' is 'horizon.ksat_r' and the 'Data Type' is 'Float'. The 'Rule Name' is 'Saturated Hydraulic Conductivity (Ksat)'. The 'Rule Description' is a detailed text block explaining that Ksat refers to the ease with which pores in a saturated soil transmit water, expressed in micrometers per second, based on soil characteristics like structure, porosity, and texture. The 'Unit of Measure' is 'micrometers per second', the 'Unit of Measure Abbreviation' is 'um/s', and the 'Default Result Column Name' is 'Ksat'. The 'Available in Basic Mode?' checkbox is unchecked. The 'Status' section shows 'Review Requested?: No', 'Ready to Distribute?: Yes', 'Date Last Updated: 3/4/2007 2:58:59 AM', and 'Record ID: 42'.

Property
Property Field: horizon.ksat_r
Data Type: Float

Rule Name:
Saturated Hydraulic Conductivity (Ksat)

Rule Description:
Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

Unit of Measure:
micrometers per second

Unit of Measure Abbreviation:
um/s

Default Result Column Name:
Ksat

Available in Basic Mode?:
<input type="checkbox"/>

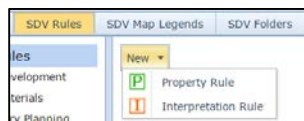
Status
Review Requested?: No
Ready to Distribute?: Yes
Date Last Updated: 3/4/2007 2:58:59 AM
Record ID: 42

For data entry guidelines for soil property SDV rule attributes, please see the section titled “

Deleting an Existing Soil Property SDV Rule

Only a member of group “Soil Data Viewer” for NASIS site “NSSC Pangaea” can delete an existing soil property SDV rule. To delete an existing SDV rule, first select that SDV rule, as seen above. After selecting an SDV rule, an authorized user can choose to delete that rule using the Delete icon/link will be visible at the top of the form.

Add a New Soil Property SDV Rule



Any authorized WSSRRM user can select and view any existing soil property SDV rule. However, only members of the group “Soil Data Viewer” for NASIS site “NSSC Pangaea” are authorized to add a soil property SDV rule. Property Rules are created by national staff, and choosing to add a new Property Rule initiates the process of adding a new soil property SDV rule. The details of adding a new soil property SDV rule are discussed in the section titled “Soil Property SDV Rule”.

A screenshot of the 'Create a new Property Rule' form. The form has two dropdown menus: 'Property Table Name:' with 'chorizon' selected, and 'Property Column Name:' with 'ksat_r' selected. There are 'Cancel' and 'Continue' buttons at the bottom left of the form.

Note that for any particular soil property; more than one SDV rule may be defined.

The list of table names is sorted in alphabetical order, by table physical name. Note that table “cointerp” is not included in the list. The only item in table “cointerp” that makes sense to aggregation is a soil interpretation, and new soil interpretation SDV rules must be added by selecting either “Rules: Add Interpretation Rule” or Rules: Find Interpretations without Rules”.

One a table is selected, then a column within that table is selected. The list of columns in the selected table is sorted in alphabetical order by column physical name. The column list includes only those columns where the corresponding logical data type is either “Float”, “Integer”, “Choice” (an alphanumeric attribute with a fixed domain, e.g. flooding frequency), “String” or “Narrative Text”, where the column physical name does not end in the substring “key”. Columns whose logical data type is “Boolean” or “Date/Time”, and primary and foreign key columns cannot be aggregated.

If an SDV rule already exists for the selected table and column, a warning will appear and a prompt to continue. More than one SDV rule may be defined for a given table and column, but it is pretty rare. One case that exists is chorizon.ksat_r. In this case one SDV rule was needed that had a natural break class map legend and another SDV rule where the map legend class boundaries reflected the standard class boundaries defined for soil survey.

Create a new Property Rule

Select the property for this rule:

Property Table Name:*

Property Column Name:

wssrulereportmanager.sc.egov.usda.gov says: ×

One or more rules for this soil property already exist.
Do you want to add another one?

After selecting a table and column, some of the information needed for this soil property SDV rule is then extracted from a data dictionary, and any default values are established.

For data entry guidelines for soil property SDV rule attributes, please see the section titled “Soil Property SDV Rule Data Entry Guidelines”.

Soil Property SDV Rule Data Entry Guidelines

The fields associated with a soil property SDV rule are distributed among five different tabs: “General”, “Constraints / Qualifiers”, “Processing Options”, “Folder / Land Uses”, “Map Legend”, and “Edit Notes”.

General	Constraints / Qualifiers	Processing Options	Folder / Land Uses	Map Legend	Edit Notes
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When adding a new soil property SDV rule, a default value has been assigned to every field for which it is possible to do so. This default value will be the most appropriate value in the majority of cases. Therefore, a default value should not be changed unless there is a reason for doing so. The data entry guidelines for a field will discuss reasons for changing a default value.

General Tab

Fields on the General Tab are used to identify, define and record the vintage of the corresponding SDV rule. The corresponding table, column, and logical data type are identified in the Property header.

General	Constraints / Qualifiers	Processing Options	Folder / Land Uses	Map Legend	Edit Notes
Property Property Field: chorizon.ksat_r Data Type: Float					
Rule Name:*		Saturated Hydraulic Conductivity (Ksat)			
Rule Description:*		Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.			
Unit of Measure:		micrometers per second			
Unit of Measure Abbreviation:		um/s			
Default Result Column Name:*		Ksat			
Available in Basic Mode?:		<input type="checkbox"/>			
Status Review Requested?: No Ready to Distribute?: Yes Date Last Updated: 3/4/2007 2:58:59 AM Record ID: 42					

General Tab for soil property SDV rule “Bulk Density one third bar”.

Property: This field displays the table and column (as table.column) to which this soil property SDV rule corresponds. This field is not edited.

Logical Data Type: This field displays the logical data type of the corresponding table column and its value influences a number of other default values. Only attributes with a logical data type of “Float”, “Integer”, “Choice”, “String” or “Narrative Text” can be aggregated. Attributes with a logical data type of “Boolean” or “Date/Time” cannot be aggregated at this time. This field is not edited.

- **“Float”** includes both single precision (4 byte) and double precision (8 byte) floating point values.
- **“Integer”** includes both short (2 byte) and long (4 byte) integer values.
- **“Choice”** implies that the allowable values of the corresponding soil property are restricted to a fixed domain, e.g. flooding frequency class. When the logical data type is “Choice”, an appended string indicates whether or not the corresponding domain is considered to be logically ordered. Whether or not the corresponding domain is logically ordered affects the default values for “Tie-Break Rule” and “Tie-Break Rule Overridable?”.
- **“String”** corresponds to fixed and variable length character strings containing 255 or fewer characters.
- **“Narrative Text”** corresponds to variable length narrative text that may contain embedded paragraph breaks.

Rule Name: The name of the corresponding SDV rule. Look at other national SDV rule names for the conventions that are used for SDV rule names. The following characters are not permitted in an SDV rule Name: \:;*?"<>|. &

This field is required. No two SDV rules, regardless of type, may have the same name.

Rule Description: This is a narrative description of the corresponding SDV rule. Look at other national SDV rule for the conventions that are used for SDV rule descriptions. This field is required.

Default Result Column Name: When a thematic map is generated for the corresponding SDV rule, this is the default column name into which the corresponding map unit rating will be stored. A Soil Data Viewer user can change this default name at runtime. Look at other result column names to get a feel for the conventions that are used for result column names. The column name is limited to ten characters, must begin with a letter, and contain only letters, digits and underscores. This field is required.

The formatting convention for the result column names is referred to as “CamelCase”, e.g. the first letter of a word or substring that represents a word is capitalized, and there are no spaces between words. The SDV rule for a state version of an existing national soil interpretation should use the same default result column name as the national interpretation counterpart.

Available in Basic Mode?: This field indicates whether or not the corresponding SDV rule should be visible when the client Soil Data Viewer application is in “Basic Mode”. The convention is that intrinsic soil property SDV rules should not be available in Basic Mode, but non-intrinsic soil property SDV rules should be. For a discussion of the difference between intrinsic and non-intrinsic soil properties, please see the section titled “Soil Attributes, client Soil Data Viewer and Web Soil Survey”.

By default, soil property SDV rules are not set (not checked). The user is responsible for setting this field for a non-intrinsic soil property.

The client Soil Data Viewer application is always either in Basic Mode or Advanced Mode. The intention is that the attributes available in Basic Mode should not require any runtime parameters for which no default value is defined, with the exception of any required data selection options, i.e. primary/secondary constraint selections.

Ready to Distribute?: This field indicates whether or not this SDV rule is ready to be included in exports from the Soil Data Mart. This field should never be set (checked) until the corresponding SDV rule has actually been tested using the client Soil Data Viewer application. More on this in a bit. For new SDV rules, this field is not set (not checked) by default.

This field cannot be set and saved unless:

1. All required fields are populated with valid values.
2. This SDV rule is associated with a folder.
3. Any corresponding custom map legend passes all custom map legend validations.

If any of these validations fail, the required issue will either be fixed or reset (uncheck) “Ready to Distribute?”, before edits are saved.

Determining if an SDV Rule is Ready to Distribute

An SDV rule should not be distributed until it has actually been tested using the client Soil Data Viewer application. Verify that a thematic map can be generated, and that the thematic map and corresponding map legend look as expected.

A new SDV rule is tested by creating a SSURGO export from either NASIS or the Staging Server. NASIS and Staging Server SSURGO exports will export an SDV rule, regardless of the setting of “Ready to Distribute?”, but a soil interpretation SDV rule requires the corresponding soil data to be included in the data export.

In order to generate a thematic map, both tabular and spatial data are required. A SSURGO export from NASIS does not include spatial data, and a SSURGO export from the Staging Server only includes spatial data when the corresponding spatial data is currently loaded into the Staging Server database.

Last Updated: This is the date and time when the corresponding SDV rule was last saved to the Soil Data Mart database. This value controls when an SDV rule in a SSURGO template database is updated. When importing tabular data, an existing SDV rule in a SSURGO template database will be updated only when the same SDV rule

(“same” being based on the SDV rule’s internal key value) in the tabular data being imported has a more recent “Last Updated” date. This field cannot be edited.

Constraints / Qualifiers Tab

In some cases, specifying a table and column isn’t sufficient to completely identify a specific soil property. The Constraints / Qualifiers Tab includes all additional information that is necessary to completely identify the soil property in question. The information on this tab is used in the construction of the query that the Soil Data Viewer application uses to retrieve data for the corresponding soil property, as input to the aggregation process.

The screenshot shows a web application interface with a top navigation bar containing buttons: New, Save, Save As New, Close, Delete, and Approve. Below this is a tabbed interface with tabs: General, Constraints / Qualifiers (selected), Processing Options, Folder / Land Uses, Map Legend, and Edit Notes. The 'Constraints / Qualifiers' tab is active and contains a section titled 'Constraints' with four input fields: 'Primary Constraint Column' (dropdown menu showing 'cropname'), 'Primary Constraint Label' (text input showing 'Crop'), 'Secondary Constraint Column' (dropdown menu showing 'yldunits'), and 'Secondary Constraint Label' (text input showing 'Yield Units'). Below the 'Constraints' section is a section titled 'SQL WHERE Clause' with a large, empty text area for entering SQL code.

Constraints / Qualifiers Tab for soil property SDV rule “Potential Irrigated Crop Yield (Component)”.

Primary Constraint Column/Secondary Constraint Column

In some cases, specifying a table and column isn’t sufficient to completely identify a specific soil property. For some tables, more than one column in that table is necessary to completely identify a specific soil property. For example, in the component crop yield table and column cocropyld.irryield_r (potential irrigated crop yield) isn’t meaningful unless the corresponding crop name and yield units are known. Another example is the component restrictions table. The value in column corestrictions.resdept_r (depth to restriction) isn’t meaningful unless the kind of restriction is known. Any additional columns in a table necessary to completely identify a soil property, beyond the column selected for aggregation, must be specified in “Primary Constraint Column” and possibly “Secondary Constraint Column”. Only two columns are available to completely identify a soil property.

If only one additional column is necessary to completely identify a soil property, that column must be selected as the “Primary Constraint Column”. If two additional columns are necessary to completely identify a soil property, the decision must be made to which one is specified as the “Primary Constraint Column” and which one is specified as the “Secondary Constraint Column”. This decision is not arbitrary.

A Soil Data Viewer user will have to make a selection for each constraint column that is defined. The choice list for the secondary constraint column will be constrained by whatever value a user selects as the primary constraint value. In most cases where two constraint columns are needed, it will be relatively clear which column should be specified as the primary constraint column. Using irrigated crop yield for example, it obviously makes more sense to select a crop before selecting the corresponding yield units, therefore the crop name column should be the primary constraint column.

The choice list for selecting a constraint column includes all valid columns in the table for the corresponding soil property, excluding the column being aggregated and the primary constraint column (when selecting a secondary constraint column). A valid column is any column whose corresponding logical data type is either “Float”,

“Integer”, “Choice”, “String” or “Narrative Text”, whose corresponding name does not end in the substring “key”. These are the same constraints as to which columns may be selected for aggregation. The columns in the choice list for selecting a constraint are sorted in ascending order on column physical name.

Primary Constraint Label/Secondary Constraint Label

When a constraint column is specified, a Soil Data Viewer user will have to make a selection from a dropdown list for each constraint column that is specified. The interface needs to provide some label for that dropdown control to indicate what it being selected. So for the crop yield attributes, the label for the primary constraint is “Crop”, and the label for the secondary constraint is “Yield Units”. This label should not include any separators, like a colon following the label.

For each constraint column that is defined, a corresponding label is required. A constraint label must include 20 or fewer characters.

Month Range

This field is displayed only when the corresponding soil property is at the component month level or below.

The screenshot shows the 'Constraints / Qualifiers' tab in a software interface. It contains several input fields and a checkbox. The 'Primary Constraint Column' and 'Secondary Constraint Column' are both set to 'No Constraint'. The 'Primary Constraint Label' and 'Secondary Constraint Label' are empty. The 'Month Range' section has 'Begin' set to 'January' and 'End' set to 'December'. The 'Month Range Overridable?' checkbox is checked. The 'SQL WHERE Clause' field contains the text 'soimoistat='wet'.

Constraints / Qualifiers Tab for soil property SDV rule “Depth to Water Table”.

Some soil properties are recorded by month. This includes attributes in table “comonth” and attributes in any table in the table hierarchy below “comonth”. For any such attribute, a default month range is required. The order of the two selected months matters. January to December includes twelve months. December to January includes only two months.

Month Range Overridable?

This field is displayed only when the corresponding soil property is at the component month level or below.

When this option is set (checked), a Soil Data Viewer user can change the default month range at runtime. The name of the corresponding SDV rule should not include the default month range unless this option is not set (not checked). For attributes that are recorded by month, this option is always set (checked) by default.

Depth Qualifier

This field is displayed only when the corresponding soil property is at the horizon level or below.

Constraints / Qualifiers Tab for soil property SDV rule “Bulk Density one third bar”.

Attributes of a soil horizon or layer includes attributes in table “chorizon” and attributes in any table in the table hierarchy below “chorizon”. For any such attribute, a default depth qualifier is required. Any of the following depth qualifiers may be selected as the default depth qualifier.

1. **Depth Range** – A Soil Data Viewer user is required to provide a top and bottom depth at runtime. Those portions of all layers that are coincident with the specified depth range are considered during the aggregation process. A weighted average value for the portion of all layers that are coincident with the specified depth range is returned for the corresponding component. The weighing factor is the layer portion’s percent of the total depth range.
2. **Surface Layer** – Only the surface layer is considered during the aggregation process. If there is only one surface layer, the attribute value for that surface layer is returned for the corresponding component. If there is more than one surface layer, which I’m not sure is ever legitimate, depending on the corresponding tie-break rule, either the minimum or maximum attribute value among all surface layers is returned for the corresponding component. A surface layer is any layer where the corresponding representative depth to top is zero (hzdept_r = 0).
3. **All Layers** – All layers are considered during the aggregation process. A weighted average value for all layers is returned for the corresponding component. The weighing factor is the layer’s percent of the total depth range.

For all numeric horizon level attributes, depth qualifier is set to “Depth Range” by default. For all non-numeric horizon level attributes, depth qualifier is set to “Surface Layer” by default.

Depth Qualifier Overridable?

This field is displayed only when the corresponding soil property is at the horizon level or below.

When this option is set (checked), a Soil Data Viewer user can change the default depth qualifier at runtime. Otherwise they cannot. The name of the corresponding SDV rule should not include any reference to the default depth qualifier unless this option is not set (not checked). For all numeric horizon level attributes, this option is set (checked) by default. For all non-numeric horizon level attributes, this option is not set (not checked) by default.

SQL Where Clause

In some cases, even the available parameterized constraints and qualifiers may not be sufficient to fully qualify/identify the soil property in question. The purpose of this field is to provide for any additional constraints that may need to be specified, beyond those parameterized optional constraints that are already provided.

Anything entered in this field must be valid Microsoft SQL Server SQL. The only columns that can be referenced are columns in the same table as the corresponding soil property. What is entered here will be AND'ed with any other constraints that have been defined. Any clause entered here should not include the keyword "WHERE". Also, do not enter the "AND" keyword to have this clause AND'ed with any other constraints that have been defined. If a complex clause is entered that includes AND's or OR's, the entire clause should be parenthesized.

At the time this was written, the soil property "Depth to Water Table" is the only rule to have a corresponding where clause: soimoiststat = 'wet'.

When an SDV rule is saved that has a corresponding where clause, what validation is available is performed, but because the query that includes this clause is not actually executed against data, not all potential problems will necessarily be found. This is another reason why it is necessary to actually test a new SDV rule against real data before setting "Ready to Distribute?" / "Ready to Review?".

