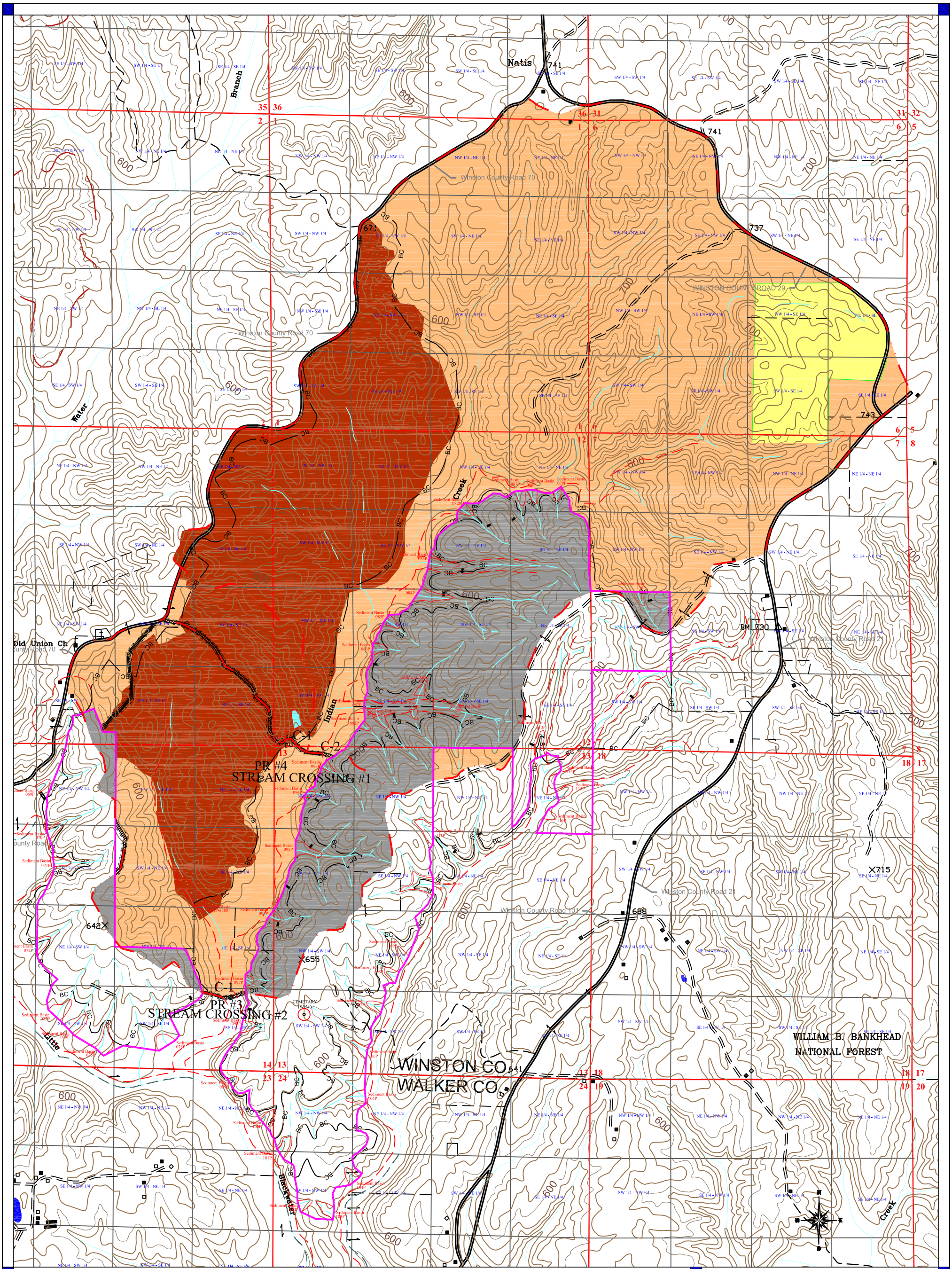

DRAWN BY:
Z.B.W.
4/102012

APPROVED BY:
J.D.M.
4/10/2012

SCALE:
1" = 1,500'

