

# Practice Notes

Notes regarding current practices and potential changes for the Rainwater and Land Development Manual

*Practice Notes* is a way to inform users of the Rainwater and Land Development manual of potential changes under consideration for the manual, additional references or factors important to design.

New information will be added occasionally and dated so that readers may know when it was posted.

You are welcome to provide feedback to us by sending a note or email to John Mathews ([john.mathews@dnr.state.oh.us](mailto:john.mathews@dnr.state.oh.us)).

## **ISSUES**

Hydrologic Soil Groups 6-29-09 .....1

# Hydrologic Soil Groups After Construction: A Draft Appendix

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## The Issue & Recommendations

For some time, researchers have known that urban soils have been altered significantly and are typically much more compacted than undisturbed or less disturbed soils (See *The Compaction of Urban Soils* by Tom Schueler in *Watershed Protection Techniques*, 3(2): 661-665, 2000). Depending upon the landuse, this could have significant changes for post-development runoff and infiltration, especially for landuses where vegetation and soils would be expected to provide some benefits to hydrology.

Potentially this could be reflected with the use of hydrologic soil groups in runoff calculations and in hydrologic models. Hydrologic soil groups were created as a means to categorize inherent soil runoff potential and are used to assign an appropriate Curve Number (CN). Soil types are assigned to hydrologic soil groups (HSG) in soil survey publications, and have been recently updated by the Natural Resource Conservation Service (NRCS) in 2007. Many users may not know that HSG values are based on undisturbed, naturally-occurring soils in an agricultural field or woodland setting.

For this reason, ODNR undertook a project to predict changes to HSG values for soils that are altered by standard construction practices. The following draft appendix to the Rainwater and Land Development book summarizes the resulting HSG values for post-construction soil profiles that would be appropriate for use in stormwater calculations.

This draft will be open for public comment until September 1, 2009 when it will be finalized and posted on the ODNR Rainwater and Land Development manual web site and in future printings of the manual.



## Appendix \_: Adjusting Hydrologic Soil Group for Construction

This appendix provides predictable hydrologic soil group (HSG) values for Ohio soils altered by construction practices.

Hydrologic soil groups are used to assign a Curve Number (CN) when performing runoff calculations or in hydrologic models. Soil map units have been assigned to hydrologic soil groups (HSG) in soil survey publications by the USDA Natural Resource Conservation Service<sup>1</sup>. These values are based on undisturbed, naturally-occurring soils. In contrast, soils at development sites are typically changed dramatically by construction practices that remove topsoil, change the soil profile and compact soils with heavy equipment. The runoff potential of a site is significantly impacted by these changes and should be reflected in hydrologic modeling and runoff calculations.

The following tables contain predicted HSG values that were developed by applying the HSG criteria to modeled representative post-construction soil profiles. The modeled scenario consisted of the removal of 9 inches of topsoil, 9 inches of cut or fill and the compaction of the zone from 0 to 6 inches at the new surface. A fuller explanation of this process is available from the Ohio Department of Natural Resources – Division of Soil and Water Resources website or by request from the stormwater staff.

Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Aaron	C	D
Abscota Variant (Warren)	A	No Eval.
Adrian	A/D	D
Aetna	B/D	D
Alexandria	C	D
Alford	B	D
Algansee	A/D	D
Algiers	B/D	D
Allegheny	B	C
Allegheny Variant (Belmont, Pike)	B	No Eval.
Allis	D	D
Alvada	B/D	D
Amanda	C	D
Amanda Variant (Licking)	B	No Eval.
Arkport	A	A
Ashton	B	D
Atlas	D	D
Aurand	C/D	D
Ava	C	D
Avonburg	D	D
Barkcamp	A	No Eval.
Barkcamp (CL surface)	A	A

Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Barkcamp (L surface)	A	B
Beasley	C	No Eval.
Beaucoup	C/D	D
Belmore	B	C
Belpre	C	No Eval.
Bennington	C/D	D
Berks	B	D
Bethesda	C	D
Biglick	D	D
Birkbeck	B	D
Bixler	B	D
Blairton	C	No Eval.
Blakeslee	B/D	D
Blanchester	C/D	D
Blount	C/D	D
Bogart	B/D	D
Bogart Variant (Mahoning)	C	No Eval.
Bonnell	C	D
Bonnie	C/D	D
Bono	C/D	D
Boston	C	D
Boyer	A	B

**Notes:** CL = clay loam; L = loam; substr = substratum; limestone substr = limestone substratum; Dual classes in Ohio, such as A/D, B/D, C/D are given for drained or undrained condition; No Eval. = No evaluation performed.