Processing Options Tab

There are a number of parameters that affect the outcome of the aggregation process. The Processing Options Tab allows the SDV rule designer to provide a default value for each of those parameters, and for some parameters, the SDV rule designer can indicate whether or not a parameter's default value can be changed at runtime.

The screenshot shows the 'Processing Options' tab in a software interface. It contains several settings for an SDV rule:

- Default Aggregation Method:** A dropdown menu set to 'Dominant Component'.
- Horizon Aggregation Method:** A dropdown menu set to 'Weighted Average'.
- Tie-break Rule:** A section with a dropdown set to 'Select Higher Value', two empty text boxes for 'Tie-break Low Label' and 'Tie-break High Label', and a checked checkbox for 'Tie-break Rule Overridable?'.
- Null Values:** A section with two checked checkboxes: 'Interpret Nulls as Zero?' and 'Interpret Nulls as Zero Overridable?'.

Processing Options Tab for soil property SDV Rule "Calcium Carbonate (CaCO₃)".

Default Aggregation Method

Aggregation method determines how a single rating value for a map unit as a whole is derived from a set of individual map unit component values.

The default aggregation method for a soil property is determined as follows.

- If the attribute in question is an attribute of a map unit, as opposed to being an attribute of a map unit component, set the default aggregation method to "No Aggregation Necessary", which happens to be the only allowable aggregation method in this case.
- Otherwise if the attribute in question is component.hydricrating, set the default aggregation method to "Percent Present", which happens to be the only allowable aggregation method in this case.

- Otherwise if the corresponding logical data type is either “Float” or “Integer”, set the default aggregation method to “Dominant Component”. Other allowable aggregation methods include “Dominant Condition”, “Weighted Average” and “Minimum or Maximum”.
- Otherwise set the default aggregation method to “Dominant Condition”. Other allowable aggregation methods include “Dominant Component” and “Minimum or Maximum”.

The current convention is to never change the default aggregation method as determined above. This default is arguably the most appropriate aggregation method, in general. The Soil Data Viewer user is ALWAYS permitted to select any valid aggregation method at runtime.

For a more complete discussion of aggregation methods and usage conventions, please see the section titled “Aggregation Methods – The Details”.

Horizon Aggregation Method

This is the aggregation method to determine the single rating value for the horizons as a whole derived from an individual component value. The two choices are “Weighted Average” or “Weighted Sum”.

Tie-Break Rule

This field indicates whether the lower or higher value should be returned in the face of multiple candidate values, or in the event of a percent composition tie.

The default tie-break rule for a soil property is determined as follows:

- If the corresponding logical data type is either “Float” or “Integer”, or the corresponding logical data type is “Choice” and the corresponding domain is logically ordered, set the default tie-break rule to “Higher”.
- Otherwise set the default tie-break rule to “Lower”.

For numeric soil properties and soil properties associated with a logically ordered domain, the default tie-break rule is “Higher”. For non-numeric soil properties and soil properties associated with a domain that is not logically ordered, the default tie break rule is “Lower”.

The current convention is to never change the default tie-break as determined above, for non-numeric soil properties and soil properties associated with a domain that is not logically ordered.

For numeric soil properties and soil properties associated with a logically ordered domain, the default tie-break rule as determined above may be changed in cases where there is some rationale for doing so.

For example, at the time this was written, for numeric soil properties and soil properties associated with a logically ordered domain, the only time that the default tie break rule as determined above was overridden, was for the following soil properties:

- Depth to Soil Restrictive Layer
- Depth to Water Table
- T Factor

For these soil properties, returning the lower value in the case of multiple candidate values or a percent composition tie represents the more conservative result for most potential applications of that soil property. In general, when possible, the aggregation process should return the more conservative, or pessimistic, result.

Tie-Break Low Label

In the Soil Data Viewer interface, the default label for the option specifying that the lower value should be returned in the face of multiple candidate values or in the event of a percent composition tie is “Lower”.

There are some cases, like permeability or flooding frequency, where a different label (Slower, Less Frequent) is more appropriate. This field is used to override the default tie-break low label.

Obviously, this field is not required, but if a tie-break low label is provided, a tie-break high label must also be provided.

Tie-Break High Label

In the Soil Data Viewer interface, the default label for the option specifying that the higher value should be returned in the face of multiple candidate values or in the event of a percent composition tie is “Higher”. There are some cases, like permeability or flooding frequency, where a different label (Faster, More Frequent) is more appropriate. This field is used to override the default tie-break high label.

Obviously, this field is not required, but if a tie-break high label is provided, a tie-break low label must also be provided.

Tie-Break Rule Overridable?

When this option is set (checked), a Soil Data Viewer user can change the default setting of “Tie-Break Rule” at runtime.

For numeric soil properties and soil properties associated with a logically ordered domain, this option is set (checked) by default. For logically ordered soil property values there is no reason to prevent a Soil Data Viewer user from being able to change the default tie-break rule at runtime.

For non-numeric soil properties and soil properties associated with a domain that is not logically ordered, this option is not set (not checked) by default. For soil property values that are not logically ordered, there is no reason to allow a Soil Data Viewer user to be able to change the default tie-break rule at runtime, since there is little or no rationale for preferring the higher ASCII value over the lower ASCII value.

Interpret Nulls as Zero?

This field is displayed only for numeric soil properties.

For some soil properties, a null or missing value can reasonably be interpreted as being equivalent to zero. Examples include calcium carbonate, electrical conductivity, gypsum, forest productivity for a given tree, potential crop yield for a given crop, range production, etc.

For numeric soil properties of a map unit component, one of the allowable aggregation methods is “Weighted Average. A component whose corresponding attribute value is null or missing is excluded from consideration for a weighted average aggregation, which means that component’s corresponding percent composition isn’t factored into the weighted average value for all components.

For example, consider a map unit with two components. One component at 50% composition records no corresponding potential irrigated corn yield. The other component, also at 50% composition records a potential irrigated corn yield of 100 bu/ac.

If a weighted average aggregation is performed for potential irrigated corn yield, and null and missing values are not converted to zero, the potential irrigated corn yield rating for the map unit as a whole would be 100 bu/ac ($50\% / 50\% * 100$). If the same aggregation is performed where null and missing values are converted to zero, the potential irrigated corn yield rating for the map unit as a whole would be 50 bu/ac ($((50\% / 100\% * 100) + (50\% / 100\% * 0) = 50$).

Setting this option (checking this option) converts null or missing values for a component to zero, *so long as at least one component for the same map unit has a non-null value for the attribute being aggregated*. In other words, if the value being aggregated is null or missing for all components of a map unit, the overall map unit rating for that attribute will be null, regardless of the setting of this field.

This option, when set, conditionally (see preceding paragraph) converts null and missing values to zero, regardless of the corresponding aggregation method.

For a soil property for which a null or missing value can reasonably be interpreted as zero, then setting (checking) this option is appropriate. By default, for any soil property, this option is not set (not checked). The person creating an SDV rule is responsible for determining when this option should be set.

Interpret Nulls as Zero Overridable?

This field is displayed only for numeric soil properties.

When this option is set (checked), a Soil Data Viewer user can change the default setting of “Interpret Nulls as Zero” at runtime.

The current convention is that when “Interpret Nulls as Zero?” is set, this option should also be set (checked), and when “Interpret Nulls as Zero?” is not set (not checked), this option should not be set (not checked). By default, for any soil property, this option is not set (not checked).

Folder / Land Uses Tab

In order to be available to end users, an SDV rule *must* be associated with a folder. SDV rules associated with a non-intrinsic soil property folder *may* also be associated with one or more specific land uses. This controls which SDV rules are available in Web Soil Survey when the Web Soil Survey user has selected a specific land use.

The screenshot shows the 'Folder / Land Uses' tab in a software interface. At the top, there are six tabs: 'General', 'Constraints / Qualifiers', 'Processing Options', 'Folder / Land Uses' (which is selected), 'Map Legend', and 'Edit Notes'. Below the tabs, there is a section labeled 'Folder: *' with a dropdown menu showing 'Building Site Development'. Below this, there is a section labeled 'Specific Land Uses:' followed by a list of land use categories with checkboxes: 'Cropland', 'Forestland', 'Hayland/Pastureland', 'Horticulture', 'Rangeland', 'Recreation' (checked), and 'Urban Uses' (checked).

Folder/Land Uses Tab for soil non-intrinsic property SDV Rule “Corrosion of Steel”.

SDV rules not associated with any specific land are still available to a Web Soil Survey user when they have selected “All Uses”. Folder and land use associations are established on the Folder / Land Uses tab.

The screenshot shows the 'Folder / Land Uses' tab in a software interface. At the top, there are six tabs: 'General', 'Constraints / Qualifiers', 'Processing Options', 'Folder / Land Uses' (which is selected), 'Map Legend', and 'Edit Notes'. Below the tabs, there is a section labeled 'Folder: *' with a dropdown menu showing 'Soil Chemical Properties (intrinsic soil property folder)'. Below this, there is a message: 'No land use associations may be specified for a soil attribute that is associated with an intrinsic soil property folder.'

Folder/Land Uses Tab for intrinsic soil property SDV Rule “Calcium Carbonate (CaCO₃)”.

Folder

This field associates an SDV rule with a folder. An SDV rule must be associated with a folder in order to be available in client Soil Data Viewer and Web Soil Survey. The folders managed by the Soil Data Viewer Rule Manager application are shared by client Soil Data Viewer and Web Soil Survey.

An SDV rule may be associated with one and only one folder. The dropdown list of folders available for a soil property SDV rule includes all folders. When a folder is an intrinsic soil property folder, the string “(intrinsic soil

property folder)” will be appended to the folder name. Obviously only intrinsic soil properties should be associated with an intrinsic soil property folder. Please see the section titled “Soil Attributes, client Soil Data Viewer and Web Soil Survey” for a discussion of the difference between intrinsic and non-intrinsic soil properties.

As long as “Ready to Distribute?” or “Ready to Review?” is not checked, an SDV rule can be saved without having to be associated with a folder.

When making folder assignments, it is helpful to have some idea about which SDV rules are already associated with which folders. But if a folder is viewed or selected in the midst of adding or editing an SDV rule, without first saving the work, all pending changes will be lost. To see which SDV rules are currently associated with a folder, while in the midst of adding or editing an existing SDV rule, start a second SDV Rule Manager Browser session to select and view folders.

Specific Land Uses

The Web Soil Survey application allows non-intrinsic soil property SDV rules to be associated with one or more specific land uses. These associations are used to filter which SDV rules are available for the current land use context, within Web Soil Survey. Web Soil Survey is always either in a specific land use context, like “Rangeland”, or in the land use context known as “All Uses”.

Intrinsic soil properties are considered to be land use independent, so an SDV rule for an intrinsic soil property cannot be associated with any specific land use, which in effect means that an intrinsic soil property SDV rule will always be available, regardless of the current land use context in Web Soil Survey.

Non-intrinsic soil property SDV rules can be associated with zero, one or more specific land uses. A non-intrinsic soil property SDV rule that is not associated with any specific land use will still be available when the corresponding land use is “All Uses”. But when the current land use is a specific land use, “Rangeland” for example, only those non-intrinsic soil property SDV rules explicitly associated with land use “Rangeland” will be available.

For an intrinsic soil property SDV rule associated with an intrinsic soil property folder, no land uses will be listed. For a non-intrinsic soil property SDV rule associated with a folder that is not an intrinsic soil property folder, all specific land uses (all land uses except “All Uses”) will be listed. To associate an intrinsic soil property SDV rule with a specific land use, the box to the left of that land use name should be checked. A non-intrinsic soil property SDV rule associated with a folder that is not an intrinsic soil property folder can be associated with zero, one or more specific land uses.

There may be interpretive soil attributes that really don’t pertain to any existing specific land use, thus the use of “All Uses”. By making such an attribute available for land use “All Uses”, it is ensuring that the corresponding SDV rule is at least available in one land use context.

Map Legend

The Map Legend Tab includes information needed to construct a thematic map as well as that map’s corresponding map legend, for the corresponding SDV rule. The information on this tab is ultimately passed to ArcMap’s map generation process.

The screenshot shows a software window with a tabbed interface. The 'Map Legend' tab is active. It contains a 'Map Legend Name' dropdown menu with the selected value 'Natural Break Classes - Progressive - Spectrum' and a 'Number of Classes' spinner box set to 5. Below these is a 'Null Replacement' section with two input fields: 'Map Null Rating Replacement' and 'Report Null Rating Replacement'.

Map Legend Tab for soil property SDV rule “Calcium Carbonate (CaCO₃)”.

Map Legend Name

This field is used to specify the name of the map legend to be used when creating thematic maps for the corresponding SDV rule. The map legend name dropdown choice list will always contain only those map legends that are valid for the current context. A map legend name is always required.

A default map legend name will always be provided. In most cases, the default map legend name should be accepted. For a discussion of considerations in selecting a map legend name, please see the section titled “Map Legends and Custom Map Legends – The Details”.

Number of Classes

This field is displayed only when the corresponding map legend is a “Natural Break Classes” type of map legend.

The value of this field specifies the number of map legend classes that should appear in the map legend of any thematic map for the corresponding soil property. For a “Natural Break Classes” map legend, a map legend class corresponds to a range of possible rating values.

For a “Natural Break Classes” type of map legend, specifying the number of map legend classes is always required. The default value for this field is 5. This default value shouldn’t be changed without a reason for doing so.

Custom Map Legend Grid

A custom map legend grid is displayed only when the corresponding SDV rule references a custom map legend type (Custom Classes, Custom Unique Values, Stoplight Interpretation).

General	Constraints / Qualifiers	Processing Options	Folder / Land Uses	Map Legend	Edit Notes																																										
Map Legend Name:* Custom Classes - Progressive - Spectrum-Full Bi																																															
Custom Map Legend Classes <table border="1"> <thead> <tr> <th>New</th> <th>Seq</th> <th>Lower Rating Value</th> <th>Upper Rating Value</th> <th>Class Name</th> <th>Color</th> </tr> </thead> <tbody> <tr> <td>Delete</td> <td>1</td> <td>0.0000</td> <td>0.0100</td> <td>Very Low (0.0 - 0.01)</td> <td>■ #FF0000</td> </tr> <tr> <td>Delete</td> <td>2</td> <td>0.0100</td> <td>0.1000</td> <td>Low (0.01 - 0.1)</td> <td>■ #FFB400</td> </tr> <tr> <td>Delete</td> <td>3</td> <td>0.1000</td> <td>1.0000</td> <td>Moderately Low (0.1 - 1)</td> <td>■ #EBFD5C</td> </tr> <tr> <td>Delete</td> <td>4</td> <td>1.0000</td> <td>10.0000</td> <td>Moderately High (1 - 10)</td> <td>■ #86F7D9</td> </tr> <tr> <td>Delete</td> <td>5</td> <td>10.0000</td> <td>100.0000</td> <td>High (10 - 100)</td> <td>■ #5796FF</td> </tr> <tr> <td>Delete</td> <td>6</td> <td>100.0000</td> <td>705.0000</td> <td>Very High (100 - 705)</td> <td>■ #0000FF</td> </tr> </tbody> </table>						New	Seq	Lower Rating Value	Upper Rating Value	Class Name	Color	Delete	1	0.0000	0.0100	Very Low (0.0 - 0.01)	■ #FF0000	Delete	2	0.0100	0.1000	Low (0.01 - 0.1)	■ #FFB400	Delete	3	0.1000	1.0000	Moderately Low (0.1 - 1)	■ #EBFD5C	Delete	4	1.0000	10.0000	Moderately High (1 - 10)	■ #86F7D9	Delete	5	10.0000	100.0000	High (10 - 100)	■ #5796FF	Delete	6	100.0000	705.0000	Very High (100 - 705)	■ #0000FF
New	Seq	Lower Rating Value	Upper Rating Value	Class Name	Color																																										
Delete	1	0.0000	0.0100	Very Low (0.0 - 0.01)	■ #FF0000																																										
Delete	2	0.0100	0.1000	Low (0.01 - 0.1)	■ #FFB400																																										
Delete	3	0.1000	1.0000	Moderately Low (0.1 - 1)	■ #EBFD5C																																										
Delete	4	1.0000	10.0000	Moderately High (1 - 10)	■ #86F7D9																																										
Delete	5	10.0000	100.0000	High (10 - 100)	■ #5796FF																																										
Delete	6	100.0000	705.0000	Very High (100 - 705)	■ #0000FF																																										
Null Replacement <div> Map Null Rating Replacement: <input type="text"/> </div> <div> Report Null Rating Replacement: <input type="text"/> </div>																																															

Map Legend Tab for soil property SDV rule “Saturated Hydraulic Conductivity (Ksat), Standard Classes”.

When an SDV rule references a custom map legend type, in addition to the attributes associated with the corresponding “map legend” (map legend name, map legend type, color ramp type, color ramp name), a number of additional custom map legend attributes must be provided. Those custom map legend attributes are associated with the corresponding SDV rule, not with the corresponding “map legend”. A custom map legend allows a user to explicitly specify map legend class names and colors, and to group rating values into the same map legend class.

For a discussion of the data entry rules for custom map legends, please see the section titled “Map Legends and Custom Map Legends – The Details”.

Null Rating Replacement Value

Any value entered for this field will be substituted for a null map unit rating for the corresponding soil property, for rating data submitted to the map generation process, but not for rating data submitted for report formatting.

