APPENDIX 2.3 –

Soils Data and Runoff Curve Number (CN) Computations

Table CN IA - Runoff Curve Number and Additional Initial Abstraction Values for Pervious Mild Slope Basins

Urban Hydrology for Small Watersheds, US Dept. of Agriculture Soil Conservation Service Technical Release 55, June 1986.

Table 2-2a – Runoff Curve Numbers for Urban Areas

Table CN - Runoff Curve Number (CN) Assumptions for Pervious Urban Areas

Table G - Basins with Large Grass Areas Excluding Parks

Table PG - Basins with Parks and Larger Grass Areas

Chapter 10 – Estimation of Direct Runoff From Storm Rainfall. Part 630 National Engineering Handbook. U.S. Dept. of Agriculture, Natural Resources Conservation Service. Last updated July 2004. See Table 10-1.

Table HSG - Hydrologic Soil Group Summary

Hydrologic Soil Group - Map Unit Name - Soils Map Unit Descriptions

Figure S - Soils Map (included as PDF file on the DVD)

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
ALCALDE BASIN												
A1	0.80000	A	**0.99**	56	1.00	49	0.00	**56**	**56**	1.57	1.00	**0.00**
		B	**0.01**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A2	0.00000	A	**1.00**	56	0.85	49	0.15	**55**	**55**	1.64	1.00	**0.00**
		B	**0.00**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A3	0.20000	A	**0.78**	56	0.90	49	0.10	**55**	**59**	1.39	1.00	**0.00**
		B	**0.22**	73	0.90	69	0.10	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A4	0.10714	A	**1.00**	56	0.83	49	0.17	**55**	**55**	1.64	1.00	**0.00**
		B	**0.00**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A5	0.15625	A	**0.89**	56	0.95	49	0.05	**56**	**57**	1.51	1.00	**0.00**
		B	**0.11**	73	0.95	69	0.05	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A6	0.12766	A	**0.77**	56	0.96	49	0.04	**56**		1.33	1.00	**0.00**
		B	**0.23**	73	0.96	69	0.04	**73**	**60**			

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A7	0.16667	A	**0.09**	56	0.97	49	0.03	**56**		0.82	1.00	**0.18**
		B	**0.91**	73	0.97	69	0.03	**73**	**71**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A8	0.27778	A	**0.05**	56	1.00	49	0.00	**56**		0.78	1.00	**0.22**
		B	**0.95**	73	1.00	69	0.00	**73**	**72**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A9	0.21277	A	**0.06**	56	1.00	49	0.00	**56**		0.78	1.00	**0.22**
		B	**0.94**	73	1.00	69	0.00	**73**	**72**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A10	0.13514	A	**0.19**	56	1.00	49	0.00	**56**		0.86	1.00	**0.14**
		B	**0.81**	73	1.00	69	0.00	**73**	**70**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A11	0.21053	A	**0.92**	56	0.99	49	0.01	**56**		1.51	1.00	**0.00**
		B	**0.08**	73	0.99	69	0.01	**73**	**57**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A12	0.07018	A	**0.32**	56	1.00	49	0.00	**56**		0.98	1.00	**0.02**

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		B	**0.68**	73	1.00	69	0.00	**73**	**67**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A13	0.11765	A	**0.71**	56	1.00	49	0.00	**56**	**61**	1.28	1.00	**0.00**
		B	**0.29**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A14-H	----	A	**0.83**	56	1.00	49	0.00	**56**	**59**	1.39	1.00	**0.00**
		B	**0.17**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A15	0.18349	A	**0.93**	56	1.00	49	0.00	**56**	**57**	1.51	1.00	**0.00**
		B	**0.05**	73	1.00	69	0.00	**73**				
		C	**0.02**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A16-C	----	A	**0.71**	56	1.00	49	0.00	**56**	**61**	1.28	1.00	**0.00**
		B	**0.29**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A17-C	----	A	**0.93**	56	1.00	49	0.00	**56**	**58**	1.45	1.00	**0.00**
		B	**0.01**	73	1.00	69	0.00	**73**				
		C	**0.06**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
A18	0.18018	A	**0.99**	56	1.00	49	0.00	**56**	**56**	1.57	1.00	**0.00**
		B	**0.01**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A19-C	----	A	**0.19**	56	1.00	49	0.00	**56**	**70**	0.86	1.00	**0.14**
		B	**0.81**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A20-C	----	A	**0.08**	56	0.25	49	0.75	**51**	**69**	0.90	1.00	**0.10**
		B	**0.92**	73	0.25	69	0.75	**70**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A21-C	----	A	**0.54**	56	1.00	49	0.00	**56**	**64**	1.12	1.00	**0.00**
		B	**0.46**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A22-O	----	A	**1.00**	56	1.00	49	0.00	**56**	**56**	1.57	1.00	**0.00**
		B	**0.00**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
A23-C	----	A	**0.20**	56	1.00	49	0.00	**56**	**70**	0.86	1.00	**0.14**
		B	**0.80**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		D	**0.00**	86	1.00	84	0.00	**86**				
A24-O	----	A	**0.76**	56	1.00	49	0.00	**56**		1.33	1.00	**0.00**
		B	**0.24**	73	1.00	69	0.00	**73**	**60**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BARELAS BASIN												
B1	0.27778	A	**0.13**	56	1.00	49	0.00	**56**		0.82	1.00	**0.18**
		B	**0.87**	73	1.00	69	0.00	**73**	**71**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B2-O	----	A	**0.97**	56	1.00	49	0.00	**56**		1.57	1.00	**0.00**
		B	**0.03**	73	1.00	69	0.00	**73**	**56**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B3	0.17544	A	**0.47**	56	1.00	49	0.00	**56**		1.08	1.00	**0.00**
		B	**0.53**	73	1.00	69	0.00	**73**	**65**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B4	0.12048	A	**0.12**	56	1.00	49	0.00	**56**		0.82	1.00	**0.18**
		B	**0.88**	73	1.00	69	0.00	**73**	**71**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B5	0.15528	A	**0.09**	56	1.00	49	0.00	**56**		0.74	1.00	**0.26**

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		B	**0.82**	73	1.00	69	0.00	**73**	**73**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.09**	86	1.00	84	0.00	**86**				
B6	0.09174	A	**0.28**	56	1.00	49	0.00	**56**	**69**	0.90	1.00	**0.10**
		B	**0.66**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.07**	86	1.00	84	0.00	**86**				
B7	0.35294	A	**0.20**	56	1.00	49	0.00	**56**	**70**	0.86	1.00	**0.14**
		B	**0.80**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B8	0.14778	A	**0.38**	56	1.00	49	0.00	**56**	**67**	0.98	1.00	**0.02**
		B	**0.62**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B9-O	----	A	**1.00**	56	1.00	49	0.00	**56**	**56**	1.57	1.00	**0.00**
		B	**0.00**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B10	0.19048	A	**0.34**	56	1.00	49	0.00	**56**	**68**	0.94	1.00	**0.06**
		B	**0.61**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.05**	86	1.00	84	0.00	**86**				

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
B11	0.90909	A	**0.27**	56	0.29	49	0.71	**51**	**66**	1.03	1.00	**0.00**
		B	**0.66**	73	0.29	69	0.71	**70**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.07**	86	0.29	84	0.71	**85**				
B12	0.18519	A	**0.09**	56	1.00	49	0.00	**56**	**73**	0.74	1.00	**0.26**
		B	**0.82**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.10**	86	1.00	84	0.00	**86**				
B13	0.19417	A	**0.16**	56	0.96	49	0.04	**56**	**70**	0.86	1.00	**0.14**
		B	**0.83**	73	0.96	69	0.04	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
		C/F	**0.01**	86	0.96	84	0.04	**86**				
B14	0.38889	A	**0.62**	56	1.00	49	0.00	**56**	**62**	1.23	1.00	**0.00**
		B	**0.38**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B15	0.15228	A	**0.03**	56	1.00	49	0.00	**56**	**72**	0.78	1.00	**0.22**
		B	**0.95**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.02**	86	1.00	84	0.00	**86**				
B16	0.23077	A	**0.00**	56	1.00	49	0.00	**56**	**73**	0.74	1.00	**0.26**
		B	**1.00**	73	1.00	69	0.00	**73**				

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B17	0.00000	A	**0.03**	56	1.00	49	0.00	**56**		0.74	1.00	**0.26**
		B	**0.95**	73	1.00	69	0.00	**73**	**73**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.02**	86	1.00	84	0.00	**86**				
B18	0.00000	A	**0.01**	56	1.00	49	0.00	**56**		0.74	1.00	**0.26**
		B	**0.97**	73	1.00	69	0.00	**73**	**73**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.02**	86	1.00	84	0.00	**86**				
B19.1	2.62857	A	**0.16**	56	1.00	49	0.00	**56**		0.86	1.00	**0.00**
B19.2	2.79412	B	**0.84**	73	1.00	69	0.00	**73**	**70**			
assume same soils for both		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B20	0.25000	A	**0.11**	56	0.90	49	0.10	**55**		0.82	1.00	**0.18**
		B	**0.83**	73	0.90	69	0.10	**73**	**71**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.06**	86	0.90	84	0.10	**86**				
B21	0.35714	A	**0.81**	56	1.00	49	0.00	**56**		1.39	1.00	**0.00**
		B	**0.19**	73	1.00	69	0.00	**73**	**59**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B22	0.14815	A	**0.47**	56	0.95	49	0.05	**56**		1.08	1.00	**0.00**

