

# Technical Note – Conservation Planning North Carolina



North Carolina Conservation Planning Technical Note No. 7

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## Standard Operating Procedures for Use of Hydrology Tools for Completing Food Security Act Wetland Compliance Determinations

The NFSAM 516.11, “Making Scope and Effect Determinations” authorizes use of Drainage Equations for determining the scope and effect of artificial drainage features for compliance determination.

Use of a “North Carolina Scope & Effect Guide” dated 1998 is not authorized for making Food Security Act wetland hydrology determinations; and is not recommended for making wetland determinations for any purpose. Documentation accompanying the NRCS 1998 “North Carolina Scope & Effect Guide” clearly indicates its limitations and poor suitability for making wetland determinations.

In North Carolina, NRCS wetland compliance determinations that require evaluations concerning lateral effects of artificial drainage features shall be based on use of one of the approved methods as given in NRCS NEH Part 650, Chapter 19, “Hydrology Tools for Wetland Determination”. Drainage Equations, such as the “van Schilfgaarde Equation”, or a combination of that equation with other approved drainage equations should be used. The “van Schilfgaarde Equation” is available as a web-based application on this website:

[http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=SUBNAVIGATION&cid=nrcs143\\_010913&navid=140140110000000&pnavid=140140000000000&position=Not%20Yet%20Determined.Html&ttype=detail&pname=tools\\_java.html%20|%20NRCS](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=SUBNAVIGATION&cid=nrcs143_010913&navid=140140110000000&pnavid=140140000000000&position=Not%20Yet%20Determined.Html&ttype=detail&pname=tools_java.html%20|%20NRCS). The other approved equations can be reached using hyper-links on the website cited above.

It should be noted that within this document the reference of the “van Schilfgaarde Equation” simply refers to the equation available through NRCS’s web based program. The web based tool is a modification to the actual van Schilfgaarde Equation, and has been approved for determining lateral effects of drainage systems.

Correct use of the “van Schilfgaarde Equation” for making lateral effect determinations for the purpose of wetland determinations according to NFSAM procedures involves the following:

- For Ditch Systems:
  - Possess Scope and Effect job approval authority (JAA) to use these procedures. This JAA is earned by completing a minimum 4 hours of state-level training in the use of the “van Schilfgaarde Equation” under supervision of an NRCS engineer who has completed Hydrology Tools training and has experience using the “van Schilfgaarde Equation”.
  - Document the extent and depth of artificial drainage present as described in Section 516.11 of the NFSAM at the time of the Food Security Act’s enactment (Dec. 23, 1985) using field observations, remote sensing data (i.e. – LiDAR), and historic photography.

- Dig soil borings, as required, verifying the soil observed in vicinity of a ditch is within the range of what is mapped.
- Document location of soil borings and data points with GPS and use GIS to map those locations on a USDA photo base.
- Record a soil profile description documenting a decision that an identified component meets that series' description.
- When observations of soil borings are not within the range for the mapped series, then identify the soil component observed and use the  $K_{sat}$  data from Web Soil Survey for the component series.  
(<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>)
- Generate the Saturated Hydraulic Conductivity ( $K_{sat}$ ) table from Web Soil Survey, then use the  $K_{sat}$  rating for the soil mapped or verified.
- When non-typical, unusual, or difficult situations are identified (such as contrasting particle size) within the evaluation zone, an evaluation shall be performed to determine the appropriateness of the “van Schilfgaarde Equation” prior to use. Contact the area office for assistance in evaluating the appropriate procedures for these situations.
- Estimate average digressional surface storage using methods described in hydrology tools training.
- For Drain Tile Systems:
  - Possess Scope and Effect job approval authority (JAA) to use these procedures. This JAA is earned by completing a minimum four hours of state-level training in the use of the “van Schilfgaarde Equation” under supervision of an NRCS engineer who has completed Hydrology Tools training and has experience using the “van Schilfgaarde Equation”.
  - Document the extent and depth of artificial drainage present as described in Section 516.11 of the NFSAM at the time of the Food Security Act's enactment (Dec. 23, 1985) using field observations, remote sensing data (i.e. – LiDAR), and historic photography.
  - Dig soil borings, as required, verifying the soil observed in vicinity of a ditch is within the range of what is mapped.
  - Document location of soil borings and data points with GPS and use GIS to map those locations on a USDA photo base.
  - Record a soil profile description documenting a decision that a component identified meets that series' description.
  - When observations of soil borings are not within the range for the mapped series, then identify the soil component observed and use the  $K_{sat}$  data from Web Soil Survey for the component series.  
(<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>)
  - Generate the Saturated Hydraulic Conductivity ( $K_{sat}$ ) table from Web Soil Survey, then use the  $K_{sat}$  rating for the soil mapped or verified.
  - For drain tile systems, the ponding (surface storage) must first be removed prior to use of the “van Schilfgaarde Equation”. This should be accomplished through the Kirkham's Equation which can be found in a web based format at the

following website:

[http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=SUBNAVIGATION&cid=nrcs143\\_010913&navid=140140110000000&pnavid=140140000000000&position=Not%20Yet%20Determined.Html&ttype=detail&pname=tools\\_java.html%20|%20NRCS](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/?ss=16&navtype=SUBNAVIGATION&cid=nrcs143_010913&navid=140140110000000&pnavid=140140000000000&position=Not%20Yet%20Determined.Html&ttype=detail&pname=tools_java.html%20|%20NRCS).

The number of days calculated from the Kirkham's equation should then be subtracted from the number of days in accordance with policy and used as an input into the "van Schilfgaardre Equation".

- When non-typical, unusual, or difficult situations are identified, (such as contrasting particle size) within the evaluation zone, an evaluation shall be performed to determine the appropriateness of the "van Schilfgaardre Equation" prior to use. Contact the area office for assistance in evaluating the appropriate procedures for these situations.
- Estimate average digressional surface storage using methods described in hydrology tools training.