The purpose of this field is best understood with an example. For soil properties “Depth to Water Table” and “Depth to Soil Restrictive Layer”, the Soil Survey Division didn’t like the fact that for a map unit where no water table or restriction exists, the corresponding map unit was originally classified as “Null or not rated”. For such a map unit, the Soil Survey Division wanted the thematic map to reflect that no water table or restriction was found within a certain depth.

So the concept of a “null rating replacement value” was added. So for “Depth to Water Table” and “Depth to Soil Restrictive Layer”, the null rating replacement value is set to 201. Therefore, a map unit with no water table or no restrictive layer is now identified in the map legend class “> 200”, rather than the map legend class “Null or not rated”. In the corresponding aggregation report, the rating value will still be Null (blank), since it didn’t seem appropriate for a variety of values to appear in a report. Other examples are the soil properties “Flooding Frequency Class” and “Ponding Frequency Class”. For these attributes, a null rating value really corresponds to “no flooding” or “no ponding”. Therefore the null rating replacement value for these soil properties was set to “None”, which is one of the existing domain choices for “Flooding Frequency Class” and “Ponding Frequency Class”. The “null rating replacement value” negatively impacts the NOTCOM areas by assigning a value when, in fact, no value should be assigned. This is a programming issue that is hoped to be rectified in the future.

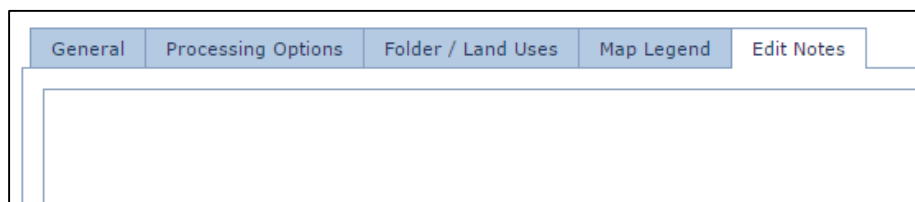
Note than when the corresponding soil property has some sort of custom map legend, setting a null rating replacement value is only effective when the null rating replacement value is a value that will cause a map unit with an original null rating to fall into the desired map legend class.

Any null rating replacement value must conform to the following constraints:

1. It must represent a valid instance of the same data type as the corresponding soil property that is being aggregated.
2. It must satisfy any range or domain constraints that are defined for the corresponding soil property that is being aggregated.

The SDV Rule Manager application will make these checks and inform when a value entered for “null rating replacement value” violates any of these constraints.

Edit Notes

A screenshot of the SDV Rule Manager application interface. It features a horizontal tab bar at the top with five tabs: 'General', 'Processing Options', 'Folder / Land Uses', 'Map Legend', and 'Edit Notes'. The 'Edit Notes' tab is currently selected and highlighted. Below the tab bar is a large, empty rectangular text area for entering notes.

The edit notes is a new feature with this release and allows the user to document changes to the report.

Soil Interpretation SDV Rule

Any authorized SDV Rule Manager user who is a member of group “Soil Data Viewer” for a particular NASIS site can create or edit a soil interpretation SDV rule for any soil interpretation owned by that NASIS site. *Note that for any particular soil interpretation, one and only one SDV rule may be defined.* To add a new SDV rule for a soil interpretation, first select the soil interpretation for which to add a corresponding SDV rule. This can be done by selecting “Add Interpretation Rule” or “Find Interpretations without Rules”.

Add a New Interpretation Rule

This option initiates the process of adding a new soil interpretation SDV rule.

“Add Interpretation Rule” Form

Search

This option prompts for a search based on three search methods and is typically used when the soil interpretation is known for which to add a corresponding SDV rule.

“Search Interpretation Rule” Form

The first method of search “Find all matching ...” searches for the NASIS primary interpretations based on the wildcard string.

SearchType: ☒ Find all matching primary interpretations in NASIS.
☐ Find primary interpretations in NASIS without a corresponding SDV Rule.
☐ Find interpretation results in the Soil Data mart without a corresponding SDV Rule.

Interpretation: ENG%
[Wild cards for LIKE (%) and _] may be used for Interpretation search]

NASIS Site: NSSC Pangaea

Cancel Find Interpretations

Interpretations found: 17

Action	Interpretation	Type	NASIS Site
+	ENG - Construction Materials; Gravel Source	suitability	NSSC Pangaea
+	ENG - Construction Materials; Reclamation	suitability	NSSC Pangaea
+	ENG - Construction Materials; Roadfill	suitability	NSSC Pangaea
+	ENG - Construction Materials; Sand Source	suitability	NSSC Pangaea
+	ENG - Construction Materials; Topsoil	suitability	NSSC Pangaea
+	ENG - Daily Cover for Landfill	limitation	NSSC Pangaea
+	ENG - Dwellings W/O Basements	limitation	NSSC Pangaea
+	ENG - Dwellings With Basements	limitation	NSSC Pangaea
+	ENG - Lawn, Landscape, Golf Fairway	limitation	NSSC Pangaea
+	ENG - Local Roads and Streets	limitation	NSSC Pangaea

Page 1 of 2 (17 items) 1 2

“Find All Matching ...Search Interpretation Rule” Results

The second method of search “Find primary interpretations...without SDV Rule” identifies those in which an Interpretation is available, but an SDV Rule has not been created. Option “NASIS” returns “primary” soil interpretations in NASIS, for the selected NASIS site, that have no corresponding SDV rule:

SearchType: ☐ Find all matching primary interpretations in NASIS.
☒ Find primary interpretations in NASIS without a corresponding SDV Rule.
☐ Find interpretation results in the Soil Data mart without a corresponding SDV Rule.

Interpretation:

NASIS Site: NSSC Pangaea

Cancel Find Interpretations

Interpretations found: 1

Action	Interpretation	Type	NASIS Site
+	WMS - Irrigation, Micro (subsurface drip) edited	limitation	NSSC Pangaea

“Find without SDV Rule” ...Search Interpretation Rule Results

This option returns soil interpretations in NASIS where:

1. An SDV rule does not already exist for that soil interpretation.
2. Interpretation naming standards are met if the soil interpretation is not owned by NASIS site “NSSC Pangaea”.
3. The soil interpretation is marked as a “Primary Interpretation”.
4. The soil interpretation is marked as “Ready to Use”.

The third method “Find interpretation results in the SDM without a corresponding SDV Rule” searches the SDM for interpretations missing a SDV rule. Option “Soil Data Mart” returns soil interpretations regardless of the setting of their Primary Interpretation flag in NASIS. This query is a ‘choice dependent’ list by state. Only those states that exported interpretations, and yet to create an SDV Rule will appear in the list. Option “Soil Data Mart” scans the Soil Data Mart database for soil interpretation results for the selected state or soil survey area, for which:

1. The corresponding soil interpretation in NASIS has no corresponding SDV rule (NASIS Site in the results grid will be populated).
2. There is no longer a corresponding soil interpretation in NASIS (NASIS Site in the results grid will be blank).

Create a new Interpretation Rule

This search returns interpretations that meet your specified criteria, plus the following:

1. State and local naming standards are met if it is not owned by NASIS site "NSSC Pangaea".
2. The interpretation is marked within NASIS as being a "primary interpretation".
3. The interpretation is marked within NASIS as being "ready to use".

SearchType: ☐ Find all matching primary interpretations in NASIS.
☐ Find primary interpretations in NASIS without a corresponding SDV Rule.
☒ Find interpretation results in the Soil Data mart without a corresponding SDV Rule.

State: **Alabama**

Survey Area: **Alabama**

Cancel Find In

Alabama
Alaska
Arizona
Arkansas
California
Colorado
Connecticut

The resulting search will list all the interpretations missing an SDV Rule. The search on Connecticut includes 23 interpretations with results stored in the SDM, but no corresponding SDV rule created for displaying the results on the WSS.

SearchType: ☐ Find all matching primary interpretations in NASIS.
☐ Find primary interpretations in NASIS without a corresponding SDV Rule.
☒ Find interpretation results in the Soil Data mart without a corresponding SDV Rule.

State: **Connecticut**

Survey Area: **Any Soil Survey Area**

Cancel Find Interpretations

Interpretations found: 23

Action	Interpretation	Type	NASIS Site
+	ENG - Closed-Loop Horizontal Geothermal Heat Pumps (CT)	suitability	MLRA12_Amherst
+	ENG - Construction Materials; Gravel Source (CT)	suitability	MLRA12_Amherst
+	ENG - Construction Materials; Sand Source (CT)	suitability	MLRA12_Amherst
+	ENG - Infiltration systems (CT)	limitation	MLRA12_Amherst
+	ENG - Intermittent wetland systems (CT)	limitation	MLRA12_Amherst
+	ENG - Large Animal Disposal, Pit (CT)	limitation	MLRA12_Amherst
+	ENG - Large Animal Disposal, Trench (CT)	limitation	MLRA12_Amherst
+	ENG - Lawn, landscape, golf fairway (CT)	limitation	MLRA12_Amherst
+	ENG - Perennial wetland systems (CT)	limitation	MLRA12_Amherst
+	ENG - Soil Potential Ratings of SSDS (CT)	class	MLRA12_Amherst

Page 1 of 3 (23 items) 1 2 3

These options return soil interpretations, if any, which match all specified criteria, in a scrollable grid. The records in this grid are sorted in ascending order by soil interpretation name.

Add Rule

To add an SDV rule for a selected soil interpretation, click the plus sign next to the soil interpretation to add the corresponding SDV rule. When the plus sign in the row for a particular soil interpretation is clicked, information about that interpretation is retrieved from the NASIS database. This includes extracting the existing rating classes associated with that interpretation. A number of validations are performed at this point, and if any of the following conditions are found, the error must be corrected before adding an SDV rule:

1. The State developed interpretation does not conform to the naming convention.
2. No corresponding "not rated" phrase is defined.

3. In NASIS, by default, the “not rated” phrase is set to “Not rated”. NASIS allows the user to change this phrase or even delete this phrase. In order to be able to create an unambiguous thematic map legend, Soil Data Viewer requires a non-null not rated phrase.
4. A rating class is defined where the rating class name is equal to the corresponding “not rated” phrase. NASIS doesn’t prevent the creation of a rating class where the rating class name is equal to the “not rated” phrase. In order to be able to create an unambiguous thematic map legend, Soil Data Viewer does not permit this.
5. One or more rating classes without a rating class name are defined. NASIS allows the creation of a soil interpretation with no corresponding rating class names, but the Soil Data Viewer application currently requires rating class names, since a rating class name is currently what is actually returned as the attribute value for a soil interpretation.
6. One or more rating classes without a rating class boundary value are defined. NASIS erroneously allows the definition of a rating class with no corresponding rating class boundary value. Without a rating class boundary value, the corresponding rating class name would never be returned.
7. Less than two distinct rating classes are defined. It doesn’t make any sense to create a soil interpretation with only one possible result, even though NASIS allows it to be done.
8. This limitation or suitability interpretation includes more rating classes than the current maximum allowable number of rating classes. For limitation or suitability (non-class) soil interpretations, a predefined color is assigned to each distinct rating class, based on the total number of distinct rating class names. The color scheme is referred to as a “stoplight” color ramp, since it ranges from red to yellow to green. When there are more than three distinct rating classes, gradations between red and yellow, and yellow and green must be used. Since these colors are predefined, they only account for a certain maximum number of distinct rating classes. If a soil interpretation is encountered with more than the maximum allowable number of distinct rating classes (nine, when this was written), then it is unable to assign a color to each distinct rating class. At the time this was written, there were no limitation or suitability soil interpretations in NASIS with more than nine distinct rating classes. If an interpretation needs more than nine distinct rating classes, please contact the Soil Hotline to extend the maximum allowable number of distinct rating classes.

The determination of distinct rating class names is case sensitive. Therefore “Very limited” is not considered to be the same as “Very Limited”. Even though NASIS allows it, never define two rating classes whose names differ only by case. Also, the desired convention for rating class names in general (at least for limitation and suitability soil interpretations) is to capitalize only the first word of a rating class name.

Selected Soil Interpretations Grid

Interpretations found: 40			
Action	Interpretation	Type	NASIS Site
2	ENG (MI) - Animal Mortality Disposal (Catastrophic)	limitation	MLRA12_Amherst
2	ENG (MI) - Construction Materials; Gravel Source tm	limitation	MLRA12_Amherst
2	ENG (MI) - Sewage Lagoons (to be deleted)	limitation	MLRA12_Amherst
+	ENG - Closed-Loop Horizontal Geothermal Heat Pumps (CT)	suitability	MLRA12_Amherst
2	ENG - Construction Materials; Gravel Source (12)	suitability	MLRA12_Amherst
+	ENG - Construction Materials; Gravel Source (CT)	suitability	MLRA12_Amherst
2	ENG - Construction Materials; Gravel Source (ESG)	suitability	MLRA12_Amherst
+	ENG - Construction Materials; Gravel Source (MI)	suitability	MLRA12_Amherst
+	ENG - Construction Materials; Gravel Source (NY)	suitability	MLRA12_Amherst
+	ENG - Construction Materials; Gravel Source (VT)	suitability	MLRA12_Amherst
Page 1 of 4 (40 items) 1 2 3 4			

Selected Soil Interpretations Grid

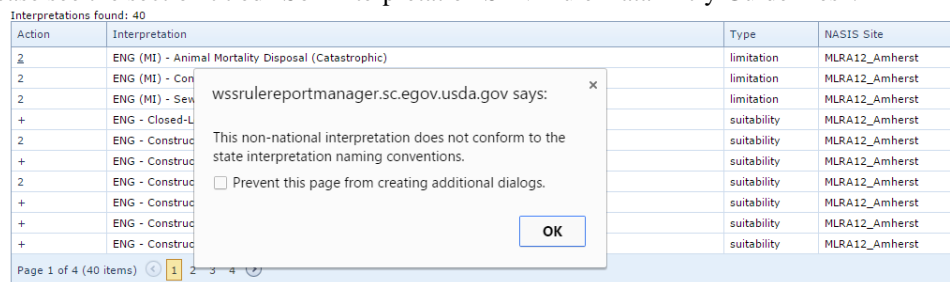
This grid includes the following columns:

1. **Action:** Plus sign or Reason(s)*
2. **Interpretation:** Soil Interpretation Name
3. **Type:** Soil Interpretation Type or “Rule Design” (Limitation, Suitability or Class)

4. **NASIS Site Name:** The name of the NASIS site that owns the corresponding soil interpretation. This column will be blank if the corresponding interpretation no longer exists in NASIS.

**If the first column contains a plus sign, the user can initiate the addition of a new SDV rule for the corresponding soil interpretation by clicking the plus sign in that row. If the first column doesn't contain a plus sign, it will contain a comma delimited list of one or more numbers. The absence of a plus sign indicates that the user cannot create a new SDV rule for this soil interpretation at this time. Click on an individual number to see the reason associated with that number.*

After clicking the plus sign to add a new SDV rule for the selected soil interpretation, some of the information needed for this soil interpretation SDV rule is then extracted from NASIS, some is then extracted from a data dictionary, and any default values are established. For data entry guidelines for soil interpretation SDV rule attributes, please see the section titled "Soil Interpretation SDV Rule Data Entry Guidelines".



The screenshot shows a table of soil interpretations with columns: Action, Interpretation, Type, and NASIS Site. An error dialog box is overlaid on the table. The dialog box title is "wssrulereportmanager.sc.egov.usda.gov says:". The message inside reads: "This non-national interpretation does not conform to the state interpretation naming conventions." Below the message is a checkbox labeled "Prevent this page from creating additional dialogs." and an "OK" button. The table behind the dialog shows rows for various interpretations, including "ENG (MI) - Animal Mortality Disposal (Catastrophic)" and "ENG (MI) - Closed-L".

Selected Soil Interpretations Error Message

Here are the reasons that prevent an SDV rule from being created for a selected soil interpretation:

1. The user is not currently authorized to add a new SDV rule for this soil interpretation's corresponding NASIS site.
2. This soil interpretation doesn't conform to the nomenclature standard for non-national soil interpretations. Naming convention requires a suffixed parenthetical state code, e.g. 'ENG – Animal Mortality Disposal (Catastrophic) (MI)'
3. In NASIS, the Ready to Use flag for this soil interpretation is not set to "Yes".
4. In NASIS, the Primary Interpretation flag for this soil interpretation is not set to "Yes".
5. This soil interpretation no longer exists in NASIS.

NASIS allows the creation of two different soil interpretations whose names differ only by case. Soil Data Viewer Rule Manager will not allow the creation of SDV rules for two soil interpretations whose names differ only by case.

If no SDV rule currently exists for either soil interpretation whose names differ only by case, both soil interpretations will be returned when searching for soil interpretations with no corresponding SDV rule. At that point an SDV rule can be added for either one of those two soil interpretations whose names differ only by case. But once an SDV rule is added for one of those interpretations, then it will not be possible to add an SDV rule for the other, because at this point, the SDV Rule Manager application thinks that an SDV rule already exists for that soil interpretation.

Editing an Existing Soil Interpretation SDV rule

Any WSSRRM authorized user who is a member of group “Soil Data Viewer” for a NASIS site other than “NSSC Pangaea” can edit existing soil interpretation SDV rules owned by that NASIS site. Any authorized SDVRM user who is a member of group “Soil Data Viewer” for NASIS site “NSSC Pangaea” can edit any existing soil interpretation SDV rule owned by any NASIS site.

To edit an existing SDV rule, the SDV rule must first be selected. See the section titled “**Error! Reference source not found.**” for a detailed discussion of the process of selecting an existing SDV rule in order to view, edit or delete that rule. After selecting an SDV rule, an authorized user can edit that rule and an edit icon/link will be visible at the top of the form.