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		B	**0.53**	73	0.95	69	0.05	**73**	**65**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B23	0.11111	A	**0.88**	56	1.00	49	0.00	**56**	**58**	1.45	1.00	**0.00**
		B	**0.12**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B24	0.00000	A	**0.40**	56	0.99	49	0.01	**56**	**66**	1.03	1.00	**0.00**
		B	**0.58**	73	0.99	69	0.01	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.02**	86	0.99	84	0.01	**86**				
B25	0.12903	A	**0.16**	56	1.00	49	0.00	**56**	**70**	0.86	1.00	**0.14**
		B	**0.84**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B26	0.00000	A	**0.50**	56	1.00	49	0.00	**56**	**65**	1.08	1.00	**0.00**
		B	**0.50**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B27	0.12987	A	**0.11**	56	0.99	49	0.01	**56**	**71**	0.82	1.00	**0.18**
		B	**0.89**	73	0.99	69	0.01	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
B28	0.10724	A	**0.25**	56	0.99	49	0.01	**56**	**69**	0.90	1.00	**0.10**
		B	**0.75**	73	0.99	69	0.01	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B29	0.11268	A	**0.27**	56	1.00	49	0.00	**56**	**68**	0.94	1.00	**0.06**
		B	**0.73**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B30	0.13793	A	**0.17**	56	1.00	49	0.00	**56**	**70**	0.86	1.00	**0.14**
		B	**0.83**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B31	0.11494	A	**0.12**	56	1.00	49	0.00	**56**	**71**	0.82	1.00	**0.18**
		B	**0.88**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B32	0.17094	A	**0.14**	56	1.00	49	0.00	**56**	**71**	0.82	1.00	**0.18**
		B	**0.86**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B33	0.10101	A	**0.28**	56	1.00	49	0.00	**56**	**68**	0.94	1.00	**0.06**
		B	**0.72**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		D	**0.00**	86	1.00	84	0.00	**86**				
B34	0.20101	A	**0.19**	56	1.00	49	0.00	**56**	**70**	0.86	1.00	**0.14**
		B	**0.81**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B35	0.40080	A	**0.00**	56	1.00	49	0.00	**56**	**73**	0.74	1.00	**0.26**
		B	**1.00**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B36	0.31496	A	**0.31**	56	1.00	49	0.00	**56**	**68**	0.94	1.00	**0.06**
		B	**0.69**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B37-C	----	A	**0.00**	56	1.00	49	0.00	**56**	**69**	0.90	1.00	**0.10**
		B	**1.00**	73	0.00	69	1.00	**69**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B38-C	----	A	**0.00**	56	1.00	49	0.00	**56**	**69**	0.90	1.00	**0.10**
		B	**1.00**	73	0.00	69	1.00	**69**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B39-O	----	A	**0.00**	56	1.00	49	0.00	**56**	**72**	0.74	1.00	**0.26**
		B	**1.00**	73	1.00	69	0.00	**73**				

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B40	0.80367	A	**0.03**	56	1.00	49	0.00	**56**		0.78	1.00	**0.22**
		B	**0.97**	73	1.00	69	0.00	**73**	**72**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
B41	0.53333	A	**0.27**	56	1.00	49	0.00	**56**		0.90	1.00	**0.10**
		B	**0.64**	73	1.00	69	0.00	**73**	**69**			
		C	**0.09**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BROADWAY BASIN												
BR1	3.86667	A	**0.13**	56	1.00	49	0.00	**56**		0.70	1.00	**0.00**
		B	**0.63**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**	**74**			
		D	**0.00**	86	1.00	84	0.00	**86**				
		C/F	**0.24**	86	1.00	84	0.00	**86**				
BR2	0.54054	A	**0.00**	56	1.00	49	0.00	**56**		0.74	1.00	**0.26**
		B	**1.00**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**	**73**			
		D	**0.00**	86	1.00	84	0.00	**86**				
BR3	2.35294	A	**0.01**	56	1.00	49	0.00	**56**		0.74	1.00	**0.00**
		B	**0.99**	73	1.00	69	0.00	**73**				

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BR4	3.05858	A	**0.24**	56	1.00	49	0.00	**56**		0.60	1.00	**0.00**
		B	**0.15**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**	**77**			
		D	**0.00**	86	1.00	84	0.00	**86**				
		C/F	**0.61**	86	1.00	84	0.00	**86**				
BR5	4.10714	A	**0.07**	56	1.00	49	0.00	**56**		0.41	1.00	**0.00**
		B	**0.09**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**	**83**			
		D	**0.00**	86	1.00	84	0.00	**86**				
		C/F	**0.84**	86	1.00	84	0.00	**86**				
BR6	0.61538	A	**0.10**	56	1.00	49	0.00	**56**		0.82	1.00	**0.18**
		B	**0.90**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**	**71**			
		D	**0.00**	86	1.00	84	0.00	**86**				
BR7-H1	----	A	**0.00**	56	1.00	49	0.00	**56**		0.60	1.00	**0.40**
		B	**0.70**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**	**77**			
		D	**0.00**	86	1.00	84	0.00	**86**				
	----	C/F	**0.30**	86	1.00	84	0.00	**86**				
BR7-H2		A	**0.00**	56	1.00	49	0.00	**56**		0.44	1.00	**0.56**
		B	**0.33**	73	1.00	69	0.00	**73**				

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		C	**0.00**	82	1.00	79	0.00	**82**	**82**			
		D	**0.00**	86	1.00	84	0.00	**86**				
		C/F	**0.67**	86	1.00	84	0.00	**86**				
BR8-H1	----	A	**0.00**	56	1.00	49	0.00	**56**	**85**	0.35	1.00	**0.65**
		B	**0.09**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
		C/F	**0.91**	86	1.00	84	0.00	**86**				
BR8-H2	----	A	**0.04**	56	1.00	49	0.00	**56**	**81**	0.47	1.00	**0.53**
		B	**0.24**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
		C/F	**0.72**	86	1.00	84	0.00	**86**				
BR9	0.23529	A	**0.02**	56	1.00	49	0.00	**56**	**73**	0.74	1.00	**0.26**
		B	**0.98**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BR10	5.10345	A	**0.00**	56	1.00	49	0.00	**56**	**73**	0.74	1.00	**0.00**
		B	**1.00**	73	0.99	69	0.01	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BR11	4.51064	A	**0.06**	56	1.00	49	0.00	**56**		0.74	1.00	**0.00**
		B	**0.81**	73	1.00	69	0.00	**73**				

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		C	**0.00**	82	1.00	79	0.00	**82**	**73**			
		D	**0.00**	86	1.00	84	0.00	**86**				
		C/F	**0.13**	86	1.00	84	0.00	**86**				
BR12	4.78261	A	**0.00**	56	1.00	49	0.00	**56**		0.74	1.00	**0.00**
		B	**0.92**	73	0.75	69	0.25	**72**				
		C	**0.00**	82	1.00	79	0.00	**82**	**73**			
		D	**0.00**	86	1.00	84	0.00	**86**				
		C/F	**0.08**	86	0.75	84	0.25	**86**				
BR13	1.66667	A	**0.00**	56	1.00	49	0.00	**56**		0.74	1.00	**0.00**
		B	**1.00**	73	0.96	69	0.04	**73**	**73**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BR14	0.40000	A	**0.00**	56	1.00	49	0.00	**56**		0.74	1.00	**0.26**
		B	**1.00**	73	1.00	69	0.00	**73**	**73**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BR15-C	----	A	**0.00**	56	1.00	49	0.00	**56**		0.90	1.00	**0.10**
		B	**1.00**	73	0.00	69	1.00	**69**	**69**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BR16	3.18584	A	**0.00**	56	1.00	49	0.00	**56**		0.86	1.00	**0.00**
		B	**0.95**	73	0.10	69	0.90	**69**				
		C	**0.00**	82	1.00	79	0.00	**82**	**70**			

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)
		D	**0.00**	86	1.00	84	0.00	**86**				
		C/F	**0.05**	86	0.10	84	0.90	**84**				
BR17	1.42857	A	**0.00**	56	1.00	49	0.00	**56**		0.74	1.00	**0.00**
		B	**1.00**	73	1.00	69	0.00	**73**	**73**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BR18	1.40000	A	**0.01**	56	1.00	49	0.00	**56**		0.74	1.00	**0.00**
		B	**0.99**	73	1.00	69	0.00	**73**	**73**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BR19	1.03704	A	**0.10**	56	1.00	49	0.00	**56**		0.82	1.00	**0.00**
		B	**0.90**	73	1.00	69	0.00	**73**	**71**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BR20	0.22222	A	**0.00**	56	1.00	49	0.00	**56**		0.74	1.00	**0.26**
		B	**1.00**	73	1.00	69	0.00	**73**	**73**			
		C	**0.00**	82	1.00	79	0.00	**82**				
		D	**0.00**	86	1.00	84	0.00	**86**				
BR21	3.25939	A	**0.20**	56	1.00	49	0.00	**56**		0.53	1.00	**0.00**
		B	**0.10**	73	1.00	69	0.00	**73**				
		C	**0.00**	82	1.00	79	0.00	**82**	**79**			
		D	**0.00**	86	1.00	84	0.00	**86**				
		C/F	**0.70**	86	1.00	84	0.00	**86**				

TABLE CN IA

RUNOFF CURVE NUMBER and ADDITIONAL INITIAL ABSTRACTION VALUES FOR PERVIOUS MILD SLOPE BASINS

(Assume "Fair" Hydrologic Condition and Average Antecedent Moisiture Condition (See Table CN))

		RUNOFF CURVE NUMBER (CN)								INITIAL ABSTRACTION		
Subcatchment (Basin No.)	Steep Slope S>1%, Mild Slope S<=1%	Hydrologic Soil Group	**Fraction of Basin Area that is HSG**	Average Open Space (lawns) and Natural Desert Landscaping (d)		Parks and Large Grass Areas (d)		**Composite CN per Cover Type Per HSG - Fraction (Area) weighted**	**FINAL Composite CN - Fraction (Area) weighted**	NRCS Initial Abstraction per CN	Assumed Average Initial Abstraction in Pervious Mild Slope Basins	**Additional Depression Storage (Initial Abstraction) to Add to SWMM Model data for Pervious Mild Slope Basins**
		(HSG)		CN	Fraction of Basin Area	CN	Fraction of Basin Area			inches	inches	inches
(a)		(b)	(b)	(c)	(c)	(c)	(c)			(d)	(e)	(f)

--- means not computed because basin hydrograph is computed external to SWMM (H), or leaves the study area (O), or is a closed basin ©