1. Hydrologic Soil Groups for Ohio (for undisturbed naturally-occurring sites) were updated in 2008 and should be used rather than values from earlier tables ([http://www.oh.nrcs.usda.gov/technical/soils/OH\\_hsg.pdf](http://www.oh.nrcs.usda.gov/technical/soils/OH_hsg.pdf) or contact the USDA Natural Resources Conservation Service in Columbus, Ohio).

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Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Braceville	C/D	D
Brady	B	No Eval.
Bratton	C	D
Brecksville	D	D
Brenton	B	No Eval.
Bronson	B	No Eval.
Brooke	D	D
Brookside	C	D
Brookston	B/D	D
Broughton	D	D
Brownsville	A	D
Brushcreek	C	D
Calcutta	C/D	D
Cambridge	D	D
Cana	C	D
Cana Variant	C	No Eval.
Canadice	D	D
Canal	C/D	D
Caneadea	D	D
Canfield	C	D
Canfield (Summit)	D	D
Canfield Variant (Stark)	C	No Eval.
Captina	C	No Eval.
Cardinal	C/D	D
Cardington	C	D
Carlisle	A/D	D
Casco	B	A
Castalia	A	D
Cedarfalls	A	No Eval.
Celina	C	D
Celina Variant	C	No Eval.
Centerburg	C	D
Ceresco	A/D	D
Chagrin	B	C
Channahon	D	D
Chavies	A	B
Chenango	A	A
Chili	B	C
Cidermill	B	D
Cincinnati	C	D
Clarksburg	C	D
Claysville	C/D	D
Clermont	D	D
Clifty	A	C
Clymer	B	C

Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Coblen	B	No Eval.
Cohoctah	A/D	D
Colonie	A	A
Colwood	B/D	D
Colwood (Erie)	C/D	D
Colyer	D	D
Colyer Variant	C	No Eval.
Condit	C/D	D
Conneaut	C/D	D
Conotton	A	C
Conotton Variant	A	No Eval.
Coolville	C	D
Corwin	C	D
Coshocton	C	D
Crane	B/D	D
Crider	B	No Eval.
Crosby	C/D	D
Crouse	B	No Eval.
Cruze	C	D
Cuba	B	C
Culleoka	B	D
Cyclone	B/D	D
Cygnets	B/D	D
Damascus	B/D	D
Damascus (Stark)	C/D	D
Dana	B	D
Darien	C/D	D
Darroch	B/D	D
Defiance	C/D	D
Dekalb	B	D
Del Rey	C/D	D
Del Rey Variant	C/D	D
Digby	B/D	D
Digby (till substr) (Wood)	C/D	D
Digby Variant (Auglaize, Putnam)	C/D	D
Dixboro	B/D	D
Doles	C/D	D
Donnelsville	B	No Eval.
Drummer	B/D	D
Dubois	C/D	D
Dunbridge	B	D
Duncannon	B	C
Dunham	B/D	D
Eden	D	D
Edenton	C	D

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Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Edwards	C/D	D
Eel	B/D	D
Eel moderately deep	C/D	D
Eel Variant (Shelby)	C	No Eval.
Elba	C	D
Eldean	B	D
Elkinsville	B	D
Elliott	C/D	D
Ellsworth	C	D
Elnora	A/D	D
Endoaquents	D	D
Enoch	C	C
Ernest	C	D
Euclid	C/D	D
Fairmount	D	D
Fairmount Variant (Greene)	C	No Eval.
Fairpoint	C	D
Farmerstown	C	C
Faywood	C	D
Fincastle	C/D	D
Fitchville	C/D	D
Fitchville Variant	C/D	D
Flatrock	B/D	D
Flatrock (limestne substr)	B/D	D
Fluvaquents	D	D
Fox	B	D
Frankstown Variant	C	No Eval.
Fredericktown	B	No Eval.
Frenchtown	D	D
Fries	D	D
Fulton	C/D	D
Fulton (till substr)	C/D	D
Fulton Variant	C/D	D
Fulton (till substr)	C/D	D
Gageville	C/D	D
Galen	A/D	D
Gallia	B	C
Gallipolis	C	C
Gallman	B	C
Gasconade	D	D
Gavers	C/D	D
Geeburg	D	D
Genesee	B	C
Genesee Variant (Ottawa)	C	No Eval.
Germano	B	D

Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Gessie	B	C
Gilford	A/D	D
Gilpin	C	D
Ginat	C/D	D
Glendora	A/D	D
Glenford	C/D	D
Glynwood	D	D
Glynwood (limestne substr) (Hancock)	C/D	D
Gosport	D	D
Granby	A/D	D
Granby (till substr)	A/D	D
Grayford	B	No Eval.
Gresham	C/D	D
Guernsey	C	D
Hackers	B	D
Haney	B	D
Hanover	C	D
Harbor	B/D	D
Harrod	C/D	D
Hartshorn	B	D
Hartshorn Variant (Monroe)	B/D	D
Haskins	C/D	D
Haubstadt	D	D
Haymond	B	C
Hayter	A	C
Hazleton	A	C
Hennepin	D	D
Henshaw	C/D	D
Henshaw Variant	C/D	D
Heverlo	C	No Eval.
Hickory	B	C
Holly	B/D	D
Holton	B/D	D
Homer	B/D	D
Homewood	C	D
Homeworth	B/D	D
Hornell	D	D
Houcktown	C/D	D
Hoytville	C/D	D
Hoytville Variant	C/D	D
Huntington	B	D
Hyatts	C/D	D
Ionia	B	No Eval.
Iva	C/D	D
Jenera	C/D	D

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Jeneva	B	No Eval.
Jessup	C	D
Jimtown	B/D	D
Johnsburg	D	D
Joliet	D	D
Jonesboro	C	D
Jules	B	No Eval.
Kanawha	B	C
Kane	B/D	D
Keene	C	D
Kendallville	C	C
Kensington	B	C/D
Kerston	C/D	D
Kibbie	B/D	D
Killbuck	C/D	D
Kings Variant	C/D	D
Kingsville	A/D	D
Kinn	B	No Eval.
Knoxdale	B	No Eval.
Kokomo	C/D	D
Kyger	A/D	D
Lakin	A	A
Lamberjack	B/D	D
Lamson	A/D	D
Landes	A	A
Lanier	A	A
Latham	D	D
Latty	C/D	D
Latty (till substr)	C/D	D
Lawshe	D	D
Lenawee	C/D	D
Lenawee Variant	C/D	D
Leoni	A	No Eval.
Lewisburg	D	D
Library Variant	C/D	D
Libre	C	No Eval.
Licking	C	D
Lily	B	D
Lindsay	C	D
Linwood	B/D	D
Lippincott	B/D	D
Lobdell	C	D
Lockport	D	D
Lorain	C/D	D
Lordstown	C	D

Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Lorenzo	A	No Eval.
Losantville	D	D
Loudon	C	D
Loudonville	C	D
Lowell	C	D
Lucas	D	D
Lumberton	B	D
Luray	C/D	D
Luray Variant (Stark)	B/D	D
Lybrand	C	D
Lykens	C	D
Mahalasville	B/D	D
Mahoning	C/D	D
Marblehead	D	D
Marengo	B/D	D
Markland	C	D
Martinsville	B	D
Martisco	B/D	D
Martisco Variant (Logan)	C/D	D
McGary	C/D	D
McGary Variant	C/D	D
McGuffey	D	D
Mechanicsburg	B	C
Medway	C	D
Medway Variant	C	D
Medway (limestne substr)	B/D	D
Melvin	B/D	D
Mentor	B	D
Mermill	C/D	D
Mermill Variant	C/D	D
Mertz	C	C
Metamora	B/D	D
Miami	C	D
Miami Variant	C	No Eval.
Miamian	C	D
Miamian Variant	C	No Eval.
Milford	C/D	D
Mill	C/D	D
Millgrove	B/D	D
Millsdale	C/D	D
Milton	C	D
Milton Variant	C	No Eval.
Miner	C/D	D
Minoa	B/D	D
Mitiwanga	C/D	D