Data entry guidelines for soil interpretation SDV rule attributes are in the section titled “Soil Interpretation SDV Rule Data Entry Guidelines”.

The impact of changes to a soil interpretation (NASIS rule) for which a corresponding SDV rule exists because a soil interpretation SDV rule IS NOT automatically updated when its corresponding NASIS rule is updated. If the ONLY change to a NASIS rule is an update to its rating classes, the corresponding SDV rule can be updated by editing that SDV rule, selecting the tab labeled “Map Legend” and then clicking the button under the custom map legend grid labeled “Reset to Defaults”.

If any of the following NASIS rule attributes are updated, any corresponding SDV rule must be dropped and re-added from scratch:

1. NASIS rule name
2. NASIS rule design (limitation, suitability, class)
3. NASIS rule “not rated phrase”.

Deleting an Existing Soil Interpretation SDV rule

Any authorized SDV Rule Manager user who is a member of group “Soil Data Viewer” for a NASIS site other than “NSSC Pangaea” can only delete existing soil interpretation SDV rules owned by that NASIS site. Any authorized SDVRM user who is a member of group “Soil Data Viewer” for NASIS site “NSSC Pangaea” can delete any existing soil interpretation SDV rule owned by any NASIS site.

To delete an existing SDV rule, first select that SDV rule. See the section titled “**Error! Reference source not found.**” for a detailed discussion of the process of selecting an existing SDV rule in order to view, edit or delete that rule. After selecting an SDV rule, an authorized user can delete that rule and a delete icon/link will be visible at the top of the form.

The intent is to not have soil interpretations in the Soil Data Mart that have no corresponding SDV rule.

Soil Interpretation SDV Rule Data Entry Guidelines

The fields associated with a soil interpretation SDV rule are distributed among four different tabs: “General”, “Processing Options”, “Folder / Land Uses”, “Map Legend”, and “Edit Notes”.

When adding a new soil interpretation SDV rule, a default value has been assigned to every field for which it is possible to do so. This default value will be the most appropriate value in the majority of cases. There shouldn't be a need to change a default value unless there is a valid reason to edit. The data entry guidelines for a field will discuss reasons for changing a default value.

Edits should be saved for the current object work before moving to another object.

General Tab

Most of the fields on the General Tab are used to identify, define and record the vintage of the corresponding SDV rule. For a soil interpretation SDV rule, the corresponding NASIS soil interpretation name and type (limitation, suitability or class) are identified.

The screenshot shows the 'General' tab of a software interface. At the top are five tabs: 'General' (selected), 'Processing Options', 'Folder / Land Uses', 'Map Legend', and 'Edit Notes'. The main content area is divided into three sections: 'Interpretation', 'Rule Name*', and 'Status'. The 'Interpretation' section contains three fields: 'NASIS Site' with the value 'NSSC Pangaea', 'Interpretation' with 'ENG - Dwellings W/O Basements', and 'Interpretation Design' with 'limitation'. The 'Rule Name*' section has a text box containing 'Dwellings Without Basements'. Below it, the 'Rule Description*' field is a scrollable text area containing two paragraphs: 'Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper.' and 'The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without...'. Below the description is the 'Default Result Column Name:*' field with the value 'DwellWOB'. The 'Available in Basic Mode?:' checkbox is checked. The 'Status' section contains four fields: 'Review Requested?:' with 'No', 'Ready to Distribute?:' with 'Yes', 'Date Last Updated:' with '1/14/2009 12:35:11 AM', and 'Record ID:' with '69'.

General Tab for limitation soil interpretation SDV rule “Dwellings Without Basements”.

NASIS Site

This is the name of the NASIS site that owns the corresponding soil interpretation and the corresponding SDV rule. This field cannot be edited.

Interpretation

This is the name of corresponding soil interpretation in NASIS. This field cannot be edited.

Interpretation Design

This is what is referred to as “Rule Design” in NASIS. The “Interpretation Design” value must be either “Limitation”, “Suitability” or “Class”. This field cannot be edited.

Rule Name

This is the name of the corresponding SDV rule. This is the name by which a user will identify an SDV rule in both client Soil Data Viewer and Web Soil Survey. Look at other national SDV rule names to get a feel for the conventions that are used for SDV rule names. This field is required. No two SDV rules may have the same name.

A soil interpretation SDV rule name should obviously indicate the subject of the corresponding soil interpretation, but the SDV rule name does not necessarily have to include any specific part of the corresponding soil interpretation name. The SDV rule name should not include any category prefix in the corresponding soil interpretation name (e.g. AGR, AWM, ENG, etc.). In many cases, the SDV rule name has been set to the name of the corresponding soil interpretation, minus the category prefix, but there are numerous exceptions to this rule.

Changing a soil interpretation name potentially has a number of negative side effects, like breaking soil reports and SDV rules that still reference the previous soil interpretation name. Therefore, do not change a soil interpretation name. But other than changing a name with which a user has become accustomed, changing an SDV rule name has no

other negative side effects. Therefore a name change is a preferred wording change in an SDV rule name, without having to actually change the name of the corresponding soil interpretation.

Certain characters that may occur in a soil interpretation name are not permitted in an SDV rule name. The following characters are not permitted in an SDV rule name:

\/:*?"<>|. &

For a state specific soil interpretation, regardless of whether or not a national counterpart exists, the corresponding state postal code, in parenthesis, must be appended to end of the SDV rule name, e.g. “Dwellings With Basements (OH)”. This constraint is not enforced by the SDV Rule Manager application, but it is one of the things that a reviewer will check before making an SDV rule available for public dissemination.

Rule Description

This is a narrative description of the corresponding SDV rule. Look at other national SDV rule descriptions to get a feel for the conventions that are used for SDV rule descriptions. This field is required.

Default Result Column Name

When a thematic map is generated for the corresponding SDV rule, this will be the default column name into which the corresponding map unit rating will be stored. A Soil Data Viewer user can change this default name at runtime. Look at other result column names to get a feel for the conventions that are used for result column names.* A result column name can include no more than ten characters, must begin with a letter and contain only letters, digits and underscores. This field is required.

*The formatting convention used for result column names is referred to as “CamelCase”, i.e. the first letter of a word or substring that represents a word is capitalized, and there are no spaces between words. Also, if an SDV rule is created for a state version of an existing national soil interpretation, then use the same default result column name as that state soil interpretation’s national counterpart.

Available in Basic Mode?

This field indicates whether or not the corresponding SDV rule should be visible when the client Soil Data Viewer application is in “Basic Mode”. The current convention is that all limitation and suitability soil interpretation SDV rules should be available in Basic Mode. At the time this was written, there was no convention as to whether or not class soil interpretation SDV rules should always be available in Basic Mode.

For limitation and suitability soil interpretation SDV rules, this field is set (checked) by default. For class soil interpretation SDV rules, this field is not set (not checked) by default.

The client Soil Data Viewer application is always either in Basic Mode or Advanced Mode. The intention is that the attributes available in Basic Mode should not require any runtime parameters for which no default value is defined, with the exception of any required data selection options, i.e. primary/secondary constraint selections.

There really isn’t any reason that a class soil interpretation SDV rule shouldn’t necessarily be available in Basic Mode. If the decision is to add a class soil interpretation SDV rule available in Basic Mode, then the user is responsible for setting this field.

Ready to Distribute? / Ready to Review?

In view mode, the label of this field will always be “Ready to Distribute?”. In edit mode, the label of this field will always be “Ready to Distribute?” for “NSSC Pangaea” users, and will always be “Ready for Review?” for non-“NSSC Pangaea” users.

Ready to Distribute?

This field indicates whether or not this SDV rule is ready to be included in exports from the Soil Data Mart. This field should never be set (checked) until the corresponding SDV rule has actually been tested using the client Soil Data Viewer application. More on this in a bit. For new SDV rules, this field is not set (not checked) by default.

This field cannot be set and saved unless:

1. All required fields are populated with valid values.
2. This SDV rule is associated with a folder.
3. Any corresponding custom map legend passes all custom map legend validations.

If any of these validations fail, the user will be required to either fix the problem, or reset (uncheck) “Ready to Distribute?”, before the user can save any edits.

Ready for Review?

Non-“NSSC Pangaea” users cannot explicitly set Ready to Distribute? When the user determines that a non-national soil interpretation SDV rule is ready to distribute, the user must check “Ready for Review?”, and then save the corresponding SDV rule. This will send an e-mail to the Soils Hotline letting them know that the corresponding SDV rule is ready to be reviewed. The Soil Hotline will then forward that request to someone on the NSSC staff. That person will then review that SDV rule and the corresponding soil interpretation in NASIS to ensure that all existing conventions and requirements have been satisfied. If there are no issues that need to be resolved, the reviewer will then set “Ready to Distribute?” and send the user an e-mail confirmation. If there are issues that need to be resolved, “Ready to Distribute?” will be left not set, and the user e-mail notification will cover all issues that need to be resolved.

Determining if an SDV Rule is Ready to Distribute

An SDV rule should not be distributed until it has actually been tested using the client Soil Data Viewer application. Verify that a thematic map can be generated, and that the thematic map and corresponding map legend look as expected.

A new SDV rule is tested by creating a SSURGO export from either NASIS or the Staging Server. NASIS and Staging Server SSURGO exports will export an SDV rule, regardless of the setting of “Ready to Distribute?”, but a soil interpretation SDV rule requires the corresponding soil data to be included in the data export.

In order to generate a thematic map, both tabular and spatial data are required. A SSURGO export from NASIS does not include spatial data, and a SSURGO export from the Staging Server only includes spatial data when the corresponding spatial data is currently loaded into the Staging Server database.

Last Updated

This is the date and time when the corresponding SDV rule was last saved to the Soil Data Mart database. This value controls when an SDV rule in a SSURGO template database is updated. When importing tabular data, an existing SDV rule in a SSURGO template database will be updated only when the same SDV rule (“same” being based on the SDV rule’s internal key value) in the tabular data being imported has a more recent “Last Updated” date. This field cannot be edited.

Processing Options Tab

There is one parameters that affect the outcome of the aggregation process. The Processing Options Tab allows the SDV rule designer to provide a default value for each of those parameters, and for some parameters, the SDV rule designer can indicate whether or not a parameter’s default value can be changed at runtime.

The screenshot shows a software interface with a top menu bar containing 'New', 'Save', 'Save As New', 'Close', 'Delete', and 'Approve'. Below this is a tabbed interface with 'General', 'Processing Options', 'Folder / Land Uses', 'Map Legend', and 'Edit Notes'. The 'Processing Options' tab is active, displaying a 'Default Aggregation Method:' label followed by a dropdown menu currently showing 'Dominant Condition'.

Processing Options Tab for soil interpretation SDV rule “Conservation Tree & Shrub Groups”.

Default Aggregation Method

Aggregation method determines how a single rating value for a map unit as a whole is derived from a set of individual map unit component values.

The default aggregation method for all soil interpretation SDV rules is “Dominant Condition”. The current convention is to never change this default aggregation method. This default is arguably the most appropriate aggregation method, in general. Keep in mind that a Soil Data Viewer user is ALWAYS permitted to select any valid aggregation method at runtime.

This choice list contains only those aggregation methods that are suitable for the corresponding soil interpretation. For limitation and suitability soil interpretations, only aggregation methods “Dominant Condition”, “Dominant Component”, “Most Limiting”, “Least Limiting”, and “Weighted Average” are appropriate. For class soil interpretations, only aggregation methods “Dominant Condition”, “Dominant Component” and “Minimum or Maximum” are appropriate.

For a more complete discussion of aggregation methods and usage conventions, please see the section titled “Aggregation Methods – The Details”.

Folder / Land Uses Tab

In order to be available to end users, an SDV rule *must* be associated with a folder. SDV rules associated with a non-intrinsic soil property folder *may* also be associated with one or more specific land uses. This controls which SDV rules are available in Web Soil Survey when the Web Soil Survey user has selected a specific land use. SDV rules not associated with any specific land are still available to a Web Soil Survey user when they have selected “All Uses”. Folder and land use associations are established on the Folder / Land Uses tab.

The screenshot shows the 'Folder / Land Uses' tab in the software interface. It features a 'Folder:*' dropdown menu set to 'Wildlife Management'. Below this, under the heading 'Specific Land Uses:', there is a list of land use categories with checkboxes. The checked categories are Cropland, Hayland/Pastureland, Horticulture, Rangeland, Recreation, and Urban Uses. Forestland is the only category that is unchecked.

Folder / Land Uses Tab for limitation soil interpretation SDV rule “Camp Areas”.

Folder

This field allows association of an SDV rule with a folder. An SDV rule must be associated with a folder in order to be available in client Soil Data Viewer and Web Soil Survey. The folders managed by the Soil Data Viewer Rule Manager application are shared by client Soil Data Viewer and Web Soil Survey. An SDV rule may be associated with one and only one folder. The dropdown list of folders available for a soil interpretation SDV rule does not include any intrinsic soil property folders.

As long as “Ready to Distribute?” or “Ready to Review?” is not checked, an SDV rule can be saved without having to be associated with a folder.

When making folder assignments, it is helpful to have some idea about which SDV rules are already associated with which folders. But if the user selects and view a folder in the midst of adding or editing an SDV rule, without first saving the work, all pending changes will be lost. If the user want to see which SDV rules are currently associated with a folder, while in the midst of adding or editing an existing SDV rule, the user need to start a second SDV Rule Manager Browser session to select and view folders.

Specific Land Uses

The Web Soil Survey application allows soil interpretation SDV rules to be associated with one or more specific land uses. These associations are used to filter which SDV rules are available for the current land use context, within Web Soil Survey. Web Soil Survey is always either in a specific land use context, like “Rangeland”, or in the land use context known as “All Uses”.

Soil interpretation SDV rules can be associated with zero, one or more specific land uses. A soil interpretation SDV rule that is not associated with any specific land use will still be available when the corresponding land use is “All Uses”. But when the current land use is a specific land use, “Rangeland” for example, only those soil interpretation SDV rules explicitly associated with land use “Rangeland” will be available.

For a soil interpretation SDV rule, all specific land uses (all land uses except “All Uses”) will be listed. To associate a soil interpretation SDV rule with a specific land use, the box to the left of that land use name should be checked. A soil interpretation SDV rule can be associated with zero, one or more specific land uses. By making such an attribute available for land use “All Uses”, it is ensuring that the corresponding SDV rule is at least available in one land use context.




Map Legend Tab

The Map Legend Tab includes information needed to construct a thematic map as well as that map’s corresponding map legend, for the corresponding SDV rule. The information on this tab is ultimately passed to ArcMap’s map generation process.

General Processing Options Folder / Land Uses **Map Legend** Edit Notes

Map Legend Name:* Stoplight Interpretation - Defined

Custom Map Legend Classes

Seq	Rating Value	Class Name	Color
1	Very limited	Very limited	 #FF0000
2	Somewhat limited	Somewhat limited	 #FFFF00
3	Not limited	Not limited	 #00FF00

Reset to Defaults

Map Legend Tab for limitation soil interpretation SDV rule “Camp Areas”.

Map Legend Name

This field is used to specify the name of the map legend to be used when creating thematic maps for the corresponding SDV rule. The map legend name dropdown choice list will always contain only those map legends that are valid for the current context. A map legend name is always required.

A default map legend name will always be provided. In most cases, the user should accept the default map legend name that is provided. For a discussion of considerations in selecting a map legend name, please see the section titled “Map Legends and Custom Map Legends – The Details”.

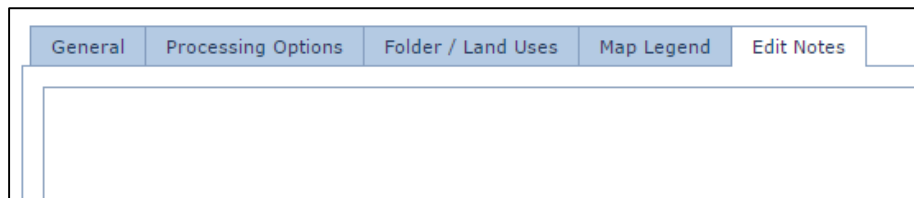
Custom Map Legend Grid

A custom map legend grid is displayed only when the corresponding SDV rule references a custom map legend type (Custom Classes, Custom Unique Values, Stoplight Interpretation).

When an SDV rule references a custom map legend type, in addition to the attributes associated with the corresponding “map legend” (map legend name, map legend type, color ramp type, color ramp name), a number of additional custom map legend attributes must be provided. Those custom map legend attributes are associated with the corresponding SDV rule, not with the corresponding “map legend”. A custom map legend allows a user to explicitly specify map legend class names and colors, and to group rating values into the same map legend class.

For a discussion of the data entry rules for custom map legends, please see the section titled “Map Legends and Custom Map Legends – The Details”.

Edit Notes

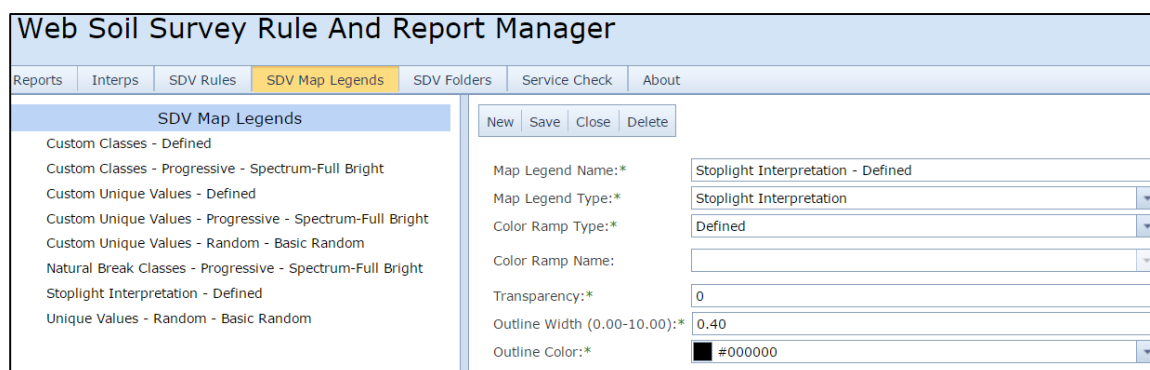
The image shows a screenshot of a software interface with five tabs: 'General', 'Processing Options', 'Folder / Land Uses', 'Map Legend', and 'Edit Notes'. The 'Edit Notes' tab is currently selected and highlighted. Below the tabs is a large, empty rectangular text area for entering notes.