(a) See Soils Map in Map Pocket

(b) Soils data were obtained from the NRCS Soil Data Viewer (internet) and Arcview 9.3. - Soil Mapping Units, descriptions and Hydrologic Soil Groups were defined by the NRCS as presented on the Soils Map in Map Pocket,

Fractions of the Hydrologic Soil Groups / Soil Types within a given sub-basin were computed by Arcview 9.3 Geometry Calculations

This Appendix contains the Soil Mapping Unit Descriptions - (Soil Types)

SCS does not assign HSG's to Cut and Fill (C/F) areas, therefore Assume C/F soils have properties similar to Hydrologic Soil Group D (HSG), therefore adopt same CN's as HSG D

(c) Appendix contains a copy of Table 2-2a Runoff Curve Numbers for Urban Areas as defined by the U.S.D.A. Soil Conservations Service (TR 55), June 1986. See Table CN (this Appendix for Assumptions Regarding Runoff Curve Numbers for Pervious Areas. See Tables PG and G this Appendix for Runoff Curve Number Assumptions, Fraction of Cover Type Assumptions and See Table G for Parks and Grass Fraction Assumptions

(d) See Table 10-1 from Part 630 National Engineering Handbook - USDA Natural Resouces Conservaton Service last Update July 2004. (copy included this Appendix)

(e) See Report discussion - An average computed by Smith Engineering Company based on report titled "Analysis of the AHYMO Program for Flat Valley Areas" Bhohannon-Huston , Inc. Fugreuary 1995.

(f) Only add additional initial abstraction if the NRCS Initial Abstraction value for the given curve number is less than 1.0 inches, to reach a total of 1.0 inches in Mild Slope Basins

United States
Department of
Agriculture

Soil
Conservation
Service

Engineering
Division

Technical
Release 55

June 1986

Urban Hydrology for Small Watersheds

Table 2-2a.—Runoff curve numbers for urban areas[1]

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1]Average runoff condition, and $I_a = 0.2S$.
[2]The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
[3]CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
[4]Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
[5]Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4, based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

TABLE CN
RUNOFF CURVE NUMBER (CN) ASSUMPTIONS FOR PERVIOUS URBAN AREAS
Mid Valley Drainage Management Plan

Cover Type Description	Hydrologic Condtion	Runoff Curve Number for Hydrologic Soil Group (A, B, C or D)				Soil Conservation Service Source Table
		A	B	C	D	
Runoff Curve Numbers for Urban Areas (a)						
Open Space (lawns, parks, golf courses, cemeteries, etc.)	Fair Condition, (grass 50% to 75%)	49	69	79	84	Table 2-2a (a)
Natural desert landscaping (pervious areas only)	(assumed as equivalent to desert shrub in poor hydrologic condition)	63	77	85	88	Table 2-2a (a)
	AVERAGES	56	73	82	86	
ASSUMPTIONS AND CONCLUSIONS -						
For residential, commercial / industrial basins or combinations of residential / commercial / industrial basins, that DO NOT INCLUDE PARKS :						
Assume that for PERVIOUS areas in all basins in this urban area, that there is an equal fraction of lawns and natural desert landscaping, and therefore adopt the Average of the CN's of Lawns and Natural Desert Landscaping	**AVERAGES**	**56**	**73**	**82**	**86**	
FOR PARK AREAS :						
Estimate the park area fraction of the basin area, and assume the associated CN's as presented here, and for the remainder of the basin area fraction, adopt the average of the CN's for lawns and park areas as described above	**Parks with grass areas**	**49**	**69**	**79**	**84**	
(a) Table 2-2a from - Urban Hydrology for Small Watersheds, USDA Soil Conservation Service, Technical Release 55, June 1986 (copy included in Appendix)						

TABLE G

BASINS WITH LARGE GRASS AREAS EXCLUDING PARKS

(Park Grass Areas are summarized in Table PG this Appendix)

Subcatchment (Basin) Name	Description	Grass Area within curbs or hard limit	Visual Estimate of Grass Fraction within outer limits	Total Grass Area
		sq ft	%	sq ft
a	b	c	d	
ALCALDE BASIN				
A4	**Laguna St. medians**	**4,228**	**100**	**4,228**
A5	Washington Middle School	79,469	100	
A5		7,517	100	
A5	**total**	**86,986**	**100**	**86,986**
A6	Manzano Day School	11,107	100	
A6	and Laguna St. and San Pasquale St. medians	9,736	100	
A6		4,079	100	
A6		2,992	100	
A6		3,476	100	
A6		7,783	100	
A6		5,623	100	
A6		5,646	100	
A6		3,355	100	
A6		7,568	100	
A6		3,130	100	
A6		5,626	100	
A6		5,965	100	
A6		4,143	100	
A6		7,017	100	
A6		2,589	100	
A6	**total**	**89,835**	**100**	**89,835**
A13	**Albuquerque Art Museum**	**21,000**	**100**	**21,000**

TABLE G

BASINS WITH LARGE GRASS AREAS EXCLUDING PARKS

(Park Grass Areas are summarized in Table PG this Appendix)

Subcatchment (Basin) Name	Description	Grass Area within curbs or hard limit	Visual Estimate of Grass Fraction within outer limits	Total Grass Area
		sq ft	%	sq ft
a	b	c	d	
BARELAS BASIN				
B20		**55,000**	**100**	**55,000**
B27	United States Courthouse	6,346	98	6,219
B27		4,869	100	4,869
B27		6,658	100	6,658
B27		7,487	98	7,337
B27		6,277	98	6,151
B27		725	100	725
B27	**total**	**32,362**	**----**	**31,960**
BROADWAY BASINS				
BR16	**CEMETARY BASIN**			
	compute 90% of the total basin area as grass			
	basin area sq ft =	1,127,866	90	1,015,079
BR16	**Total**			**1,015,079**
BR12	**CEMETARY BASIN**	**238,000**	**100**	**238,000**

a - see Drainage Basin Maps

b - observed on the drainage basin maps, and then verified with clearer photographs from Google Earth

c - measured as closed areas in the Drainage Basin Map AutoCad Files

d - visual estimate of sidewalks or impervious surfaces within the measured areas

TABLE PG

BASINS WITH PARKS AND LARGER GRASS AREAS

		Parks			Other Significant Grass Areas					
Subcatchment (Basin) Name	Park Name as Identified by City of Albuquerque GIS Data Base **OR** Grass Area Description	Park Area within approximate outer sidewalk or curb limits	Visual Estimate of Park Grass Fraction within outer park limits	Park Grass Area	Area within approximate outer sidewalk or curb limits	Visual Estimate of Grass Fraction within outer limits	Grass Area	TOTAL GRASS AREA	Total Subcatchment Area	Fraction of Subcatchment Area that is Grass
		sq ft	%	sq ft	sq ft	%	sq ft	sq ft	sq ft	
(a)		(b)	(b)		(c)	(c)	(c)			(d)
ALCALDE BASIN										
A2	Rio Grande Triangle	31,744	30	9,523	---	---	---	---	---	---
A2	Rio Grande Pool	40,109	100	40,109	0	0	0	40,109	---	---
A2	TOTAL FOR BASIN A2	71,853	---	49,632	24,922	100	24,922	74,554	482,697	0.15
A3	Forest Park	36,130	100	36,130	0	0	0	36,130	---	---
A3	Oxnard	6,921	95	6,575	0	0	0	6,575	---	---
A3	Kit Carson	388,366	90	349,529	0	0	0	349,529	---	---
A3	TOTAL FOR BASIN A3	431,417	---	392,234	0	0	0	392,234	3,854,763	0.10
A4	Kit Carson	87,458	100	87,458	4,228	100	4,228	91,686	540,886	0.17
A5	Washington Middle School	75,275	90	67,748	86,986	100	86,986	154,734	3,423,443	0.05
A6	Mazano Day School and Laguan St and San Pasqlae St medians	0	0	0	89,835	100	89,835	89,835	2056902	0.04
A7	Soldier & Sailors Park	9,948	98	9,749	0	0	0	9,749	---	---
A7	Mary Fox	38,643	85	32,847	0	0	0	32,847	---	---
A7	TOTAL FOR BASIN A7	48,591	---	42,596	0	0	0	42,596	1,666,460	0.03
A11	Old Town Plaza	24,285	50	12,143	0	0	0	12,143	1,582,108	0.01
A13	Albuquerque Art Museum	0	0	0	21,000	100	21,000	21,000	5375127	0.00

TABLE PG

BASINS WITH PARKS AND LARGER GRASS AREAS

		Parks			Other Significant Grass Areas					
Subcatchment (Basin) Name	Park Name as Identified by City of Albuquerque GIS Data Base **OR** Grass Area Description	Park Area within approximate outer sidewalk or curb limits	Visual Estimate of Park Grass Fraction within outer park limits	Park Grass Area	Area within approximate outer sidewalk or curb limits	Visual Estimate of Grass Fraction within outer limits	Grass Area	TOTAL GRASS AREA	Total Subcatchment Area	Fraction of Subcatchment Area that is Grass
		sq ft	%	sq ft	sq ft	%	sq ft	sq ft	sq ft	
(a)		(b)	(b)		(c)	(c)	(c)			(d)
A20-C	Tiguex	269,360	75	202,020	0	0	0	202,020	269360	0.75
BARELAS BASIN										
B1	Eddie Garcia	3,585	20	717	0	0	0	717	1,746,781	0.00
B2-O	Eddie Garcia	2,918	5	146	0	0	0	146	142,701	0.00
B11	Tingley	428,279	90	385,451	0	0	0	385,451	540,693	0.71
B12	Hazeldine is considered a developed park	4,528	0	0	0	0	0	0	413,824	0.00
B13	Barelas	33,861	100	33,861	0	0	0	33,861	872,617	0.04
B18	S. 4th St. Mall	10,326	25	2,582	0	0	0	2,582	608,804	0.00
B20	Civic Plaza	19,585	100	19,585	55,000	100	55,000	74,585	738,847	0.10
B21	Washington Middle School	3,000	100	3,000	0	0	0	3,000	1346289	0.00
B22	Robinson	73,702	98	72,228	0	0	0	72,228	1,455,710	0.05
B24	N. 4th St. Mall	18,738	25	4,685	0	0	0	4,685	803,158	0.01
B27	US Courthouse	0	0	0	0	0	31,960	31,960	2244130	0.01
B28	Wells	25,908	100	25,908	0	0	0	25,908	2,827,405	0.01
B37-C	Coronado	157,714	100	157,714	0	0	0	157,714	157,713	1.00