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Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Mitiwanga Variant	D	D
Monongahela	D	D
Montgomery	C/D	D
Montgomery Variant (Pike)	D	D
Morley	D	D
Morley (limestone substr)	C	No Eval.
Morningsun	B	No Eval.
Morristown	C	C
Morrisville	C	No Eval.
Mortimer	C/D	D
Moshannon	B	D
Muck	B/D	D
Muse	C	D
Muskego	C/D	D
Muskingum	C	C
Nappanee	D	D
Negley	A	C
Neotoma	A	No Eval.
Newark	B/D	D
Newark Variant	B/D	D
Nicely	C	No Eval.
Nicholson	C	No Eval.
Nineveh	B	No Eval.
Nolin	B	D
Nolin Variant	B	No Eval.
Oakville	A	A
Ockley	B	C
Odell	C/D	D
Ogontz	B	No Eval.
Olentangy	B/D	D
Olmsted	B/D	D
Omulga	D	D
Opequon	D	D
Orrville	B/D	D
Orrville Variant (Richland)	A/D	D
Orrville Variant (Ashland)	C/D	D
Oshtemo	A	A
Oshtemo (till substr)	A	C
Otego	B/D	D
Otisville	A	A
Ottokee	A	D
Ottokee (till substr)	A	No Eval.
Otwell	D	D
Pacer	B	No Eval.
Painesville	C/D	D

Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Pandora	C/D	D
Papakating	C/D	D
Parke	B	D
Parr	B	No Eval.
Pate	D	D
Patton	B/D	D
Patton Variant	B/D	D
Paulding	D	D
Pekin	D	D
Peoga	C/D	D
Perrin	A	No Eval.
Pewamo	C/D	D
Pewamo Variant	C/D	D
Philo	B	D
Pierpont	C	D
Pike	B	D
Pinegrove	A	A
Pinnebog	A/D	D
Piopolis	C/D	D
Plainfield	A	A
Platea	D	D
Plattville	C	No Eval.
Plumbrook	A/D	D
Pope	B	A
Princeton	B	B
Prout	C/D	D
Purdy Variant	C/D	D
Pymont	D	D
Ragsdale	C/D	D
Rainsboro	C	D
Rainsville	C	No Eval.
Ramsey	D	D
Randolph	C/D	D
Rarden	D	D
Raub	B/D	D
Ravenna	D	D
Rawson	D	D
Red Hook	B/D	D
Reesville	B/D	D
Remsen	D	D
Rensselaer	B/D	D
Rensselaer (till substr)	B/D	D
Richland	B	D
Riddles	B	C
Rigley	A	A

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Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Rigley Variant	A	No Eval.
Rimer	A/D	D
Rimer (deep phase)	A/D	D
Risingsun	C/D	D
Ritchey	D	D
Rittman	D	D
Rockmill	B/D	D
Rodman	A	A
Rollersville	C/D	D
Romeo	D	D
Roselms	D	D
Ross	B	C
Ross Variant	D	D
Roszburg	B	D
Rossmoyne	C	D
Roundhead	C/D	D
Rush	B	D
Russell	B	D
Russell (bedrock substr)	B	No Eval.
Sandusky	B/D	D
Sarahsville	D	D
Saranac	C/D	D
Sardinia	B	D
Savona	B/D	D
Saylesville	C	D
Schaffenaker	A	D
Schaffer	C/D	D
Scioto	B	No Eval.
Sciotoville	C	D
Sebring	C/D	D
Sebring Variant	C/D	D
Secondcreek	C/D	D
Sees	C	D
Senecaville	C/D	D
Seward	A	D
Sewell	A	No Eval.
Shawtown	B	No Eval.
Sheffield	D	D
Shelocta	B	D
Shinrock	C	D
Shinrock Variant (Henry)	C/D	D
Shinrock (till substr)	C/D	D
Shoals	B/D	D
Shoals (mod deep)	C/D	D
Shoals Variant	C/D	D

Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Sisson	B	D
Skidmore	A	C
Skidmore Variant	A	No Eval.
Sleeth	B/D	D
Sligo	B	No Eval.
Sloan	B/D	D
Sloan (mod deep)	B/D	D
Sloan Variant	B/D	D
Sloan (limestone substr)	B/D	D
Smothers	C/D	D
Spargus	B	No Eval.
Sparta	A	No Eval.
Spinks	A	A
Spinks (deep to limestone)	A	No Eval.
St. Clair	D	D
Stafford	A/D	D
Stanhope	B/D	D
Steinsburg	B	D
Stendal	B/D	D
Stone	C/D	D
Stonelick	A	B
Strawn	D	D
Stringley	A	No Eval.
Sugarvalley	B/D	D
Summitville	C	D
Swanton	B/D	D
Switzerland	B	No Eval.
Taggart	C/D	D
Tarhollow	C	D
Tarlton	C	No Eval.
Tedrow	A/D	D
Tedrow (till substr) (Wood)	C/D	D
Teegarden	C/D	D
Thackery	B	D
Thackery Variant	B	No Eval.
Thackery (till substr)	B/D	D
Thrifton	D	D
Tiderishi	C/D	D
Tilsit	D	D
Tioga	A	C
Tioga variant (Cuyahoga)	A	No Eval.
Tioga variant (Lake)	B	No Eval.
Tippecanoe	B	D
Tiro	C/D	D
Titusville	D	D

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Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Toledo	C/D	D
Towerville	C/D	D
Trappist	C	D
Treaty	B/D	D
Tremont	C	D
Trumbull	D	D
Tuscarawas	C	No Eval.
Tuscola	C	D
Tuscola Variant	C	No Eval.
Tygart	C/D	D
Tyler	D	D
Tyner	A	A
Tyner Variant	A	No Eval.
Typic Udorthents	C	No Eval.
Uniontown	C	D
Upshur	C	D
Valley	D	D
Vandalia	C	D
Vandergrift	C/D	D
Vanlue	C/D	D
Vaughnsville	C	D
Venango	C/D	D
Vincent	C	D
Wabasha	C/D	D
Wabasha Variant	D	D
Wadsworth	D	D
Wadsworth Variant	D	D
Wakeland	B	No Eval.
Wakeman	B	No Eval.
Wallkill	B/D	D
Wallkill Variant	C/D	D
Wapahani	D	D
Wappinger	B	No Eval.
Warners	C/D	D
Warsaw	B	C
Warsaw Variant	B	No Eval.
Watertown	A	A
Waupecan	B	No Eval.
Wauseon	A/D	D
Wauseon (deep to till)	A/D	D
Wayland	C/D	D
Waynetown	B/D	D
Wea	B	B
Wea Variant	B	No Eval.
Weikert	D	D

Soil Map Unit Component	HSG <sup>1</sup>	Post-Const HSG
Weinbach	D	D
Wellston	B	D
Wernock	C	No Eval.
Wernock Variant	C	No Eval.
Westboro	C/D	D
Westgate	C	D
Westland	B/D	D
Westmore	C	D
Westmoreland	B	C
Wetzel	C/D	D
Weyers	A/D	D
Wharton	C	D
Wheeling	B	C
Whitaker	B/D	D
Wick	B/D	D
Wilbur	B	No Eval.
Willette	C/D	D
Williamsburg	B	C
Wilmer Variant	C	No Eval.
Woodsfield	C	C
Woolper	C	No Eval.
Wooster	C	D
Wyatt	D	D
Wynn	C	D
Xenia	C	D
Zanesville	C	D
Zepernick	B/D	D
Zipp	C/D	D
Zurich	C	No Eval.

**Notes:** CL = clay loam; L = loam; substr = substratum; limestone substr = limestone substratum; Dual classes in Ohio, such as A/D, B/D, C/D are given for drained or undrained condition; No Eval. = No evaluation performed.

1. Hydrologic Soil Groups for Ohio (for undisturbed naturally-occurring sites) were updated in 2008 and should be used rather than values from earlier tables. These can be found at: [http://www.oh.nrcs.usda.gov/technical/soils/OH\\_hsg.pdf](http://www.oh.nrcs.usda.gov/technical/soils/OH_hsg.pdf).