The edit notes is a new feature with this release and allows the user to document changes to the report.

SDV Map Legends

Any authorized SDV Rule Manager Application user can select and view any existing map legend, but only a member of group “Soil Data Viewer” for NASIS site “NSSC Pangaea” can add, edit or delete a map legend.

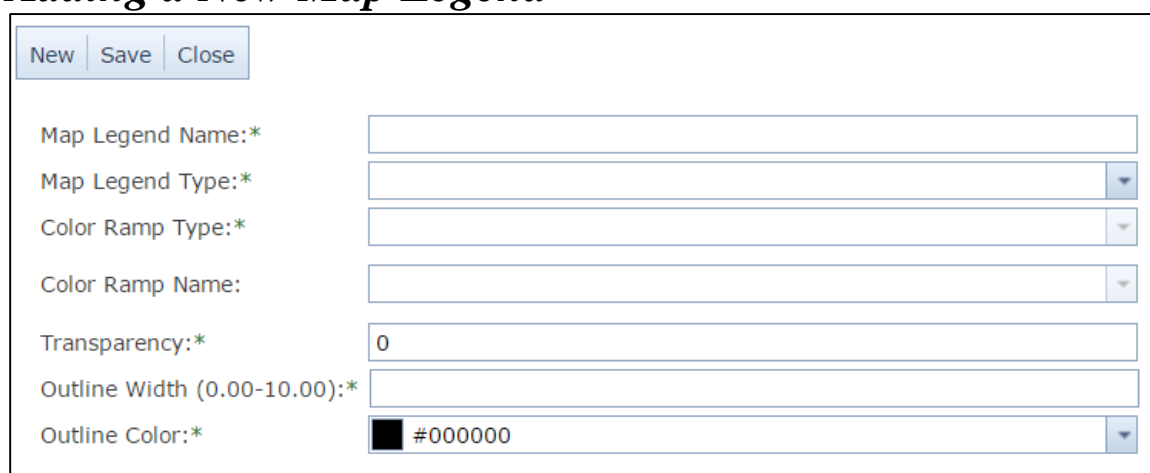
This section discusses only the very basics of adding, editing and deleting map legends. For a description of exactly what constitutes a map legend, and additional details, please see the section titled “Map Legends and Custom Map Legends – The Details”.



The screenshot shows the 'Web Soil Survey Rule And Report Manager' application. The 'SDV Map Legends' tab is selected in the top navigation bar. On the left, a list of map legends is displayed, including 'Custom Classes - Defined', 'Custom Classes - Progressive - Spectrum-Full Bright', 'Custom Unique Values - Defined', 'Custom Unique Values - Progressive - Spectrum-Full Bright', 'Custom Unique Values - Random - Basic Random', 'Natural Break Classes - Progressive - Spectrum-Full Bright', 'Stoplight Interpretation - Defined', and 'Unique Values - Random - Basic Random'. The 'Stoplight Interpretation - Defined' legend is selected. On the right, the 'Select Map Legend Form' is shown with fields for 'Map Legend Name:', 'Map Legend Type:', 'Color Ramp Type:', 'Color Ramp Name:', 'Transparency:', 'Outline Width (0.00-10.00):', and 'Outline Color:'. The values for these fields are: 'Stoplight Interpretation - Defined', 'Stoplight Interpretation', 'Defined', (empty), '0', '0.40', and '#000000'.

Select Map Legend Form

Adding a New Map Legend



The screenshot shows the 'New' form for adding a new map legend. The form has a 'New' button and a 'Close' button. The fields are: 'Map Legend Name:', 'Map Legend Type:', 'Color Ramp Type:', 'Color Ramp Name:', 'Transparency:', 'Outline Width (0.00-10.00):', and 'Outline Color:'. The values for these fields are: (empty), (empty), (empty), (empty), '0', (empty), and '#000000'.

Only a member of group “Soil Data Viewer” for NASIS site “NSSC Pangaea” can add a map legend. A “map legend” only defines the general characteristics of a map legend.

To add a new map legend, select “SDV Map Legends: New”. For data entry guidelines for map legend attributes, please see the section titled “Map Legend Data Entry Guidelines”. In general, the intent is to use the same color ramp for all map legends using a progressive color ramp, and to use the same color ramp for all map legends using a random color ramp. In general, the current conventions are to use a progressive color ramp for soil attributes whose results can be logically ordered, and to use a random color ramp for soil attributes whose results cannot be logically ordered. For limitation and suitability soil interpretation SDV rules, always use a stoplight color scheme.

In general, a new map legend should only be added for one or more of the following reasons.

1. The decision that either the default progressive or default random color ramp previously chosen was a bad decision. In this case all existing map legends that use the original default progressive or a random color ramp should be updated.
2. A new, valid reason for using a different progressive or random color ramp in a special case is approved.
3. A decision is made to specify something other than the current recommended default value for transparency, outline width or outline color.

Editing an Existing Map Legend

Only a member of group “Soil Data Viewer” for NASIS site “NSSC Pangaea” can edit an existing map legend. To edit an existing map legend, first select that map legend. This can be done by selecting “SDV Map Legends”. This brings up a scrollable list of all existing map legends. To select a map legend, click the name of the map legend name. For data entry guidelines for map legend attributes, please see the section titled “Map Legend Data Entry Guidelines”.

For an existing map legend that is currently referenced by one or more SDV rules, the user are never allowed to edit the corresponding map legend type or color ramp type. This is due to that fact that changing these values for a map legend that is currently referenced by one or more SDV rules could create inconsistencies with existing custom map legend specifications, resulting in a requirement for a custom map legend where one did not previously exist, or resulting in the need to drop a custom map legend where one previously existed. A message is displayed when the editing of certain map legend fields is restricted.

Deleting an Existing Map Legend

Only a member of group “Soil Data Viewer” for NASIS site “NSSC Pangaea” can delete an existing map legend.

To delete an existing map legend, first select that map legend. After selecting a map legend, an authorized user can delete that map legend using the delete button visible at the top of the form.

A map legend that is currently referenced by one or more SDV rules cannot be deleted. When a map legend that the user could normally delete cannot be deleted because it is currently referenced by one or more SDV rules, a message explaining this is displayed in lieu of a delete icon/link.

Map Legend Data Entry Guidelines

All of the fields associated with a map legend appear on the same form.

The SDV Rule Manager application will not force a save or cancel any pending edits prior to navigating out of the add/edit form. Navigating away from adding or editing an SDV rule before saving all pending changes, all pending changes will be lost.

Map Legend Name

This field specifies the name by which a map legend is identified. No two map legends may have the same map legend name. This field is required.

The current convention is that, at a minimum, a map legend name must be composed of at least two or three parts, separated by dashes:

Map Legend Type Name – Color Ramp Type Name – Color Ramp Name

The color ramp name is included only when the corresponding color ramp type name is not “Defined”.

Here are the map legend names that were defined at the time this document was written.

Map Legend Name
Custom Classes - Defined
Custom Classes - Progressive - Spectrum-Full Bright
Custom Unique Values - Defined
Custom Unique Values - Progressive - Spectrum-Full Bright
Custom Unique Values - Random - Basic Random
Natural Break Classes - Progressive - Spectrum-Full Bright
Stoplight Interpretation - Defined
Unique Values - Random - Basic Random

If two different map legends share the same map legend type name and color ramp type name (where color ramp type name is “Defined”), or map legend type name, color ramp type name and color ramp name (where color ramp type name is not “Defined”), the map legend name should somehow indicate how those two map legends differ. For example:

Custom Classes – Defined – Black Border

Custom Classes – Defined – Red Border

or

Unique Values – Random – Basic Random – 0% Transparent

Unique Values – Random – Basic Random – 50% Transparent

Map Legend Type

A map legend type defines the general characteristics of a map legend. This field is required. There are five different types of map legends.

Natural Break Classes

For a natural break classes map legend, each map legend class corresponds to a range of possible values. The map legend accounts for only those values that occur in the underlying data. The map legend classes and labels are dynamically determined at runtime, based on naturally occurring breaks in the underlying data. The desired number of classes is specified as part of the corresponding SDV rule.

This kind of map legend is only suitable for numeric attributes. This is one of the valid candidate map legend types for attributes for which all possible values cannot be enumerated prior to runtime.

Custom Classes

A custom classes map legend is a class type of map legend where the map legend class ranges are explicitly defined prior to runtime. The ability to predefine all map legend classes makes it possible for the map legend to account for all possible values. This type of map legend allows the user specify a map legend class name that is something other than the corresponding range of values. This type of map legend also allows the user to explicitly define the range for each map legend class, and to define the colors associated with each map legend class. This type of map legend is typically used for continuous numeric attributes for which predefined, generally accepted class ranges are already defined.

Unique Values

For a unique values map legend, the map legend includes a class for each unique value that occurs in the underlying data. The map legend accounts for only those values that occur in the underlying data. The map legend classes and labels are dynamically determined at runtime.

This kind of map legend is best suited for attributes where the number of possible values is relatively small. It is most typically used for non-numeric attributes, but it can also be used for numeric attributes. This is one of the valid candidate map legend types for attributes for which all possible values cannot be enumerated prior to runtime.

Custom Unique Values

A custom unique values map legend is a unique values type of map legend where map legend classes are explicitly defined prior to runtime. A custom unique values map legend typically accounts for all possible values, not just those included in the underlying data. This type of map legend allows the user to specify a map legend class name that is different from its corresponding value. This type of map legend also allows the user to do such things as explicitly order the map legend classes, group more than one value into the same map legend class, and explicitly define the colors associated with each map legend class.

Stoplight Interpretation

A stoplight interpretation map legend is really a special instance of a custom unique values map legend. This map legend type was coined for use with limitation and suitability soil interpretation SDV rules. The fact that this is a variant of a custom unique values map legend makes it possible to account for all possible soil interpretation rating class values. But because a standard stoplight color scheme is used for all limitation and suitability soil interpretation SDV rules, the colors are predefined, based on the number of distinct map legend classes, and then automatically assign those colors when the corresponding SDV rule is saved. This is the only kind of map legend that can be specified for a limitation or suitability soil interpretation SDV rule.

Color Ramp Type

Color ramp type indicates how the colors associated with each map legend class will be assigned. This field is required. Currently there are three different types of color ramps.

Progressive

I don't know how to technically define a progressive color ramp. Visually, it includes one or more segments where a color at one end of a segment gradually becomes a different color at the other end of that segment. Because this color morphing implies a progression, in the Soil Data Viewer application the tendency is to use progressive color ramps for attributes whose values can be logically ordered. The range of output values are associated with colors along the ramp, from low to high, i.e. lower values are assigned colors towards the left end of the ramp, and higher values are assigned colors towards to right end of the ramp. The progressive color ramp that is used as the default, at least at the time this was written, "Spectrum-Full Bright", is shown below.



Progressive Color Ramp “Spectrum-Full Bright”

Spectrum-Full Bright was chosen as the default progressive color ramp because it seemed to provide the best color separation for larger numbers of map legend classes.

Random

I don’t know how to technically define a random color ramp. Visually, it includes a number of adjacent color bars that tend to look like they are all based on some underlying unified theme (pastels, earth tones, etc.). In a random color ramp, there doesn’t appear to be any logical progression to the colors, therefore in the Soil Data Viewer application the use of random color ramps for attributes is used for those values that cannot be logically ordered. Somehow, pseudo randomly I assume, each output value is associated with some color derived from the corresponding random color ramp. I’m not entirely sure that some colors aren’t reused, in cases where the map legend includes a large number of classes. At a minimum, they are sometime so close that the user can’t tell them apart. The random color ramp that is used as the default, at least at the time this was written, “Basic Random”, is shown below.



Random Color Ramp “Basic Random”

“Basic Random” was chosen as the default random color ramp simply because it seemed to have the most distinct and vibrant colors among all available random color ramps.

Defined

Technically, “Defined” is not a color ramp type. It actually represents the absence of a color ramp. When the color ramp type is “Defined”, the color associated with each map legend class must be explicitly defined.

For a given map legend type, not all color ramp types may be permitted. The following table shows which color ramp types are available for each map legend type, and which color ramp type is the default for is corresponding map legend type.

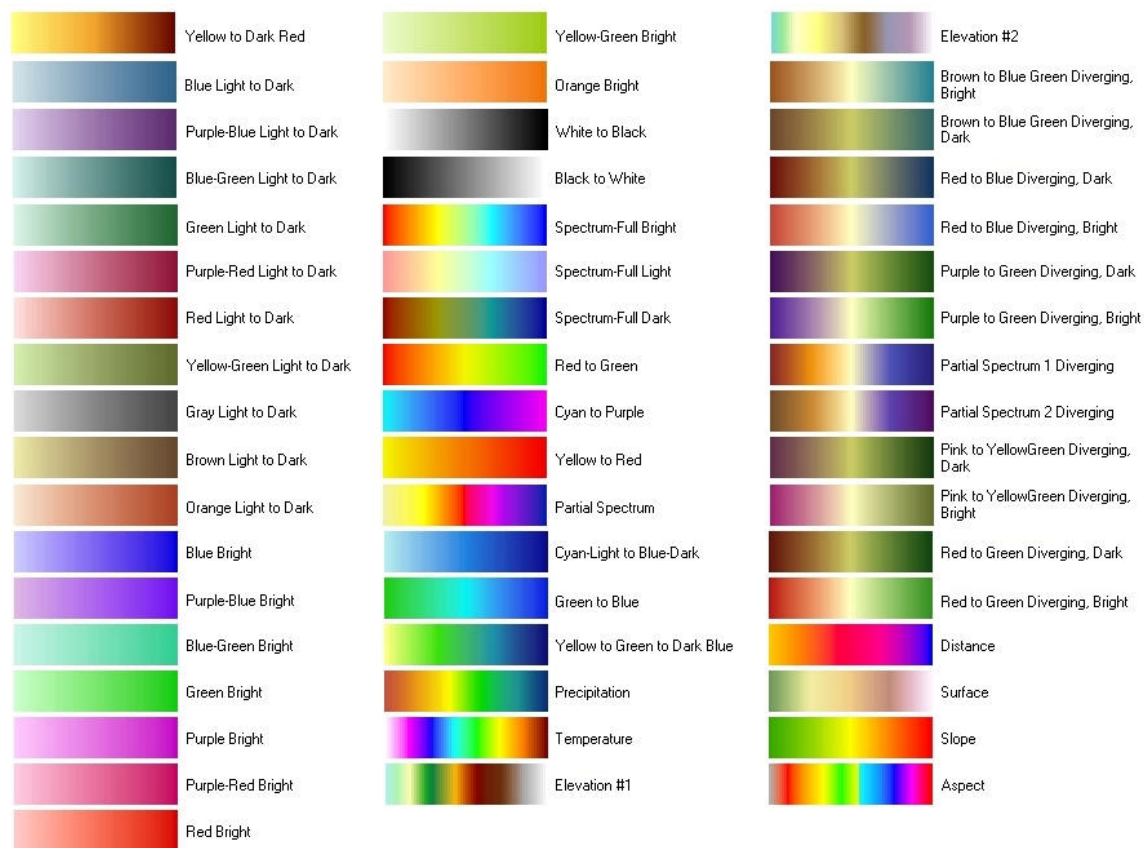
Map Legend Type Name	Color Ramp Type Name	Default?
Custom Classes	Defined	Yes
Custom Classes	Progressive	No
Custom Classes	Random	No
Custom Unique Values	Defined	Yes
Custom Unique Values	Progressive	No
Custom Unique Values	Random	No
Natural Break Classes	Progressive	Yes
Stoplight Interpretation	Defined	Yes
Unique Values	Progressive	No
Unique Values	Random	Yes

Color Ramp Name

This field specifies the name by which a color ramp is identified. No two color ramps may have the same color ramp name. When the corresponding value of color ramp type is either “Progressive” or “Random”, a selection for this field is required. When the corresponding value of color ramp type is “Defined”, this choice list is not available.

This choice list displays the names of all available color ramps for the current corresponding color ramp type. There is one set of names for progressive color ramps and an entirely different set of names for random color ramps. The current sets of available progressive and random color ramps are those that were predefined by ESRI at the time the Soil Data Viewer application was originally written.

In many cases the user can’t really tell what a color ramp looks like, based only on its name. Clicking the binoculars to the right of this choice list displays a graphic showing a visualization of the actual color ramp associated with each color ramp name.



Available Progressive Color Ramps



Available Random Color Ramps

Transparency

This field permits the user to specify the percent transparency of the map legend colors assigned to the map units in a thematic map. This field is required.

The current convention is to leave this value set to its default of 0% (non-transparent). This means that layers beneath a client Soil Data Viewer thematic map layer will not be visible.

If the user do change the default setting of this field, that change should be reflected in the corresponding map legend name.