TABLE PG

BASINS WITH PARKS AND LARGER GRASS AREAS

		Parks			Other Significant Grass Areas					
Subcatchment (Basin) Name	Park Name as Identified by City of Albuquerque GIS Data Base **OR** Grass Area Description	Park Area within approximate outer sidewalk or curb limits	Visual Estimate of Park Grass Fraction within outer park limits	Park Grass Area	Area within approximate outer sidewalk or curb limits	Visual Estimate of Grass Fraction within outer limits	Grass Area	TOTAL GRASS AREA	Total Subcatchment Area	Fraction of Subcatchment Area that is Grass
		sq ft	%	sq ft	sq ft	%	sq ft	sq ft	sq ft	
(a)		(b)	(b)		(c)	(c)	(c)			(d)
B38-C	Coronado	74,918	100	74,918	0	0	0	74,918	74,917	1.00
BR0ADWAY BASIN										
BR10	Santa Barbara	12,563	100	12,563	0	0	0	12,563	1,587,043	0.01
BR12	Cemetary	0	0	0	238,000	100	238,000	238,000	971127	0.25
BR13	Santa Barbara	98,109	50	49,055	0	0	0	49,055	1,269,496	0.04
BR15-C	Martinez Town & Santa Barbara	299,925	100	299,925	0	0	0	299,925	299,925	1.00
BR16	Cemetary	0	0	0	0	0	1,015,079	1,015,079	1127866	0.90

(a) - C is a closed basin, -H is a basin hydrograph computed external to SWMM model computed in a previous drainage plan, -O - basin drains out of study area

(b) - Park areas observed on the drainage basin maps, then visually verified grass areas in Google Earthmeasured in AutoCad because the photo is clearer, then measured the grass area on the Drainage Basin Maps in AutoCad

(c) - See Table G for a summary of the larger grass areas that are not within Parks

(d) - This fraction is included in Table CN Final

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Chapter 10 Estimation of Direct Runoff from Storm Rainfall

630.1000 Introduction

The Natural Resources Conservation Service (NRCS) method of estimating direct runoff from storm rainfall is described in this chapter. The rainfall-runoff relationship is developed, parameters in the relationship are described, and applications of the method are illustrated by examples.

The NRCS method of estimating direct runoff from storm rainfall was the end product of a major field investigation and the work of numerous early investigators (Mockus 1949, Sherman 1942, Andrews 1954, and Ogrosky 1956). A major catalyst for getting this procedure to the field was the passage of the Watershed Protection and Flood Prevention Act (Public Law 83-566) in August 1954. As a result, studies associated with small watershed planning requiring solutions of hydrologic problems were expected to produce a quantum jump in hydrologic computations within NRCS (Rallison 1980, Rallison and Miller 1982). Most NRCS work is with small, ungaged, agricultural watersheds, so the method was developed for rainfall and watershed data that are available or easily obtainable.

The method is a direct descendent of the hydrologic heritage developed in the United States in the first half of the 20th century. In the early 1900's investigators commonly plotted total runoff versus total rainfall to describe river hydrology. Mead (1919) showed several of these plots, which were reasonably useful on an annual basis. However, for shorter periods, such as seasons or months, the scatter became excessive. More than just rainfall depth alone was involved in determining the amount of runoff. Sherman (1942) attempted to include additional information by plotting runoff versus rainfall with separate curves for each month and a tabular adjustment for antecedent rainfall. This was an attempt to deal with event situations; however, the scatter of the data was still significant. Kohler and Linsley (1951) expanded upon the approach of Sherman with the multiple correlation diagram. This incorporated such items as antecedent precipitation, week of the year, and storm duration along with the basic rainfall and runoff values. Coaxial correlation diagrams must be generated for each basin, so this approach cannot be used in an ungaged situation.

Mockus' goal was to develop a procedure for use on small, ungaged agricultural watersheds. No evidence indicates that he had the coaxial graphical correlation diagrams in mind when he started the work that led to curve numbers. It does seem appropriate, however, to consider the procedures to be related with curve number tables taking the place of some graphs used for coaxial correlation work. Rallison (1980) and Rallison and Miller (1982), in describing the origin and evolution of the runoff equation, point to this heritage.

The principal application of the method is in estimating quantities of runoff in flood hydrographs or in relation to flood peak rates (National Engineering Handbook 630 (NEH-630), chapter 16). An understanding of runoff types is necessary to apply the method properly in different climatic regions. Four types are distinguished: channel, surface, lateral subsurface flow, and baseflow.

Channel runoff occurs when rain falls on a flowing stream. It appears in the hydrograph at the start of the storm and continues throughout the storm, varying with the rainfall intensity. This type of runoff is generally a negligible quantity in flood hydrographs and is ignored except in special studies.

Surface runoff or overland flow occurs when the rainfall rate is greater than the infiltration rate. The runoff equation was developed for this condition. The runoff flows on the surface of the watershed and through channels to the point of reference. This type of runoff appears in the hydrograph after the initial demands of interception, infiltration, and surface storage have been satisfied. It varies during the storm and ends during or soon after the storm. The volume of surface runoff flowing down dry channels of watersheds in arid, semiarid, or subhumid climates may be reduced by transmission losses (NEH, part 630, chapter 19), which could be large enough to eliminate the runoff.

Subsurface flow occurs when infiltrated rainfall meets a subsurface horizon of lower hydraulic conductivity, travels laterally above the interface, and reappears as a seep or spring. This type runoff is often called quick return flow because it contributes to the hydrograph during or soon after the storm.

Baseflow occurs when there is a fairly steady flow from natural storage. The flow comes from an aquifer that is replenished by infiltrated rainfall or surface runoff. Changes in this type of runoff seldom appear soon enough after a storm to have an influence on the hydrograph for that storm, but an increase in baseflow from a previous storm increases the streamflow rate. Baseflow must be considered in the design of the principal spillway of a floodwater-retarding structure (NEH, part 630, chapter 21). The runoff equation does not include baseflow.

All types of runoff do not regularly appear on all watersheds. Climate is one indicator of the probability of the types of runoff that will occur in a given watershed. In arid regions the flow on smaller watersheds is nearly always surface runoff. Subsurface flow is more likely in humid regions. A long succession of storms, however, may produce subsurface flow or changes in baseflow even in arid climates, although the probability of this occurring is less in arid than in humid climates.

n flood hydrology baseflow is generally dealt with separately, and all other types are combined into *direct runoff*, which consists of channel runoff, surface runoff, and subsurface flow in unknown proportions. The curve number method estimates this combined direct runoff.

630.1001 Rainfall-runoff relationship

The NRCS runoff equation was developed to estimate total storm runoff from total storm rainfall. That is, the relationship excludes time as a variable. Rainfall intensity is ignored. An early version of the relationship was described by Mockus (1949). The material that follows evolved from that 1949 report.

(a) Development

The curve number runoff equation is:

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S} \qquad P > I_a$$
$$Q = 0 \qquad P \le I_a \qquad [10\text{–}1]$$

where:
Q = depth of runoff, in inches
P = depth of rainfall, in inches
I_a = initial abstraction, in inches
S = maximum potential retention, in inches

The derivation that follows is from Mockus. It should be viewed as an effort to get a curve of the proper shape. This derivation is not physically based, but it does satisfy conservation of mass.

A curve drawn through a plot of total storm runoff versus total storm rainfall for many storms on a watershed is concave upward and shows that no runoff occurs for small storms. The trend as storm size increases is for the curve to become asymptotic to a line parallel to a line of equality. The goal of Mockus was to determine an equation for a curve that describes that pattern. First he considered the condition in which no initial abstraction occurs; i.e., $I_a = 0$. Mockus found that an appropriate curve resulted from using the relationship among rainfall, runoff, and retention (the rain not converted into runoff) given by

$$\frac{F}{S} = \frac{Q}{P} \qquad [10\text{–}2]$$

where:
F = actual retention after runoff begins, in inches
S = potential maximum retention after runoff begins ($S \geq F$), in inches
Q = actual runoff, in inches
P = actual rainfall ($P \geq Q$), in inches

To satisfy the conservation of mass:

$$F = P - Q \qquad [10–3]$$

Substituting the equation 10–3 definition of F into equation 10–2 yields

$$\frac{P-Q}{S} = \frac{Q}{P} \qquad [10–4]$$

and solving for Q produces

$$Q = \frac{P^2}{P+S} \qquad [10–5]$$

This is the rainfall-runoff relationship in which the initial abstraction I_a is zero.

When the initial abstraction is not zero, the amount of rainfall available for runoff is $(P - I_a)$ instead of P. Substituting $(P - I_a)$ for P in equation 10–2 results in

$$\frac{F}{S} = \frac{Q}{P-I_a} \qquad [10–6]$$

where:
$F \leq S$
$Q \leq (P - I_a)$

The total retention for a storm consists of both I_a and F, so the conservation of mass equation can be expressed

$$F = (P - I_a) - Q \qquad [10–7]$$

Substituting equation 10–7 for F in equation 10–6 results in

$$\frac{(P-I_a)-Q}{S} = \frac{Q}{(P-I_a)} \qquad [10–8]$$

Solving for the total storm runoff, Q, results in the runoff equation

$$Q = \frac{(P-I_a)^2}{(P-I_a)+S} \qquad [10–9]$$

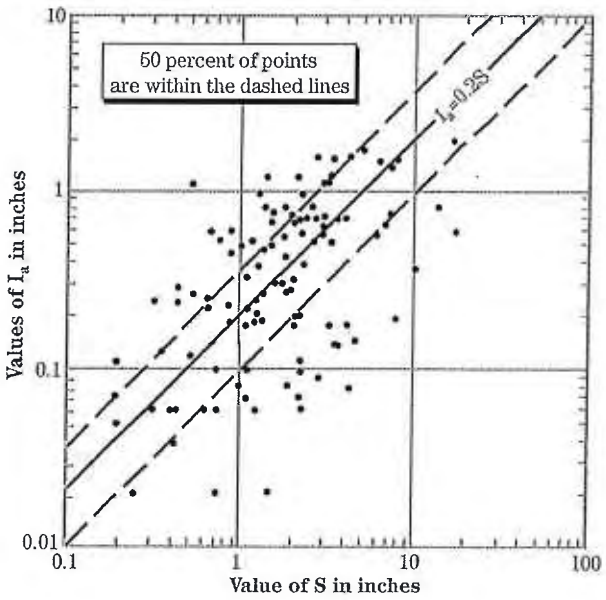
This is the rainfall-runoff relationship with the initial abstraction explicitly taken into account.

The initial abstraction consists mainly of interception, infiltration during early parts of the storm, and surface depression storage. It can be determined from observed rainfall-runoff events for small watersheds, where lag is minimal, as the rainfall that occurs before runoff begins. Interception and surface depression storage may be estimated from cover and surface conditions, but infiltration during the early part of the storm is highly variable and dependent on such factors as rainfall intensity, soil crusting, and soil moisture. Establishing a relationship for estimating I_a is not easy. Thus, I_a was assumed to be a function of the maximum potential retention, S. An empirical relationship between I_a and S was expressed as

$$I_a = 0.2S \qquad [10–10]$$

Figure 10–1 illustrates the variability for this relationship. The points plotted in the figure are derived from experimental watershed data.

Figure 10–1 Relationship between I_a and S



The rainfall-runoff relationship is obtained by substituting equation 10–10 for initial abstraction into equation 10–9

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S} \qquad P > I_a \qquad [10\text{–}11]$$

Equation 10–11, using $I_a = 0.2S$, was used to determine the curve numbers in NEH, part 630, chapter 9. Thus, if a relationship different from $I_a = 0.2S$ is used, a new set of curve numbers must be developed.

(b) Use of S and CN

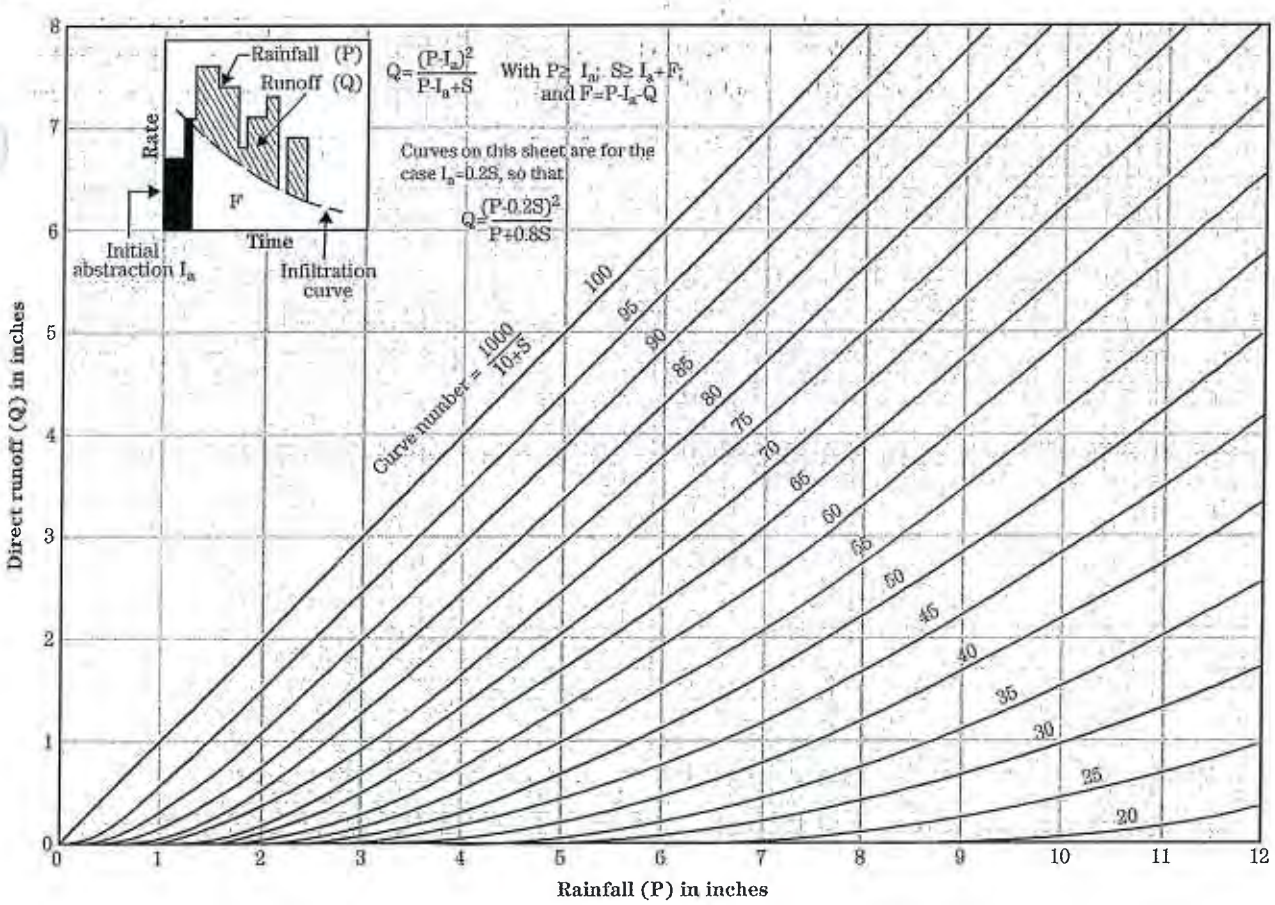
Figure 10–2 shows the solution of the runoff equation (eq. 10–11). The parameter CN (curve number) is a transformation of S.

$$CN = \frac{1000}{10 + S} \qquad [10\text{–}12]$$

for potential maximum retention (S) in inches. If S is in millimeters:

$$CN = \frac{1000}{10 + \frac{S}{25.4}} \qquad [10\text{–}13]$$

Figure 10–2 ES–1001 graphical solution of the equation $Q = \frac{(P - 0.2S)^2}{P + 0.8S}$



Note: Appendix A gives the tabular solution to this equation for P and Q up to 40 inches. In most cases use of this appendix gives a more exact solution than reading from the figure.

Figure 10–2 and appendix 10A are convenient ways to estimate runoff from rainfall directly without having to calculate S. S is generally needed for other applications, such as the analysis of runoff data or the development of supplementary runoff relationships.

(c) Retention parameters

Several retention parameters were used in the derivation of the runoff relationship, equation 10–11. The initial abstraction, I_a, can be considered the boundary between the storm size that produces runoff and the storm size that produces no runoff. The potential maximum retention, S, is dependent upon the soil-cover complex and, in principle, should not vary from storm to storm. It is in excess of the initial abstraction so that the maximum possible loss is given by $I_a + S$. This can be demonstrated noting that the loss is given by the difference between the rainfall and runoff $(P - Q)$. Substituting equation 10–9 for Q results in

$$\text{Loss} = P - Q = P - \frac{(P - I_a)^2}{(P - I_a) + S} \qquad [10–14]$$

After multiplying both terms on the right hand side by:

$$1 = \frac{(P - I_a) + S}{(P - I_a) + S}$$

with some manipulation this becomes:

$$\text{Loss} = \frac{(S + I_a) - \frac{I_a^2}{P}}{1 - \frac{I_a}{P} + \frac{S}{P}} \qquad [10–15]$$

As P becomes large, where large is defined as P being much greater than the maximum potential retention (S), the terms with P in the denominator approach zero, with the result

$$\text{Loss} = S + I_a \qquad [10–16]$$

The parameter F is the actual retention for a storm and is more than the initial abstraction. That is, the total actual retention is given by the sum of the initial abstraction and the actual retention $(I_a + F)$.

The preceding material, which shows that the S does not include I_a, has little significance in the normal application of the runoff equation. It is significant if an attempt is made to demonstrate a physical basis for the potential maximum retention. It is tempting to assume that S stands for storage, so that one can determine pore space and initial soil moisture to determine S in the same sense that Holtan and Lopez (1971) determined S in their infiltration relation. One of the difficulties in using this approach for an ungaged watershed is establishing an appropriate hydrologically active depth, a problem shared with the application of Holtan's equation. Chen (1976) and Hjelmfelt (1980a) showed that the Holtan and Lopez (1971) equation and the curve number runoff equation are identical for the special case of constant rainfall intensity and for zero asymptotic infiltration rate.

(d) Curve number variability

Rainfall-runoff data do not fit the curve number runoff concept precisely. This is exhibited in the data used in NEH, part 630, chapter 5, examples 5–4 and 5–5, and is expressed by the bounding curves in figure 5–6. The curve numbers for the enveloping curves were empirically related to the curve numbers of NEH, part 630, chapter 9, table 9–1. The results of the empirical relation are shown in columns 1, 2, and 3 of table 10–1, which also gives values of S, given $I_a = 0.2$ S for the curve number in column 1.

The variability in the CN results from rainfall intensity and duration, total rainfall, soil moisture conditions, cover density, stage of growth, and temperature. These causes of variability are collectively called the *Antecedent Runoff Condition* (ARC). ARC is divided into three classses: II for average conditions, I for dry conditions, and III for wetter conditions. Past attempts to explain the scatter quantitatively have focused on the antecedent soil moisture, usually as indicated by 5-day antecedent precipitation. This was used in early editions of National Engineering Handbook Section 4 (now Part 630, Hydrology).