This is the one instance I'm aware of where the same value is not used for both client Soil Data Viewer and Web Soil Survey. The client Soil Data Viewer will use whatever value is entered here for transparency. Web Soil Survey ignores whatever value is entered here for transparency, and always automatically sets transparency to 50%, so that the underlying orthophotography will always be visible.

Outline Width

This field permits the user to specify the width, in points, of the line that borders all map unit polygons in a Soil Data Viewer thematic map. This field is required.

The current convention is to leave this value set to its default of 0.4 points.

If the user does change the default setting of this field, that change should be reflected in the corresponding map legend name.

Outline Color Red/Green/Blue

These fields permit the user to specify the color components of the line that borders all map unit polygons in a Soil Data Viewer thematic map. Each individual value must be an integer value in the range 0 to 255, inclusive. These fields are required.

The current convention is to leave each of these values set to its default of 0, which results in a black border line.

If the user do change the default setting of these fields, that change should be reflected in the corresponding map legend name.

Map Legends and Custom Map Legends – The Details

Introduction

Every SDV rule must reference a map legend. A “map legend” specifies a map legend name, a map legend type, a color ramp type, and, when the color ramp type is not “Defined”, a color ramp name.

A map legend represents a fairly general concept. The same map legend is typically associated with a number of SDV rules. This is because the map legend itself only specifies the very general characteristics of a map legend. Because a map legend represents a fairly general concept that is reused for a variety of SDV rules, the total number of map legends defined at any given time should be relatively small. For further details on what is encompassed by the term “map legend”, please see the section titled “SDV Map Legends”.

When an SDV rule references a custom map legend, in addition to the attributes associated with the corresponding “map legend” (map legend name, map legend type, color ramp type, color ramp name), a number of additional custom map legend attributes must be provided. Those custom map legend attributes are associated with the corresponding SDV rule, not with the corresponding “map legend”. A custom map legend allows a user to explicitly specify map legend class names and colors, and to group aggregation rating values into the same map legend class.

Default and Allowable Map Legends

For a description of any map legend type or color ramp type, please see the section titled “Map Legend Data Entry Guidelines”. Any color ramp types and color ramp names in this section represent the current preferred convention for the corresponding situation. In the discussion below, please keep the following in mind. A soil property whose corresponding logical data type is “Choice” is one that has an associated fixed domain or choice list of allowable values. A soil property whose corresponding logical data type is “Narrative Text” is used to record variable length narrative text, which can include line breaks.

1. For a limitation or suitability soil interpretation SDV rule, the default and only allowable map legend type is “Stoplight Interpretation”. The Soil Survey Division wants the same paradigm used for all limitation or suitability soil interpretation SDV rules. This paradigm ensures that all potential rating values are accounted for and that a stoplight color scheme is used for the corresponding set of map legend classes.
2. For a class soil interpretation SDV rule, the only allowable type of map legend is “Custom Unique Values”. The default map legend is the first* map legend whose corresponding type is “Custom Unique Values”, and whose corresponding color ramp type is “Random”, and whose corresponding color ramp name is “Basic Random”.

This forces all potential rating values to be accounted for, and the default color scheme represents the current preferred convention for attributes whose values cannot be logically ordered, which are obviously assuming is the case for most class soil interpretation SDV rules.

In those cases where the results of a class soil interpretation can be logically ordered, the user should select a “Custom Unique Values” type of map legend where the corresponding color ramp type name is “Progressive”, and the corresponding color ramp name is “Spectrum-Full Bright”, which is the current preferred convention for attributes whose values can be logically ordered. In this case the user would also need to ensure that the map legend classes are correctly ordered in the custom map legend grid. For class soil interpretation SDV rules, by default, the records in the custom map legend grid are sorted in ascending order on the corresponding Rating Value (which in this case corresponds to a soil interpretation rating class name). If the rating class names for a class soil interpretation SDV rule can be logically ordered, this default sort order won’t likely reflect that ordering.

3. For a soil property SDV rule where the corresponding logical data type is “Choice” and the corresponding domain is not logically ordered, the only allowable type of map legend is “Custom Unique Values”. The default map legend is the first* map legend whose corresponding type is “Custom Unique Values”, and whose corresponding color ramp type is “Random”, and whose corresponding color ramp name is “Basic Random”.

This forces all potential rating values to be accounted for, and the default color scheme represents the current preferred convention for attributes whose values cannot be logically ordered.

4. For a soil property SDV rule where the corresponding logical data type is “Choice” and the corresponding domain is logically ordered, the only allowable type of map legend is “Custom Unique Values”. The default map legend is the first* map legend whose corresponding type is “Custom Unique Values”, and whose corresponding color ramp type is “Progressive”, and whose corresponding color ramp name is “Spectrum-Full Bright”.

This forces all potential rating values to be accounted for, and the default color scheme represents the current preferred convention for attributes whose values can be logically ordered.

5. For a soil property SDV rule where the corresponding logical data type is “Float”, the allowable map legend types are “Natural Break Classes” and “Custom Classes”. The default map legend is the first* map legend whose corresponding type is “Natural Break Classes”, and whose corresponding color ramp type is “Progressive”, and whose corresponding color ramp name is “Spectrum-Full Bright”.

The default choices represent the current preferred convention for floating point soil property attributes. In most cases, a “Natural Break Classes” map legend is probably the most appropriate type of map legend, even though a “Natural Break Classes” type of map legend doesn’t necessarily reflect all possible values. But exceptions do exist.

In some cases, existing standard classes may be already be associated with a soil property, e.g. saturated hydraulic conductivity, or the user may wish to specify classes that account for the full range of possible values. In this case the user should select a “Custom Classes” type of map legend.

6. For a soil property SDV rule where the corresponding logical data type is “Integer”, the allowable map legend types are “Natural Break Classes”, “Custom Classes”, “Unique Values” and “Custom Unique Values”. The default map legend is the first* map legend whose corresponding type is “Natural Break Classes”, and whose corresponding color ramp type is “Progressive”, and whose corresponding color ramp name is “Spectrum-Full Bright”.

The default choices represent the current preferred convention for integer soil property attributes. In most cases, a “Natural Break Classes” map legend is probably the most appropriate type of map legend, even though a “Natural Break Classes” type of map legend doesn’t necessarily reflect all possible values. But exceptions do exist.

In some cases, existing standard classes may be already be associated with a soil property, or the user may wish to specify classes that account for the full range of possible values. In this case the user should select a “Custom Classes” type of map legend.

In rare cases, when the number of allowable values for an integer soil property is limited to a known set, the user may want the corresponding map legend to reflect each individual possible value. T factor is an example of such a soil property. In such a case the user should select a “Custom Unique Values” type of map legend.

When the number of allowable values for an integer soil property is limited, and the user wants a separate map legend class for each value that occurs in the underlying data, but the number of allowable values is still too large to explicitly specify each possible value, the user should select a “Unique Values” type of map legend. At the time this was written, there is no attribute that reflected this case. In general, the preference is that the map legends reflect all possible values.

Regardless of the type of map legend ultimately selected, the user should probably either provide explicitly sequenced colors or use the progressive color ramp named “Spectrum-Full Bright”, which is the current convention for attributes whose values can be logically ordered.

7. For a soil property SDV rule where the corresponding logical data type is either “String” or “Narrative Text”, the only allowable type of map legend is “Unique Values”. The default map legend is the first* map legend whose corresponding type is “Unique Values”, and whose corresponding color ramp type is “Random”, and whose corresponding color ramp type name is “Basic Random”.

The default choices represent the current preferred convention for non-numeric soil property attributes whose values cannot be logically ordered.

**Default map legends are selected from a list of all map legends of the appropriate types, where the list of appropriate map legends is sorted in ascending order on map legend name. When no map legend in the list meets the corresponding requirements, the first map legend in the list is returned. This scheme has the advantage that the sort will result in the selection of the more general version of a map legend, when there are multiple map legends for the same combination of map legend type, color ramp type and color ramp name, i.e. "Unique Values – Random – Basic Random" would be selected rather than "Unique Values – Random – Basic Random – 50% Transparency". Of course this assumes that the map legend naming conventions are being religiously followed.*

Custom Map Legends

A custom map legend is a map legend where the corresponding map legend classes are explicitly specified prior to runtime, rather than being automatically derived at runtime. Any explicitly specified map legend classes are stored as part of an SDV rule, rather than as part of a “map legend”.

Reasons for Selecting a Custom Map Legend

Why go to the work of creating a custom map legend rather than letting the map legend be derived dynamically at runtime?

1. If the user wants to guarantee that the map legend will account for all possible values, this can only be done with a custom map legend. Of course this can only be done when all possible values can be explicitly enumerated or expressed as a set of numeric ranges that account for all possible values. In general, when possible, a map legend should account for all possible values.
2. If the user wants to explicitly define the color associated with each map legend class, this can only be done with a custom map legend.
3. If the user wants to explicitly sequence the classes in a map legend where the desired sequencing cannot be derived from the underlying data, this can only be done with a custom map legend.
4. If the user wants to explicitly specify a name for a map legend class that can’t be derived from the underlying data, this can only be done with a custom map legend.
5. If the user wants to explicitly merge rating values into the same map legend class in a way that will not occur naturally, this can only be done with a custom map legend.

Custom Map Legend Grid







A row in the custom map legend grid defines all or part of a map legend class, and indicates the sequence of that map legend class in the map legend. A row indicates a value or set of values that should be grouped into the corresponding map legend class. A row can optionally indicate the color associated with the corresponding map legend class.

A map legend class corresponds to a single item in a map legend.

Custom Map Legend Grid Contents









From a data entry standpoint, there are two basic kinds of custom map legends.

In one case every row in the custom map legend table corresponds to a range of numeric values. In this case the corresponding map legend type will always be “Custom Classes”. For every row, the user must specify the lower end of the range, “Lower Rating Value” and the upper end of the range, “Upper Rating Value”, which indicates the range of values that will be grouped into the corresponding map legend class. Keep in mind that more than one range can be grouped into the same map legend class.

New	Seq	Lower Rating Value	Upper Rating Value	Class Name	Color
Delete	1	0.0000	0.0100	Very Low (0.0 - 0.01)	 #FF0000
Delete	2	0.0100	0.1000	Low (0.01 - 0.1)	 #FFB400
Delete	3	0.1000	1.0000	Moderately Low (0.1 - 1)	 #EBFD5C
Delete	4	1.0000	10.0000	Moderately High (1 - 10)	 #86F7D9
Delete	5	10.0000	100.0000	High (10 - 100)	 #5796FF
Delete	6	100.0000	705.0000	Very High (100 - 705)	 #0000FF

Custom Map Legend Grid for soil property SDV rule “Saturated Hydraulic Conductivity (Ksat), Standard Classes”.

In the other case, every row in the custom map legend table corresponds to a single numeric or alphanumeric value. In this case the corresponding map legend type will be either “Custom Unique Values” or “Stoplight Interpretation”. “Stoplight Interpretation” is a special instance of a custom unique values map legend. For every row, the user must specify a single value, “Rating Value”, that will be grouped into the corresponding map legend class with the name specified in “Class Name”. Keep in mind that more than one value can be grouped into the same map legend class.




Seq	Rating Value	Class Name	Color
1	Excessively drained	Excessively drained	 #FF0000
2	Somewhat excessively drained	Somewhat excessively drained	 #FF9200
3	Well drained	Well drained	 #FFE400
4	Moderately well drained	Moderately well drained	 #E1FC71
5	Somewhat poorly drained	Somewhat poorly drained	 #9CF8C9
6	Poorly drained	Poorly drained	 #42D4FF
7	Very poorly drained	Very poorly drained	 #5569FF
8	Subaqueous	Subaqueous	 #0000FF

Custom Map Legend Grid for soil property SDV rule “Drainage Class”.

Every custom map legend grid will always include columns “Seq” and “Class Name”. The value of column “Seq” orders the classes in the map legend from top to bottom. Rows corresponding to the same map legend class must share the same sequence value. “Class Name” records the name of the corresponding map legend class.

When the color ramp type of the corresponding map legend is “Defined”, and the corresponding map legend type is not “Stoplight Interpretation”, the custom map legend grid will include four additional columns, “Red”, “Green”, “Blue” and “Color”. Columns “Red”, “Green” and “Blue” allow the user to explicitly specify the color components

of the color swatch associated with the corresponding map legend class. Column “Color” shows the color that results from the combination of the specified color components.

Custom Map Legend Classes			
Seq	Rating Value	Class Name	Color
1	High	High	 #FF0000
2	Moderate	Moderate	 #FFFF00
3	Low	Low	 #00FF00

Custom Map Legend Grid for soil property SDV rule “Corrosion Concrete”.

Custom Map Legend Grid Auto-Population and Related Controls

When the user add a new SDV rule for any soil interpretation or for any soil property with a corresponding domain, the custom map legend grid will automatically be populated for the user .

For a soil interpretation, the custom map legend grid will be populated with all rating classes that are defined for the corresponding soil interpretation. For limitation and suitability soil interpretations, by default the rows in the grid will always be sequenced from “bad”/“most unsuitable”/red to “good”/“most suitable”/green. For class soil interpretations, by default the rows in the grid will always be sequenced in ascending order by Rating Value, which in this case contains a soil interpretation rating class name.

For a soil property with an associated domain, the custom map legend grid will be populated with the contents of the domain associated with the corresponding soil property. By default, the rows in the grid will be sequenced based on the sequence numbers that are already defined for the corresponding domain.

In cases where the custom map legend grid is automatically populated, the user are not permitted to add new rows or drop existing rows, the idea being that the map legend should account for every possible rating value. There is no need to add a row since the map legend grid will include all possible rating values, by default.

In cases where the custom map legend grid is automatically populated, the user are still permitted to edit existing rows, in order to edit map legend class names, explicitly specify the color associated with a map legend class, and to be able to merge values or ranges of values into the same map legend class.

In cases where the custom map legend grid is automatically populated, directly underneath the map legend grid there will be a button labeled “Reset to Defaults”. Clicking this button repopulates the custom map legend grid from scratch, replacing any existing contents. The user might want to do this because the user just want to start over from scratch, or the rating classes of the corresponding soil interpretation or the corresponding domain has been updated, since the corresponding SDV rule was last updated.

Custom Map Legend Classes			
Seq	Rating Value	Class Name	Color
1	1	1	#885EDA
2	1A	1A	#8F975C
3	1H	1H	#60BAA9
4	1K	1K	#995EDD
5	1KK	1KK	#75A25E
6	1S	1S	#F45894
7	1SK	1SK	#D05CE5
8	1SKK	1SKK	#65A75F
9	2	2	#AB5DDF
10	2A	2A	#F5A8A8

Custom Map Legend Grid for soil interpretation SDV rule “Conservation Tree & Shrub Groups”, showing the “Reset to Defaults” Button.

Custom Map Legend Grid Data Entry Guidelines and Controls

For any attribute other than a soil interpretation or a soil property with an associated domain, in edit mode the user can add, edit or delete rows from the custom map legend grid. For soil interpretations and soil properties with an associated domain, the user are restricted to editing existing rows in the map legend grid.

To add a new row, click the button directly underneath the custom map legend grid that is labeled “Add Row”.

To edit an existing row, double click that row.

Reports	Interps	SDV Rules	SDV Map Legends	SDV Folders	Service Check	About
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SDV Map Legends

- Custom Classes - Defined
- Custom Classes - Progressive - Spect
- Custom Unique Values - Defined
- Custom Unique Values - Progressive
- Custom Unique Values - Random - Ba
- Natural Break Classes - Progressive -
- Stoplight Interpretation - Defined
- Unique Values - Random - Basic Ranc

New Save Close

Map Legend Name:*

Map Legend Type:*

Color Ramp Type:*

Color Ramp Name:

Transparency:*

Outline Width (0.00-10.00):*

Outline Color:*

Add/Edit Row Form for a Custom Classes Type Map Legend (Color Ramp Type <> “Defined”)

Add/Edit Row Form for a Custom Unique Values Type Map Legend (Color Ramp Type = “Defined”)

To delete an existing row, click a row to select that row and then press the delete key.

Below is a list of all columns that can appear in the custom map legend grid. Not all of these columns will be visible at any given time.

Seq

This field specifies the top to bottom sequence of the corresponding map legend class specified in “Class Name”, in the map legend. This field is always visible and always editable, although how this column should be edited is conditional.

Although more than one row may share the same sequence value (more on this later), the lowest sequence value must be 1, and there cannot be any gaps between sequence values. The user will not be able to save an SDV rule with a custom map legend that violates either of these constraints.

For limitation and suitability soil interpretations, the relative sequence of the rating classes should never be changed. The reason for this is that the convention for both limitation and suitability soil interpretation SDV rules is to always order the map legend classes from “bad” to “good”, i.e. from “Red” to “Green”. The default sequence values reflect this desired ordering.

For soil properties associated with a logically ordered domain (Logical Data Type = Choice (logically ordered)), the relative sequence of the domain members should not be changed, since the default sequence values reflect the appropriate low to high ordering.

Sequence values can be edited in order to merge values or ranges into the same map legend class.

Lower Rating Value/Upper Rating Value

These two fields correspond to a range of numeric values that should be grouped into the corresponding map legend class. These columns appear only when the corresponding map legend type is “Custom Classes”. When visible, both columns must contain a valid numeric value, and the lower value must be less than the higher value. Unfortunately the user cannot specify only one value in order to create a class for all values less than some value, or all values greater than some value. To create such a range the user would have to specify a value lower or higher than the lowest or highest possible value.

Note that with the exception of the lowest range, the low end of the range is exclusive and the upper end of the range is inclusive. For the lowest range, the lower end of the range and the upper end of the range are both inclusive.