A graph of the maximum potential retention versus the 5-day antecedent precipitation for Watershed 2 at Treynor, Iowa, is shown in figure 10–3. Data plotted are from the same events used in NEH, part 630,

Table 10–1 Curve numbers (CN) and constants for the case $I_a = 0.2S$

1	2	3	4	5	1	2	3	4	5
CN for ARC II	-- CN for ARC -- I	III	S values* (in)	Curve* starts where P = (in)	CN for ARC II	-- CN for ARC -- I	III	S values* (in)	Curve* starts where P = (in)
100	100	100	0	0	60	40	78	6.67	1.33
99	97	100	.101	.02	59	39	77	6.95	1.39
98	94	99	.204	.04	58	38	76	7.24	1.45
97	91	99	.309	.06	57	37	75	7.54	1.51
96	89	99	.417	.08	56	36	75	7.86	1.57
95	87	98	.526	.11	55	35	74	8.18	1.64
94	85	98	.638	.13	54	34	73	8.52	1.70
93	83	98	.753	.15	53	33	72	8.87	1.77
92	81	97	.870	.17	52	32	71	9.23	1.85
91	80	97	.989	.20	51	31	70	9.61	1.92
90	78	96	1.11	.22	50	31	70	10.0	2.00
89	76	96	1.24	.25	49	30	69	10.4	2.08
88	75	95	1.36	.27	48	29	68	10.8	2.16
87	73	95	1.49	.30	47	28	67	11.3	2.26
86	72	94	1.63	.33	46	27	66	11.7	2.34
85	70	94	1.76	.35	45	26	65	12.2	2.44
84	68	93	1.90	.38	44	25	64	12.7	2.54
83	67	93	2.05	.41	43	25	63	13.2	2.64
82	66	92	2.20	.44	42	24	62	13.8	2.76
81	64	92	2.34	.47	41	23	61	14.4	2.88
80	63	91	2.50	.50	40	22	60	15.0	3.00
79	62	91	2.66	.53	39	21	59	15.6	3.12
78	60	90	2.82	.56	38	21	58	16.3	3.26
77	59	89	2.99	.60	37	20	57	17.0	3.40
76	58	89	3.16	.63	36	19	56	17.8	3.56
75	57	88	3.33	.67	35	18	55	18.6	3.72
74	55	88	3.51	.70	34	18	54	19.4	3.88
73	54	87	3.70	.74	33	17	53	20.3	4.06
72	53	86	3.89	.78	32	16	52	21.2	4.24
71	52	86	4.08	.82	31	16	51	22.2	4.44
70	51	85	4.28	.86	30	15	50	23.3	4.66
69	50	84	4.49	.90	25	12	43	30.0	6.00
68	48	84	4.70	.94	20	9	37	40.0	8.00
67	47	83	4.92	.98	15	6	30	56.7	11.34
66	46	82	5.15	1.03	10	4	22	90.0	18.00
65	45	82	5.38	1.08	5	2	13	190.0	38.00
64	44	81	5.62	1.12	0	0	0	infinity	infinity
63	43	80	5.87	1.17					
62	42	79	6.13	1.23					
61	41	78	6.39	1.28					

* For CN in column 1.

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
A1	BCC	347	A	0.99
	MWA	2	B	0.01
		349		
A2	BCC	115	A	1.00
	BKD	4	A	
		119		
A3	BCC	711	A	0.78
	BKD	31	A	
	PAC	210	B	0.22
		952		
A4	BCC	54	A	1.00
	BKD	79	A	
		133		
A5	BCC	756	A	0.89
	MWA	56	B	0.11
	PAC	34	B	
		846		
A6	BCC	378	A	0.77
	BKD	14	A	
	PAC	115	B	0.23
		507		
A7	BCC	36	A	0.09
	BKD	0	A	
	MWA	212	B	0.91
	PAC	164	B	
		412		
A8	BKD	12	A	0.05
	MWA	170	B	0.95
	PAC	55	B	
		237		
A9	BCC	17	A	0.06
	BKD	2	A	
	MWA	177	B	0.94
	PAC	117	B	
		313		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
A10	BCC	77	A	0.19
	BKD	24	A	
	PAC	438	B	0.81
		539		
A11	BCC	85	A	0.92
	BKD	274	A	
	MWA	3	B	0.08
	PAC	28	B	
		390		
A12	BCC	370	A	0.32
	BKD	6	A	
	MWA	351	B	0.68
	PAC	431	B	
		1158		
A13	BCC	700	A	0.71
	BKD	286	A	
	PAC	396	B	0.29
		1382		
A14-H	BCC	183	A	0.83
	BKD	135	A	
	KR	7	A	
	PAC	67	B	0.17
		392		
A15	BCC	175	A	0.93
	BKD	278	A	
	KR	14	A	
	MWA	25	B	0.05
	PAC	0	B	
	AmB	8	C	0.02
		500		
A16-C	BCC	5	A	0.71
	PAC	2	B	0.29
		7		
A17-C	BCC	21	A	0.93
	BKD	82	A	
	KR	11	A	
	MWA	1	B	0.01
	AmB	7	C	0.06
		122		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
A18	BCC	85	A	0.99
	BKD	522	A	
	MWA	4	B	0.01
	PAC	4	B	
		615		
A19-C	BCC	20	A	0.19
	PAC	84	B	0.81
		104		
A20-C	BCC	2	A	0.08
	BKD	8	A	
	PAC	122	B	0.92
		132		
A21-C	BCC	19	A	0.54
	BKD	10	A	
	PAC	25	B	0.46
		54		
A22-O	BCC	42	A	1.00
	BKD	9	A	
		51		
A23-C	BCC	46	A	0.20
	BKD	0	A	
	PAC	186	B	0.80
		232		
A24-O	BCC	2	A	0.76
	BKD	155	A	
	MWA	4	B	0.24
		161		
B1	BCC	11	A	
	BcA	6	A	
	Br	39	A	0.13
	Bs	6	B	
	Bt	108	B	
	Gb	58	B	
	Ge	0	B	
	Gk	15	B	
	Va	78	B	
	VbA	42	B	
	Af	67	B	0.87
		430		
B2-O	BCC	33	A	
	BcA	1	A	0.97
	Va	1	B	0.03

TABLE HSG HYDROLOGIC SOIL GROUP SUMMARY				
Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
		35		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
B3	BCC	26	A	0.47
	MWA	29	B	0.53
		55		
B4	BCC	0	A	
	BcA	8	A	
	Br	0	A	0.12
	Bt	10	B	
	Va	28	B	
	Af	18	B	0.88
		64		
B5	Br	61	A	0.09
	Af	60	B	0.82
	Ag	13	B	
	An	10	B	
	Ao	48	B	
	Bs	12	B	
	Bt	67	B	
	Gb	63	B	
	Ge	4	B	
	Gk	7	B	
	Gm	15	B	
	Va	97	B	
	VbA	157	B	
	Vc	24	B	
	Ar	64	D	0.09
		702		
B6	Br	21	A	0.28
	Af	3	B	0.66
	Bt	10	B	
	Gb	15	B	
	Gm	1	B	
	VbA	16	B	
	Vc	5	B	
	Ar	5	D	0.06
		76		
B7	Br	25	A	0.20
	Af	2	B	
	Bs	1	B	
	Bt	37	B	
	Gb	13	B	
	Va	26	B	
	VbA	21	B	0.80
	Ar	0	D	
		125		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
B8	BCC	59	A	
	BKD	25	A	
	Br	12	A	0.38
	MWA	142	B	
	Va	4	B	
	VbA	9	B	
	Ao	3	B	0.62
		254		
B9-O	BCC	15	A	1.00
	MWA	0	B	
		15		
B10	BCC	10	A	
	BKD	9	A	
	BcA	8	A	
	Br	23	A	0.34
	Af	7	B	
	An	7	B	
	Bt	5	B	
	Gb	29	B	
	Gk	3	B	
	Gm	4	B	
	MWA	18	B	
	Va	10	B	
	VbA	8	B	
	Vc	0	B	0.61
	Ar	8	D	0.05
		149		
B11	BKD	14	A	
	Br	22	A	0.27
	Ao	11	B	
	MWA	51	B	
	Va	2	B	
	VbA	24	B	0.66
	Ar	9	D	0.07
		133		
B12	Br	9	A	0.09
	Af	3	B	
	Ag	1	B	
	An	4	B	
	Ao	5	B	
	Bs	20	B	
	Bt	37	B	
	Gb	6	B	
	VbA	0	B	
	Vc	8	B	0.82
	Ar	10	D	0.10
		103		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
B13	Cu	2	Cu	
	BKD	26	A	
	BcA	8	A	0.16
	Af	36	B	
	Ag	3	B	
	Ao	19	B	
	Gb	13	B	
	Gk	1	B	
	Gm	1	B	
	MWA	68	B	
	Va	7	B	
	VbA	24	B	
	Vc	7	B	0.83
	Ar	1	CF	0.01
		216		
B14	BCC	64	A	
	BKD	123	A	
	BcA	2	A	0.62
	Ge	24	B	
	Gm	6	B	
	Va	31	B	
	VbA	15	B	
	Vc	39	B	0.38
		304		
B15	BKD	0	A	
	Br	16	A	0.03
	Af	93	B	
	An	5	B	
	Ao	3	B	
	Bt	8	B	
	Gb	22	B	
	Ge	5	B	
	Gk	3	B	
	Gm	48	B	
	Va	69	B	
	VbA	55	B	
	Vc	117	B	0.95
	Ar	7	D	0.02
		451		
B16	Af	74	B	1.00
	Ao	13	B	
	Bt	9	B	
	Gb	64	B	
	Gk	8	B	
	Va	133	B	
	VbA	14	B	
	Vc	9	B	
		324		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
B17	Br	6	A	0.03
	Af	20	B	
	An	16	B	
	Ao	38	B	
	Gb	40	B	
	Va	67	B	0.95
	Ar	3	D	0.02
		190		
B18	Br	2	A	0.01
	Af	9	B	
	An	84	B	
	Ao	32	B	
	Bt	5	B	
	Gb	4	B	
	Ge	5	B	
	Gm	0	B	
	Vc	4	B	0.97
	Ar	3	D	0.02
		148		
B19.1	Br	47	A	0.16
	Ag	41	B	
and	Ao	2	B	
	Gb	40	B	
B19.2	Gd	38	B	
	Ge	13	B	
assume	Gk	0	B	
same soils in each	Gm	23	B	
basin	Va	67	B	
	VbA	22	B	0.84
		293		
B20	Br	21	A	0.11
	Af	20	B	
	Ag	32	B	
	An	21	B	
	Ao	2	B	
	Gb	14	B	
	Gk	49	B	
	Va	13	B	0.83
	Ar	11	D	0.06
		183		
B21	BCC	212	A	0.81
	BKD	60	A	
	MWA	62	B	0.19
		334		
B22	BCC	34	A	0.47
	BKD	135	A	
	MWA	190	B	0.53
		359		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
B23	BCC	25	A	
	BKD	65	A	0.88
	Af	1	B	
	An	2	B	
	Vc	9	B	0.12
		102		
B24	BCC	41	A	
	BKD	24	A	
	Br	13	A	0.40
	Af	35	B	
	An	24	B	
	Ao	11	B	
	Bt	4	B	
	Gb	5	B	
	Ge	0	B	
	Gk	2	B	
	MWA	33	B	
	Vc	1	B	0.58
	Ar	4	D	0.02
		197		
B25	Br	69	A	0.16
	Af	10	B	
	Ag	41	B	
	Bs	28	B	
	Gb	17	B	
	Ge	19	B	
	Gk	91	B	
	Gm	23	B	
	Va	7	B	
	VbA	104	B	
	Vc	19	B	0.84
		428		
B26	BCC	152	A	
	BKD	167	A	0.50
	Af	6	B	
	Ag	2	B	
	An	0	B	
	Gb	31	B	
	Gk	12	B	
	MWA	226	B	
	Va	10	B	
	VbA	33	B	
	Vc	0	B	0.50
		639		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
B27	BKD	55	A	
	Br	8	A	0.11
	An	75	B	
	Gb	23	B	
	MWA	10	B	
	Va	23	B	
	VbA	227	B	
	Vc	135	B	0.89
		556		
B28	BCC	9	A	
	BKD	168	A	0.25
	Af	43	B	
	An	7	B	
	Ao	4	B	
	GF	52	B	
	Gb	17	B	
	Ge	3	B	
	Gk	7	B	
	MWA	284	B	
	TP	67	B	
	VF	31	B	
	Va	1	B	
	VbA	4	B	
	Vc	0	B	0.75
		697		
B29	BCC	195	A	
	BKD	108	A	0.27
	MWA	833	B	0.73
		1136		
B30	BKD	3	A	
	Br	92	A	0.17
	Af	1	B	
	Ag	6	B	
	An	35	B	
	Ao	10	B	
	Bs	29	B	
	Bt	35	B	
	Gb	91	B	
	Ge	1	B	
	Gk	18	B	
	TP	148	B	
	VF	57	B	
	Va	16	B	
	VbA	14	B	
	Vc	2	B	0.83
		558		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
B31	Br	58	A	0.12
	Af	40	B	
	Ag	107	B	
	An	4	B	
	Bs	34	B	
	Bt	51	B	
	Gb	35	B	
	Ge	33	B	
	Gk	22	B	
	Gm	15	B	
	TP	3	B	
	VF	57	B	
	Va	9	B	0.88
		468		
B32	BCC	21	A	
	BKD	40	A	0.14
	Bs	2	B	
	Bt	12	B	
	MWA	290	B	
	PAC	1	B	
	TP	32	B	
	VF	32	B	0.86
		430		
B33	BCC	123	A	
	BKD	29	A	0.28
	MWA	332	B	
	PAC	26	B	
	TP	40	B	0.72
		550		
B34	BKD	12	A	
	Br	44	A	0.19
	Af	6	B	
	Ag	14	B	
	An	17	B	
	Bs	60	B	
	Bt	92	B	
	Ge	26	B	
	TP	64	B	
	VF	85	B	0.81
		420		
B35	Br	12	A	
	Af	48	B	
	Ag	159	B	
	Bs	5	B	
	Bt	0	B	
	Gb	6	B	
	Ge	420	B	1.00
		650		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
B36	Br	83	A	0.31
	Af	1	B	
	Bs	39	B	
	Ge	118	B	
	Gm	10	B	
	TP	2	B	
	VF	19	B	0.69
		272		
B37-C	Ag	22	B	1.00
	Bs	4	B	
	Bt	8	B	
	Ge	42	B	
		76		
B38-C	Ge	38	B	1.00
B39-O	Bt	16	B	1.00
	Gb	4	B	
	Va	9	B	
		29		
B40	Af	46	B	
	Ag	124	B	
	Gb	1	B	
	Ge	210	B	0.97
	Br	12	A	0.03
		393		
B41	AmB	23	C	0.09
	BCC	21	A	
	BKD	38	A	
	KR	14	A	0.27
	MWA	144	B	
	PAC	26	B	0.64
		266		
BR1	Cu	75	CF	0.24
	BCC	25	A	
	Br	14	A	0.13
	Af	2	B	
	Bt	24	B	
	Gk	1	B	
	Gm	86	B	
	TP	46	B	
	VF	39	B	0.63
		312		
BR2	Gb	4	B	1.00
	VbA	57	B	
		61		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
BR3	Br	2	A	0.01
	Af	10	B	
	Bs	44	B	
	Bt	3	B	
	Gb	29	B	
	Gm	129	B	
	TP	78	B	
	VF	47	B	
	VbA	59	B	0.99
		401		
BR4	Cu	208	Cu	0.61
	BKD	37	A	
	Br	13	A	0.24
	Bt	6	B	
	Gm	33	B	
	TP	12	B	
	VF	10	B	0.15
		319		
BR5	Cu	76	Cu	0.84
	BKD	31	A	0.07
	Bt	2	B	
	Gm	8	B	0.09
		117		
BR6	Br	32	A	0.10
	Af	12	B	
	Bs	51	B	
	Bt	6	B	
	TP	67	B	
	VF	42	B	
	Va	4	B	
	VbA	94	B	0.90
		308		
BR7-H1	Cu	52	Cu	0.30
	Gm	122	B	0.70
		174		
BR7-H2	Cu	218	Cu	0.67
	Gm	106	B	0.33
		324		
BR8-H1	Cu	116	Cu	0.91
	Gm	7	B	
	Af	4	B	0.09
		127		
BR8-H2	BKD	11	A	0.04
	Cu	213	Cu	0.72
	Gk	25	B	
	Gm	39	B	
	Af	6	B	0.24

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
		294		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
BR9	Br	10	A	0.02
	Af	31	B	
	Ag	10	B	
	Ao	12	B	
	Bs	158	B	
	Bt	203	B	
	Ge	1	B	
	Gk	14	B	
	TP	24	B	
	VF	59	B	
	VbA	73	B	0.98
		595		
BR10	Cu	1	Cu	
	Af	70	B	
	Bt	36	B	
	Ge	15	B	
	Gk	198	B	
	Gm	53	B	
	VbA	20	B	1.00
		393		
BR11	Cu	14	Cu	0.13
	BKD	6	A	0.06
	Ge	11	B	
	Gk	43	B	
	Gm	31	B	0.81
		105		
BR12	Cu	20	Cu	0.08
	Ge	52	B	
	Gk	103	B	
	Gm	65	B	0.92
		240		
BR13	Bt	26	B	1.00
	Gb	23	B	
	Ge	130	B	
	Gk	51	B	
	Gm	16	B	
	Va	7	B	
	VbA	60	B	
		313		
BR14	Af	37	B	1.00
	Ag	55	B	
	Bt	4	B	
	Gb	32	B	
	Ge	7	B	
	Gk	13	B	
	Gm	17	B	
	VbA	50	B	
		215		

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b
BR15-C	Gb	26	B	
	Ge	42	B	
	VbA	5	B	1.00
		73		
BR16	Cu	15	Cu	0.05
	Bt	2	B	
	Gb	162	B	
	Ge	2	B	
	Gk	75	B	
	Gm	22	B	0.95
		278		
BR17	Bt	16	B	
	Gb	241	B	
	Gd	3	B	
	Ge	167	B	
	Gk	2	B	
	Va	37	B	
	VbA	15	B	1.00
		481		
BR18	Br	3	A	0.01
	Af	18	B	
	Ag	59	B	
	Gb	15	B	
	Gd	3	B	
	Ge	201	B	
	Gm	25	B	
	VbA	7	B	0.99
		331		
BR19	Br	29	A	0.10
	Af	23	B	
	Ag	0	B	
	Gb	78	B	
	Ge	141	B	
	TP	12	B	0.90
		283		
BR20	Br	0	A	
	Ag	11	B	1.00
	Gb	64	B	
	Ge	135	B	
	VbA	50	B	
		260		
BR21	BKD	50	A	0.20
	CU	180	D	0.70
	MWA	26	B	
	WaB	0	B	0.10
		256		

a - See Soils Map in Appendix for Basins and Soils Map Unit Symbols

TABLE HSG
HYDROLOGIC SOIL GROUP SUMMARY

Subcatchment (Basin) ID	Soil Map Symbol	Area	Hydrologic Soil Group	Fraction of Hydrologic Soil Group
		Acres		
a		b	a	b

Soil Map Unit Names, Descriptions and Hydrologic Soil Group Designations are included in Appendix
Souced Data from USDA Natural Resources and Conservation Service , Survey Area Version 9, 12/9/2008
Internet Web Site
b - Soils data areas were computed within ArcMap

Hydrologic Soil Group

Aggregation Method: Dominant Condition
Tie-break Rule: Lower

Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico
Survey Area Version and Date: 9 - 12/09/2008

Map symbol	Map unit name	Rating
Af	Agua loam	B
Ag	Agua silty clay loam	B
AmB	Alemeda sandy loam, 0 to 5 percent slopes	C
An	Anapra silt loam	B
Ao	Anapra silty clay loam	B
Ar	Armijo clay loam	D
BcA	Bluepoint loamy fine sand, 1 to 3 percent slopes	A
BCC	Bluepoint loamy fine sand, 1 to 9 percent slopes	A
BKD	Bluepoint-Kokan association, hilly	A
Br	Brazito fine sandy loam	A
Bs	Brazito silty clay loam	B
Bt	Brazito complex	B
Cu	Cut and fill land	
Gb	Gila loam	B
Gd	Gila loam, moderately alkali	B
Ge	Gila clay loam	B
GF	Gila complex, moderately alkali	B
Gk	Glendale loam	B
Gm	Glendale clay loam	B
KR	Kokan-Rock outcrop association	A
[illegible]A	Madurez-Wink associatin, gently sloping	B
PAC	Pajarito loamy fine sand, 1 to 9 percent slopes	B
TP	Torrifluvents, frequently flooded	B
Va	Vinton loamy sand	B
VbA	Vinton sandy loam, 0 to 1 percent slopes	B
Vc	Vinton clay loam	B
VF	Vinton and Brazito soils, occasionally flooded	B
WaB	Wink fine sandy loam, 0 to 5 percent slopes	B

Hydrologic Soil Group

Rating Options

Attribute Name: Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Aggregation Method: Dominant Condition

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 nonsoil 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.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.