Rating Value

This field corresponds to a single numeric or alphanumeric rating value that should be grouped into the corresponding map legend class. This column appears only when the corresponding map legend type is “Custom Unique Values” or “Stoplight Interpretation”. When visible, this column must contain a string containing 254 or fewer characters.

For a soil interpretation SDV rule, this field always contains one of the rating class names that were defined for the corresponding soil interpretation.

For an SDV rule for a soil property associated with a domain, this field always contains the longer, typically mixed case string, i.e. choice label, that is used to represent a particular domain member or choice.

Class Name

This field is used to record the name of the map legend class into which the corresponding value or range of values will be grouped. This is the name that will actually appear in the map legend of any thematic map for the corresponding soil interpretation or soil property. This field is always visible and always editable. A map legend class name must contain 254 or fewer characters.

For what it’s worth, the current convention is that a map legend class name should never include any corresponding units of measure. Any corresponding units of measure will always be reflected in the title associated with a map legend.

For a soil interpretation SDV rule, the default value for this field is set to the corresponding value of “Rating Value”, which is one of the rating class names that were defined for the corresponding soil interpretation. For this case, the current convention is to leave the map legend class name set to the corresponding rating class name.

For an SDV rule for a soil property associated with a domain, the default value for this field is set to the corresponding value of “Rating Value”, which contains the longer, typically mixed case string, i.e. choice label, that is used to represent a particular domain member or choice. For this case the convention is to leave the map legend class name set to the corresponding choice value.

Red Color Value/Green Color Value/Blue Color Value/Resulting Color

These fields are used to explicitly specify and preview the color associated with the corresponding map legend class. These fields are visible only when the corresponding color ramp type is “Defined” and the corresponding map legend type is not “Stoplight Interpretation”. Each individual color component value must be an integer number in the range 0 – 255. Field “Color” shows the color that results from the combination of the specified color components.

At the time this was written, there were only four attributes for which custom colors were defined (Corrosion Concrete, Corrosion Steel, Frost Free Days and T Factor), and in each of these cases the explicitly specified colors corresponded to the same colors used for a stoplight color ramp for a specified number of rating classes. In other words, other than to sometimes specify the same red to yellow to green colors that is used for soil interpretations, there hasn’t been any need to get any more creative when it comes to custom colors.

Should such a need ever arise, the user ’ll probably need access to some application that can tell the user the red, green and blue color component values associate with a selected color. Such an application is sometimes referred to as a color picker application. A Google search on “color picker” should come up with one or more free or web accessible versions of such an application.

Below is a table showing the color component values currently used for a stoplight color ramp, for 2 to 9 map legend classes.

Number Map Legend Classes	Red to Green Class Sequence	Red Color Component	Green Color Component	Blue Color Component
2	1	255	0	0
2	2	0	255	0
3	1	255	0	0
3	2	255	255	0
3	3	0	255	0
4	1	255	0	0
4	2	255	170	0
4	3	169	255	0
4	4	0	255	0
5	1	255	0	0
5	2	255	127	0
5	3	255	255	0
5	4	127	255	0
5	5	0	255	0
6	1	255	0	0
6	2	255	102	0
6	3	255	204	0
6	4	203	255	0
6	5	101	255	0
6	6	0	255	0
7	1	255	0	0
7	2	255	85	0
7	3	255	170	0
7	4	255	255	0
7	5	169	255	0
7	6	84	255	0
7	7	0	255	0
8	1	255	0	0
8	2	255	72	0
8	3	255	144	0
8	4	255	216	0
8	5	216	255	0
8	6	144	255	0
8	7	72	255	0
8	8	0	255	0
9	1	255	0	0
9	2	255	63	0
9	3	255	127	0
9	4	255	191	0
9	5	255	255	0
9	6	191	255	0
9	7	127	255	0
9	8	63	255	0
9	9	0	255	0

Merging Values into the Same Map Legend Class

There may be cases where the user wish to merge individual values or ranges into the same map legend class. This is done by setting the sequence value for all rows that should be merged into the same map legend class, to the same value.

All rows in the custom map legend grid with the same sequence value must also have the same value for “Class Name” and “Red”, “Green” and “Blue”, when present. The user will not be able to save an SDV rule with a custom map legend that violates this constraint.

Under what situations might one wish or need to do this? At the time that this was written, there were only two types of cases where this was done.

In one case, some of the older forestry interpretations had rating class names that differed only by case, e.g. “Not limited” and “Not Limited”. By default, Soil Data Viewer recognizes these as two distinct rating classes. Therefore in order to merge these two distinct rating class names into the same map legend class, they were assigned the same sequence value. In general, in such a case, the underlying soil interpretation should be fixed, but there was a period of time when it was hesitant to make any changes to the existing older forestry soil interpretations; the work around for this problem without editing the underlying soil interpretation.

The screenshot shows a web interface for defining a custom map legend. At the top, there is a dropdown menu labeled 'Map Legend Name:' with the selected value 'Stoplight Interpretation - Defined'. Below this is a section titled 'Custom Map Legend Classes' containing a table with four columns: 'Seq', 'Rating Value', 'Class Name', and 'Color'. The table has five rows of data. The first two rows have 'Seq' values of 1, 'Rating Value' of 'Very severe', and 'Class Name' of 'Very severe', but with different 'Color' values. The remaining three rows have 'Seq' values of 2, 3, and 4, with corresponding 'Rating Value', 'Class Name', and 'Color' values. A 'Reset to Defaults' button is located at the bottom of the table.

Seq	Rating Value	Class Name	Color
1	Very severe	Very severe	Red #FF0000
1	Very Severe	Very severe	Orange #FF7F00
2	Severe	Severe	Yellow #FFFF00
3	Moderate	Moderate	Light Green #7FFF00
4	Slight	Slight	Green #00FF00

Custom Map Legend Grid for soil interpretation SDV rule “Potential Erosion Hazard (Road, Trail)”.

The other case where values have been merged into the same map legend class is for domains that include obsolete values that can be mapped into a non-obsolete value. Take the SDV rule “Flooding Frequency” for example. This domain includes the now obsolete choice “Common”. Since every possible domain value must be accounted for, the default custom map legend grid includes a row for “Common”. Since “Common” is not to appear in the map legend, and since “Common” is considered equivalent to “Frequent”, the rows for “Common” and “Frequent” were edited to have the same sequence value, and both values are mapped to map legend class “Frequent”.

The screenshot shows a web interface for defining a custom map legend. At the top, there is a section titled 'Custom Map Legend Classes' containing a table with four columns: 'Seq', 'Rating Value', 'Class Name', and 'Color'. The table has six rows of data. The first four rows have 'Seq' values of 1, 2, 3, and 4, with corresponding 'Rating Value', 'Class Name', and 'Color' values. The last two rows have 'Seq' values of 5 and 6, 'Rating Value' of 'Common' and 'Frequent', 'Class Name' of 'Frequent', and 'Color' of 'Cyan #00F5FF'. A 'Reset to Defaults' button is located at the bottom of the table.

Seq	Rating Value	Class Name	Color
1	None	None	Red #FF0000
2	Very rare	Very Rare	Orange #FFA000
3	Rare	Rare	Yellow #FFFF00
4	Occasional	Occasional	Light Green #C4FA9E
5	Common	Frequent	Cyan #00F5FF
6	Frequent	Frequent	Cyan #00F5FF

Custom Map Legend Grid for soil property SDV rule “Flooding Frequency”.

SDV Folders

Any authorized WSSRRM user can select and view any existing folder. However, only a member of the “Soil Data Viewer” group for NASIS site “NSSC Pangaea” can add or edit a folder.

Folders are used to group SDV rules that are related in some manner. The folders managed by the SDV Rule Manager application are used in both client Soil Data Viewer and for the Soil Data Viewer related interface in Web Soil Survey.

The screenshot shows the 'Web Soil Survey Rule And Report Manager' application. The top navigation bar includes 'Reports', 'Interps', 'SDV Rules', 'SDV Map Legends', 'SDV Folders' (highlighted), 'Service Check', and 'About'. On the left, a list of 'SDV Folders' is displayed: Building Site Development, Construction Materials, Disaster Recovery Planning, Land Classifications, Land Management, Military Operations, Recreational Development, Sanitary Facilities, Soil Chemical Properties, Soil Erosion Factors, Soil Physical Properties, Soil Qualities and Features, Vegetative Productivity, Waste Management, Water Features, Water Management, and Wildlife Management. On the right, there is a 'New' button.

Adding a New Folder

Only a member of group “Soil Data Viewer” for NASIS site “NSSC Pangaea” can add a folder. It is done by choosing ‘New’. The Name and Description are required fields.

This screenshot shows the 'New' folder form within the 'SDV Folders' tab. The left sidebar lists the folders, with 'Construction Materials' highlighted. The main area contains a 'New | Save | Close' button bar. Below it are two required fields: 'Folder Name:*' and 'Folder Description:*', each with a text input box. At the bottom, there is a checkbox labeled 'Intrinsic Soil Property Folder?:'.

Contents of existing folders can be viewed or edited by clicking on the folder. Clicking on a Rule within the folder will open that particular SDV Rule.

Reports	Interps	SDV Rules	SDV Map Legends	SDV Folders	Service Check	About
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SDV Folders

- Building Site Development
- Construction Materials
- Disaster Recovery Planning
- Land Classifications
- Land Management
- Military Operations
- Recreational Development
- Sanitary Facilities
- Soil Chemical Properties
- Soil Erosion Factors
- Soil Physical Properties
- Soil Qualities and Features
- Vegetative Productivity
- Waste Management
- Water Features
- Water Management
- Wildlife Management

New Save Close

Folder Name:*

Folder Description:*

Building site development interpretations are designed to be used as tools for evaluating soil suitability and identifying soil limitations for various construction purposes. As part of the interpretation process, the rating applies to each soil in its described condition and does not consider present land use.
Example interpretations can include corrosion of concrete and

Intrinsic Soil Property Folder?: ☐

Status

Last Updated: 10/25/2006 1:35:41 AM
Folder Key: 2
Rules in this Folder:

- [Capping Fill Gravity Septic System \(DE\)](#)
- [Concrete Driveways and Sidewalks \(TX\)](#)
- [Corrosion of Concrete](#)
- [Corrosion of Steel](#)
- [Dwellings On Concrete Slab \(TX\)](#)
- [Dwellings With Basements](#)
- [Dwellings With Basements \(CA\)](#)
- [Dwellings With Basements \(OH\)](#)
- [Dwellings With Basements \(TX\)](#)
- [Dwellings Without Basements](#)
- [Dwellings Without Basements \(CA\)](#)
- [Dwellings Without Basements \(HI\)](#)
- [Dwellings Without Basements \(OH\)](#)
- [Dwellings Without Basements \(PIA\)](#)
- [Elevated Sand Mound Septic System \(DE\)](#)
- [Gravity Full Depth Septic System \(DE\)](#)

Folder Data Entry Guidelines

Folder Name

The value of this field is the folder name an end user sees when selecting SDV rules in both client Soil Data Viewer and within Web Soil Survey. A folder name is required, and must contain 80 or fewer characters.

Folder Description

This field records a narrative description of what kinds of soil interpretations and/or soil properties are contained in the corresponding folder. A folder description is required.

Intrinsic Soil Property Folder?

This option should be set (checked) when the corresponding folder is intended to contain only intrinsic soil properties. Please see the section titled “Soil Attributes, client Soil Data Viewer and Web Soil Survey” for a discussion of the different between intrinsic and non-intrinsic soil properties. *This option can only be set or reset when a folder is created.* This option cannot be changed for an existing folder because changing this option for an existing folder would require land use associations to either be added or dropped for each SDV rule in that folder.

Aggregation Methods – The Details

This section provides a brief description of aggregation in general, and a brief description of every aggregation method. This section also describes the circumstances where an aggregation method is permitted, and describes the circumstances, if any, for which that aggregation method is selected as the default aggregation method. If the user wants to know the gory details on aggregation, please feel free to request a copy of the functional specifications for the aggregation process from the Soils Hotline at soilshotline@lin.usda.gov.

Aggregation is the process by which a set of component attribute values is reduced to a single value to represent the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some non-soil entity, e.g., rock outcrop. The components in the map unit name represent the major soils within a map unit delineation. Minor components make up the balance of the map unit. Great differences in soil properties can occur between map unit components and within short distances. Minor components may be very different from the major components. Such differences could significantly affect use and management of the map unit. Minor components may or may not be documented in the database. The results of aggregation do not reflect the presence or absence of limitations of the components which are not listed in the database. An on-site investigation is required to identify the location of individual map unit components.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be generated. Aggregation must be done because, on any soil map, map units are delineated but components are not.

Dominant Condition

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie.

The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

This aggregation method is appropriate for any soil property at the component level or below, or any soil interpretation, and is not appropriate in any other case. This is the default aggregation method for any non-numeric soil property at the component level or below, or any soil interpretation.

Why? When the number of possible result values is limited, the chance that two components of the same map unit might share the same result value is much higher than for a numeric soil property whose values are constrained to a bounded or unbounded continuous range. This aggregation method provides the best possible "expected value" for the map unit as a whole.

Dominant Component

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie.

The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

This aggregation method is appropriate for any soil property at the component level or below, or any soil interpretation, and is not appropriate in any other case. This is the default aggregation method for any numeric soil property at the component level or below.

Why? For a soil property whose values are constrained to a bounded or unbounded continuous range, the chance that two components of the same map unit might share the same result value isn't nearly as high as that of a non-numeric soil property where the number of possible result values is much more limited. Even if "Dominant Condition" is selected as the default aggregation method in this case, in the vast majority of cases, the ultimate value returned would likely correspond to the dominant component, rather than a dominant condition. Therefore it was felt that if the result in this case was most likely to correspond to the dominant component, even when the corresponding aggregation method was "Dominant Condition", the "Dominant Component" should be selected as the default aggregation method to begin with, from a "truth in advertising" perspective.

Most Limiting

The aggregation method "Most Limiting" is suitable only for attributes that correspond to a programmatically generated soil interpretation. Such an interpretation attempts to determine if a soil is suitable for a particular use. The results for such an interpretation can be ranked from least limiting (or most suitable) to most limiting (or least suitable). For this aggregation method, the most limiting result among all components of the map unit is returned.

The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit. The result may well be based on the limitations of a map unit component of very minor extent. If one were making a decision based on this result, that decision would be based on the most conservative, or most pessimistic, result.

The aggregation method is appropriate for limitation and suitability soil interpretations, and is not appropriate in any other case. This aggregation method is never selected as the default aggregation method.

Least Limiting

The aggregation method "Least Limiting" is suitable only for attributes that correspond to a programmatically generated soil interpretation. Such an interpretation attempts to determine if a soil is suitable for a particular use. The results for such an interpretation can be ranked from least limiting (or most suitable) to most limiting (or least suitable). For this aggregation method, the least limiting result among all components of the map unit is returned.

The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit. The result may well be based on the limitations of a map unit component of very minor extent. If one were making a decision based on this result, that decision would be based on the least conservative, or most optimistic, result.

The aggregation method is appropriate for limitation and suitability soil interpretations, and is not appropriate in any other case. This aggregation method is never selected as the default aggregation method.

Weighted Average

The aggregation method "Weighted Average" computes a weighted average value for all components in the map unit. Percent composition is the weighting factor.

The result returned by this aggregation method represents a weighted average value of the corresponding attribute throughout the map unit.

This aggregation method is appropriate for numeric soil properties at the component level or below, and is not appropriate in any other case. This aggregation method is never selected as the default aggregation method.

Minimum or Maximum

The aggregation method "Minimum or Maximum" returns the lowest or highest attribute value among all components of the map unit, depending on the corresponding "tie-break" rule. In this case, the "tie-break" rule indicates whether the lowest or highest value among all components should be returned. For this aggregation method, percent composition ties cannot occur.

The result returned by this aggregation method represents either the minimum or maximum value of the corresponding attribute throughout the map unit. The result may well be based on a map unit component of very minor extent.

This aggregation method is appropriate for any soil property at the component level or below, or any class soil interpretation, and is not appropriate in any other case. This aggregation method is never selected as the default aggregation method.

Percent Present

The aggregation method "Percent Present" returns a value that indicates the percent of components of a map unit that meets the condition. The result returned by this aggregation method quantifies the degree to which the corresponding condition is present throughout the map unit.

This is the default and only allowable aggregation method for the hydric rating soil property (component.hydricrating (SSURGO)). At the current time this aggregation method is not appropriate in any other case. At some point in the future it would like to be able to define conditions and generalize this aggregation method so that it could be used for any predefined condition.

No Aggregation Necessary

The majority of soil attributes are associated with a component of a map unit, and such an attribute has to be aggregated to the map unit level before a thematic map can be rendered. Map units, however, also have their own attributes. An attribute of a map unit does not have to be aggregated in order to render a corresponding thematic map. Therefore, the "aggregation method" for any attribute of a map unit is referred to as "No Aggregation Necessary".

This is the default and only allowable aggregation method for soil properties at the map unit level or below, but above the component level, and is not appropriate in any other case.

How the Overall Soil Data Viewer Data Management System Works

Introduction

A number of the user may be familiar with how previous versions of the Soil Data Viewer application worked. The SDV rules that drove the application were distributed with the application itself. The SDV rules could reside in a different Access database than the one where the tabular soil data resided. The official SDV rules were maintained by hand. It didn't take very long for a higher end user to figure out how to modify existing SDV rules, or add their own.

Things have changed significantly between Soil Data Viewer 4.x and 5.x.

The SDV rules are no longer distributed with the Soil Data Viewer application. When soil data is exported from the Soil Data Mart, the appropriate corresponding SDV rules are also exported and bundled with that data. When tabular soil data is imported into a SSURGO template database, the corresponding SDV rules are now imported at the same time. The SDV rules must now reside in the same database as the tabular soil data. That is why a new SSURGO template database was released when Soil Data Viewer 5.0 was released. The tables needed to accommodate the SDV rules had to be added to the database.