Tie-break Rule: Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Map Unit Description

Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico

[Minor map unit components are excluded from this report]

Map unit: Af - Agua loam

Component: Agua (90%)

The Agua component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains, valleys. The parent material consists of recent alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Ag - Agua silty clay loam

Component: Agua (90%)

The Agua component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains, valleys. The parent material consists of recent alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: AmB - Alemeda sandy loam, 0 to 5 percent slopes

Component: Alemeda (70%)

The Alemeda component makes up 70 percent of the map unit. Slopes are 0 to 5 percent. This component is on uplands, hillslopes. The parent material consists of eolian deposits derived from igneous and sedimentary rock. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA056NM Malpais ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 45 percent. The soil has a very slightly saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: An - Anapra silt loam

Component: Anapra (85%)

The Anapra component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, valley floors. The parent material consists of recent alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Ao - Anapra silty clay loam

Component: Anapra (90%)

The Anapra component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, flood plains. The

Map Unit Description

Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico

Map unit: Ao - Anapra silty clay loam

Component: Anapra (90%)

parent material consists of recent alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Ar - Armijo clay loam

Component: Armijo (85%)

The Armijo component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, flood plains. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: BcA - Bluepoint loamy fine sand, 1 to 3 percent slopes

Component: Bluepoint (90%)

The Bluepoint component makes up 90 percent of the map unit. Slopes are 1 to 3 percent. This component is on flood plains, valleys. The parent material consists of sandy alluvium and/or eolian sands. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. This component is in the R042XA054NM Deep Sand ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: BCC - Bluepoint loamy fine sand, 1 to 9 percent slopes

Component: Bluepoint (85%)

The Bluepoint component makes up 85 percent of the map unit. Slopes are 1 to 9 percent. This component is on valleys, flood plains. The parent material consists of sandy alluvium and/or eolian sands. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. This component is in the R042XA054NM Deep Sand ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: BKD - Bluepoint-Kokan association, hilly

Component: Bluepoint (50%)

The Bluepoint component makes up 50 percent of the map unit. Slopes are 5 to 15 percent. This component is on flood plains, valleys. The parent material consists of sandy alluvium and/or eolian sands. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. This component is in the R042XA054NM Deep

Map Unit Description

Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico

Map unit: BKD - Bluepoint-Kokan association, hilly

Component: Bluepoint (50%)

Sand ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 4s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Component: Kokan (40%)

The Kokan component makes up 40 percent of the map unit. Slopes are 15 to 40 percent. This component is on uplands, hillslopes. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA053NM Gravelly Sand ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Br - Brazito fine sandy loam

Component: Brazito (90%)

The Brazito component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, flood plains. The parent material consists of residuum weathered from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 4s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Bs - Brazito silty clay loam

Component: Brazito (85%)

The Brazito component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, flood plains. The parent material consists of residuum weathered from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 60 inches during March, April, May, June, July, August, September, October. Organic matter content in the surface horizon is about 0 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Bt - Brazito complex

Component: Brazito (50%)

The Brazito component makes up 50 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains, valleys. The parent material consists of residuum weathered from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 60 inches during March, April, May, June, July, August, September, October. Organic matter content in the surface horizon is about 0 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Component: Brazito (30%)

The Brazito component makes up 30 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains, valleys. The

Map Unit Description

Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico

Map unit: Bt - Brazito complex

Component: Brazito (30%)

parent material consists of residuum weathered from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 36 inches during March, April, May, June, July, August, September, October. Organic matter content in the surface horizon is about 0 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 4s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Cu - Cut and fill land

Component: Cut and fill land (100%)

Generated brief soil descriptions are created for major soil components. The Cut and fill land is a miscellaneous area.

Map unit: Gb - Gila loam

Component: Gila (90%)

The Gila component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, flood plains. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7c. Irrigated land capability classification is 1 This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Gd - Gila loam, moderately alkali

Component: Gila (85%)

The Gila component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains, valleys. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA055NM Salty Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Ge - Gila clay loam

Component: Gila (90%)

The Gila component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains, valleys. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7c. Irrigated land capability classification is 1 This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

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Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico

Map unit: GF - Gila complex, moderately alkali

Component: Gila (70%)

The Gila component makes up 70 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains, valleys. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA055NM Salty Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Component: Gila (15%)

The Gila component makes up 15 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains, valleys. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA055NM Salty Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 1 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Gk - Glendale loam

Component: Glendale (90%)

The Glendale component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, flood plains. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7c. Irrigated land capability classification is 1 This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a very slightly saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Gm - Glendale clay loam

Component: Glendale (85%)

The Glendale component makes up 85 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, flood plains. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7c. Irrigated land capability classification is 1 This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a very slightly saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: KR - Kokan-Rock outcrop association

Component: Kokan (75%)

The Kokan component makes up 75 percent of the map unit. Slopes are 25 to 45 percent. This component is on hillslopes, uplands. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is very high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation

Map Unit Description

Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico

Map unit: KR - Kokan-Rock outcrop association

Component: Kokan (75%)

within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA053NM Gravelly Sand ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Component: Rock outcrop (10%)

Generated brief soil descriptions are created for major soil components. The Rock outcrop is a miscellaneous area.

Map unit: MWA - Madurez-Wink associatin, gently sloping

Component: Madurez (55%)

The Madurez component makes up 55 percent of the map unit. Slopes are 1 to 5 percent. This component is on alluvial fans, uplands. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA052NM Loamy ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Component: Wink (25%)

The Wink component makes up 25 percent of the map unit. Slopes are 1 to 7 percent. This component is on uplands, alluvial fans. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. This component is in the R042XA052NM Loamy ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: PAC - Pajarito loamy fine sand, 1 to 9 percent slopes

Component: Pajarito (85%)

The Pajarito component makes up 85 percent of the map unit. Slopes are 1 to 9 percent. This component is on uplands, alluvial fans. The parent material consists of eolian sands and/or alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA051NM Sandy ecological site. Nonirrigated land capability classification is 7e. Irrigated land capability classification is 3e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: TP - Torrifluvents, frequently flooded

Component: Torrifluvents, frequently flooded (100%)

The Torrifluvents, frequently flooded component makes up 100 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains, valleys. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA051NM Sandy ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

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Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico

Map unit: TP - Torrifluvents, frequently flooded

Component: Torrifluvents, frequently flooded (100%)

Map unit: Va - Vinton loamy sand

Component: Vinton (90%)

The Vinton component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains, valleys. The parent material consists of recent alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA054NM Deep Sand ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: VbA - Vinton sandy loam, 0 to 1 percent slopes

Component: Vinton (90%)

The Vinton component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on flood plains, valleys. The parent material consists of recent alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: Vc - Vinton clay loam

Component: Vinton (90%)

The Vinton component makes up 90 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, flood plains. The parent material consists of recent alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: VF - Vinton and Brazito soils, occasionally flooded

Component: Vinton (35%)

The Vinton component makes up 35 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, flood plains. The parent material consists of recent alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA054NM Deep Sand ecological site. Nonirrigated land capability classification is 6w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Component: Brazito (30%)

The Brazito component makes up 30 percent of the map unit. Slopes are 0 to 2 percent. This component is on valleys, flood plains. The

Map Unit Description

Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico

Map unit: VF - Vinton and Brazito soils, occasionally flooded

Component: Brazito (30%)

parent material consists of residuum weathered from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 51 inches during May, June, July, August, September. Organic matter content in the surface horizon is about 0 percent. This component is in the R042XA057NM Bottomland ecological site. Nonirrigated land capability classification is 7w. Irrigated land capability classification is 4w. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Component: Torrifluvents (20%)

The Torrifluvents component makes up 20 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, flood plains. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 27 inches during March, April, May, June, July, August, September, October, November. Organic matter content in the surface horizon is about 1 percent. This component is in the R042XA051NM Sandy ecological site. Nonirrigated land capability classification is 5w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 5 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map unit: WaB - Wink fine sandy loam, 0 to 5 percent slopes

Component: Wink (85%)

The Wink component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on uplands, fan piedmonts. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. This component is in the R042XA052NM Loamy ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent. The soil has a slightly sodic horizon within 30 inches of the soil surface.

Map Unit Description

e map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit scriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

The Map Unit Description (Brief, Generated) report displays a generated description of the major soils that occur in a map unit. Descriptions of non-soil (miscellaneous areas) and minor map unit components are not included. This description is generated from the underlying soil attribute data.

Additional information about the map units described in this report is available in other Soil Data Mart reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the Soil Data Mart reports define some of the properties included in the map unit descriptions.