In previous versions of Soil Data Viewer, all soil interpretation SDV rules were always displayed, regardless of whether or not that corresponding soil interpretation existed in the underlying data. Now when soil tabular data is exported from the Soil Data Mart, only those soil interpretation SDV rules for which the corresponding soil interpretation exists in the data being exported, are included. As before, all soil property SDV rules are always displayed, regardless of whether or not the corresponding soil property is populated in the underlying data.

When SDV rules are imported into a SSURGO template database, a newer version of a given SDV rule will update an older version of that same SDV rule. In other words, the import of SDV rules is an 'append AND an update' operation, whereas the import of soil tabular data is still strictly an append operation.

SDV rules in one SSURGO template database can be imported into a different SSURGO template database.

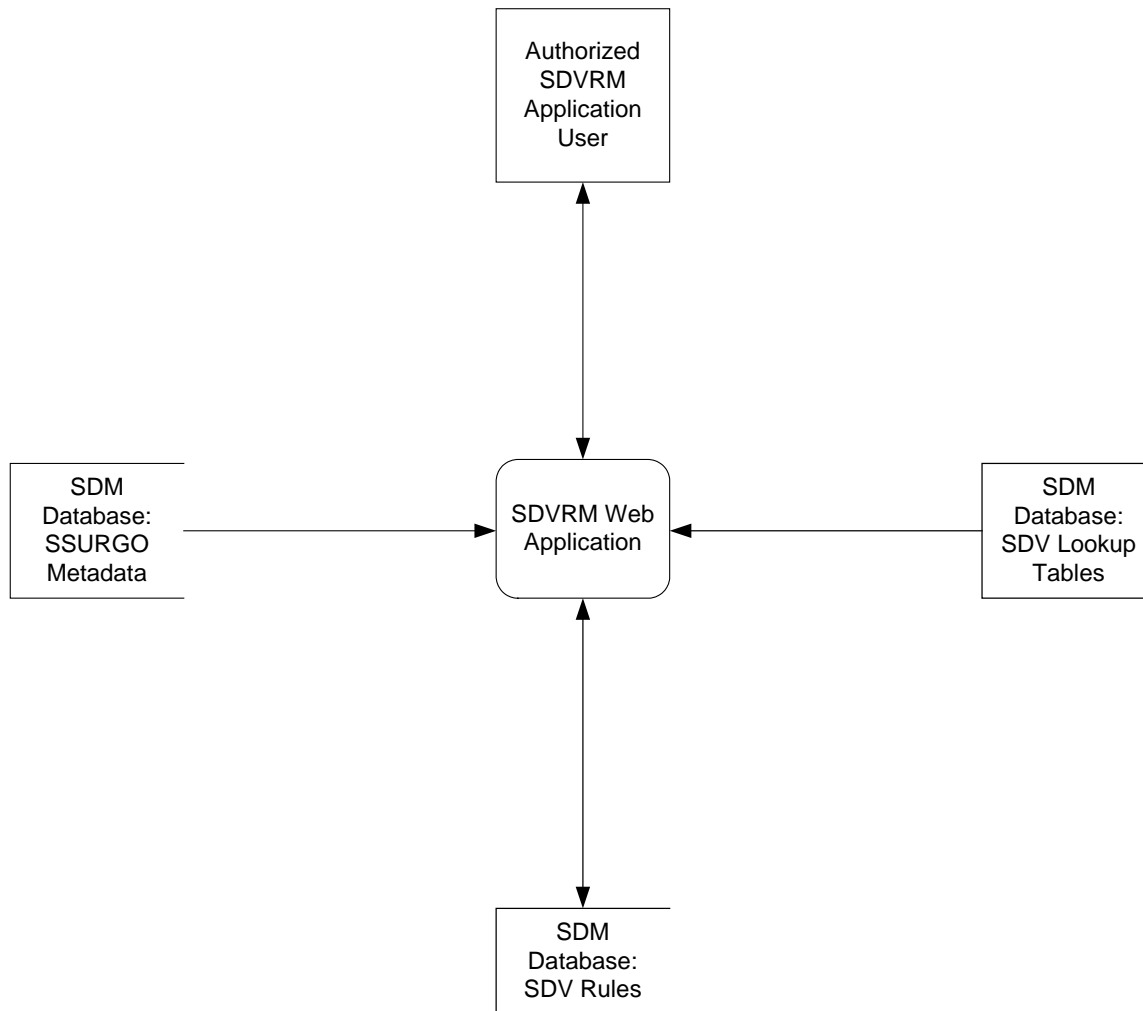
As far as an end user being able to modify an existing SDV rule or add a new SDV rule, users no longer have the freedom they use to have. There are two main reasons for this:

1. The number of fields associated with an SDV rule has increased dramatically, and not every required field is even documented in this User Guide. A person attempting to modify an existing SDV rule or create a new SDV rule from scratch isn't aware of all of the constraints that must be satisfied for an SDV rule to not fail outright.
2. Specifying map legend parameters for ArcGIS is much more complicated than it was for ArcView. Ultimately, these map legend parameters are provide as a set of XML. This map legend XML is required for every SDV rule, and this XML isn't something that an end user is going to be able to create from scratch. The SDV Rule Manager application calls a function to generate this map legend XML, and that function references tables that aren't even available in a SSURGO template database. The best a person could do is to copy a set of map legend XML from an existing SDV rule, and that would only work for SDV rules that don't have or need a custom map legend.

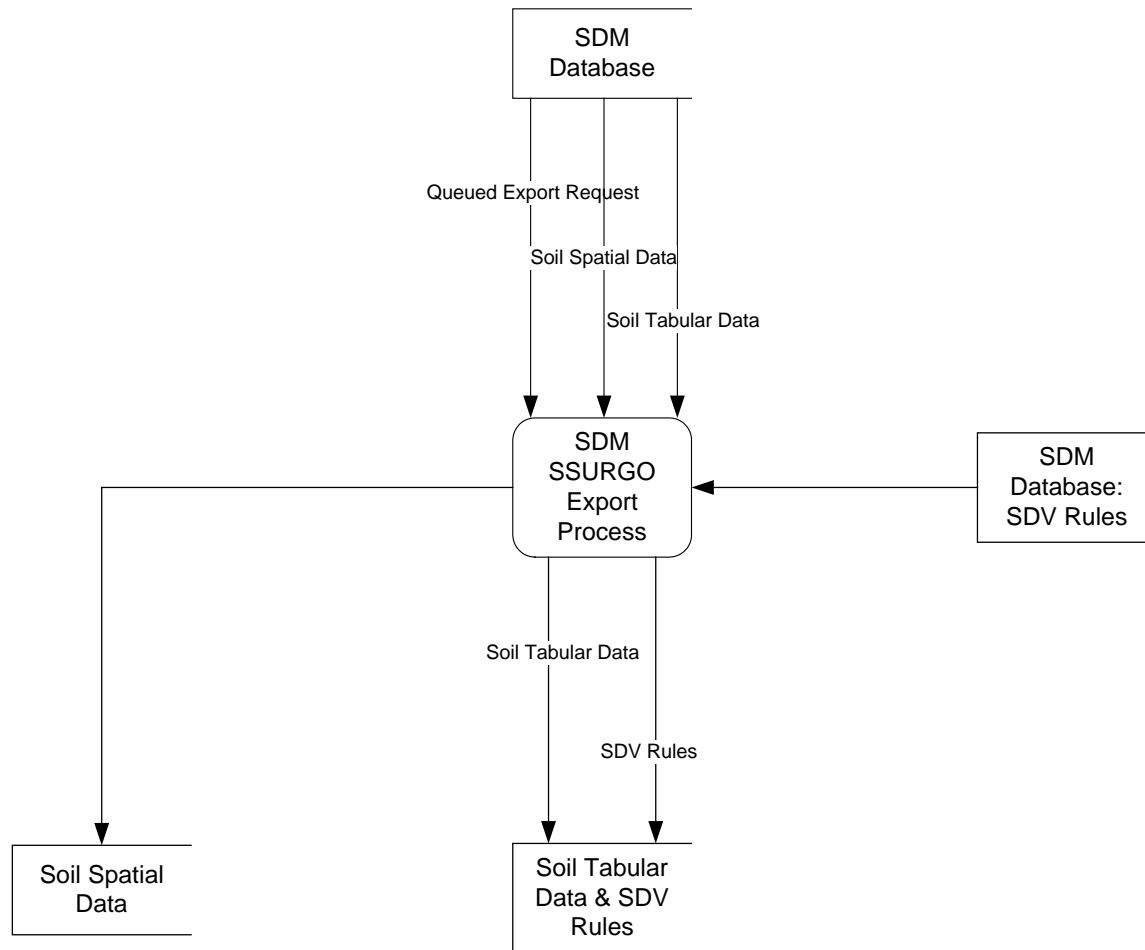
How the current Soil Data Viewer data management system works is illustrated by the following series of data flow diagrams. This discussion assumes that a person is already familiar with how soil tabular and spatial data ultimately makes it way to the Soil Data Mart.

In the following diagrams, where the term "SDV Rules" appears in a data store, keep in mind that "SDV Rules" always includes both SDV rules and folders.

SDV Rule Creation and Maintenance

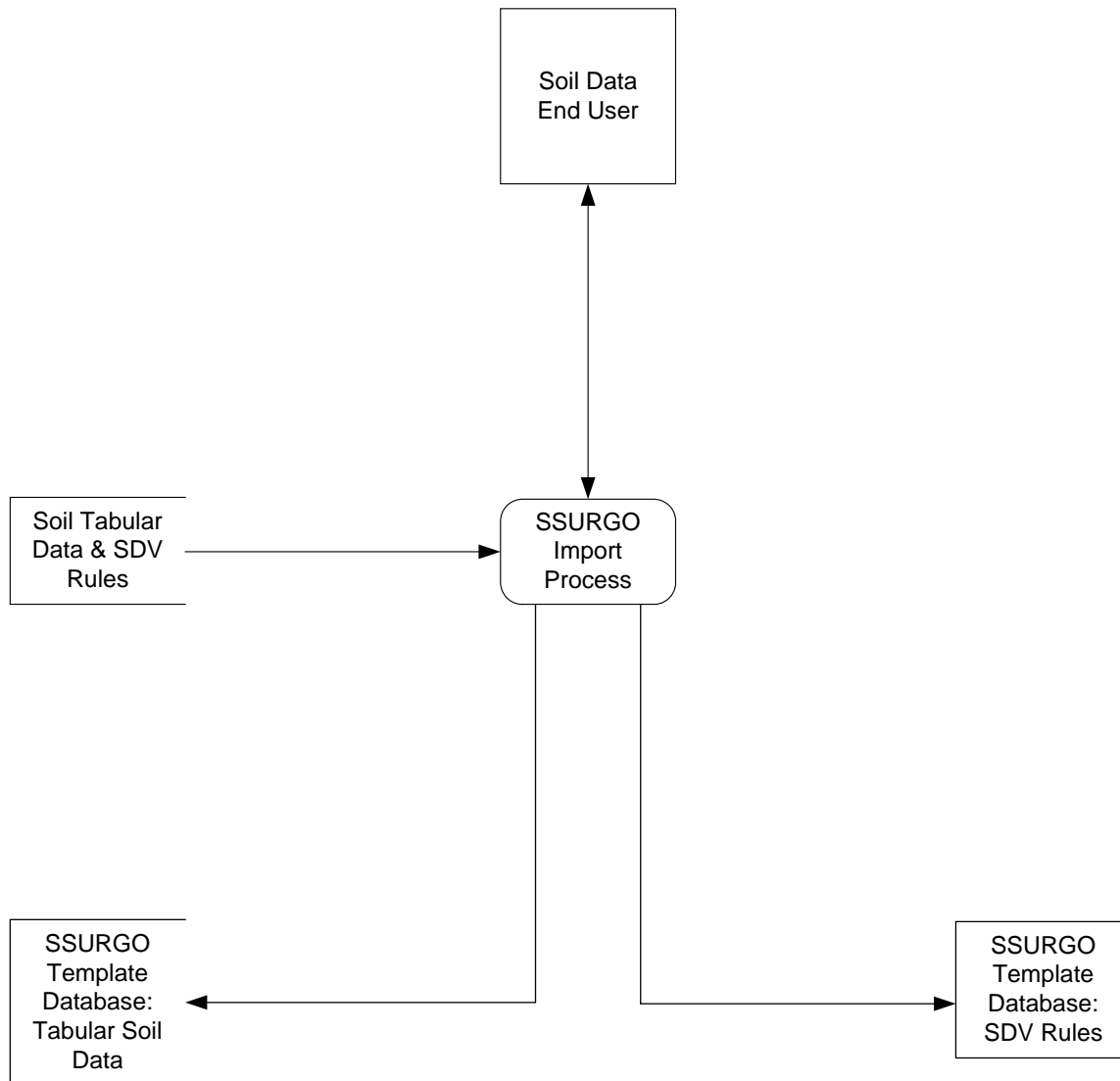


SSURGO Export Generation

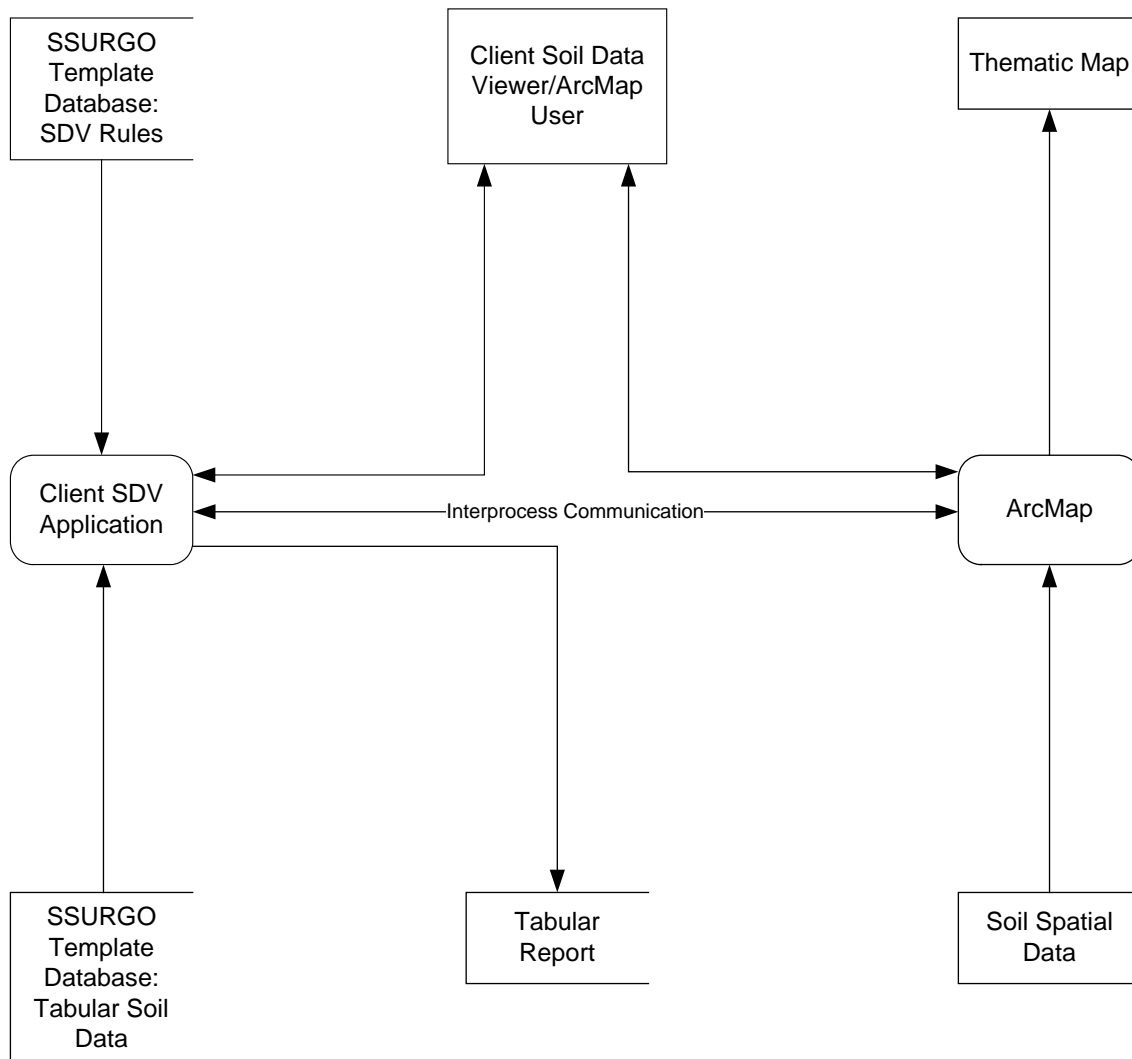


This diagram illustrates a SSURGO export for the Soil Data Mart. The user can also export SSURGO data from either NASIS or the Staging Server, and those exports include SDV property rules for NASIS exports and all SDV rules for Staging Server exports. All three SSURGO exports reference the SDV rules stored in the Soil Data Mart database. SSURGO exports from NASIS do not include SDV interpretation rules or soil spatial data.

SSURGO Template Database Import



Running client Soil Data Viewer under ArcMap



When creating thematic maps and aggregation reports via Web Soil Survey, the SDV rules and all soil tabular and spatial data are extracted directly from the Soil Data Mart database, and ArcMap is replaced by ArcGIS Server and ArcIMS.