SHEET:
1 OF 1

BIRMINGHAM COAL & COKE CO., INC
OLD UNION NO. 2 MINE, P-3962
PRIMARY ROAD 3 (C-1) & PRIMARY ROAD 4 (C-1 & C-2)

WATERSHED MAP

- CULVERT
- ROADSIDE DITCHES
- PERMIT BOUNDARY
- DRAINAGE DIVIDE
- GRADED & BARE, CN 81
- MOSTLY FOREST, CN 55
- RECLAIMED LAND, CN 79
- CLEAR CUT, CN 67
- PONDS USED FOR ROUTING

DSM
DESIGN GROUP, LLC
ENGINEERING / SURVEYING
1400 VIKING DRIVE
JASPER, ALABAMA 35501
TELEPHONE: (205) 221-6262

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Birmingham Coal & Coke Co., Inc.
Old Union #2 Mine , P-3962
Primary Road 3 & Primary Road 4

Culvert C-1 (PR3)

Culvert C-1 (PR4)

Culvert C-2 (PR4)

J. David McGehee, PE/LS

General Information

Storm Information:

Storm Type:	SCS 6 HOUR
Design Storm:	10 yr - 6 hr
Rainfall Depth:	4.200 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Culvert	#1	==>	#2	0.237	0.385	Primary Road 4 Culvert C-2
Culvert	#2	==>	End	0.000	0.000	Primary Road 3 Culvert C-1
Pond	#3	==>	#4	0.009	0.357	P-3888, BASIN 014
Culvert	#4	==>	#2	0.237	0.385	Primary Road 4, Culvert C-1

		#3 Pond
	#4 Culvert	
	#1 Culvert	
#2 Culvert		

Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	9. Small streams flowing bankfull	0.40	19.44	4,860.00	5.69	0.237
#1	**Muskingum K:**					**0.237**
#3	8. Large gullies, diversions, and low flowing streams	2.00	2.80	140.00	4.24	0.009
#3	**Muskingum K:**					**0.009**
#4	9. Small streams flowing bankfull	0.40	19.44	4,860.00	5.69	0.237
#4	**Muskingum K:**					**0.237**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#3	In	74.150	74.150	155.17	12.66
	Out			31.00	12.65
#4		3.300	77.450	32.33	13.07
#1		1,770.000	1,770.000	1,229.48	155.15
#2		493.000	2,340.450	1,451.61	232.21

Structure Detail:

Structure #3 (Pond)

P-3888, BASIN 014

Pond Inputs:

Initial Pool Elev:	541.00 ft
Initial Pool:	10.26 ac-ft

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
36.00	80.00	2.00	0.0240	541.00	0.90	0.00

Pond Results:

Peak Elevation:	543.90 ft
Dewater Time:	1.64 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
530.00	0.245	0.000	0.000	
530.50	0.287	0.133	0.000	
531.00	0.331	0.287	0.000	
531.50	0.379	0.464	0.000	
532.00	0.430	0.666	0.000	
532.50	0.484	0.895	0.000	
533.00	0.542	1.151	0.000	
533.50	0.603	1.437	0.000	
534.00	0.666	1.754	0.000	
534.50	0.734	2.104	0.000	
535.00	0.804	2.489	0.000	
535.50	0.875	2.908	0.000	
536.00	0.950	3.364	0.000	
536.50	1.027	3.858	0.000	
537.00	1.107	4.392	0.000	
537.50	1.191	4.966	0.000	
538.00	1.277	5.583	0.000	
538.50	1.367	6.244	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
539.00	1.459	6.950	0.000		
539.50	1.555	7.704	0.000		
540.00	1.653	8.505	0.000		
540.50	1.750	9.356	0.000		
541.00	1.849	10.255	0.000		Spillway #1
541.50	1.939	11.202	2.224	31.40	
542.00	2.032	12.195	6.287	3.10	
542.50	2.126	13.234	11.541	1.45	
543.00	2.223	14.322	17.776	0.90	
543.50	2.322	15.458	24.832	0.65	
543.90	2.402	16.395	31.003	1.95	Peak Stage
544.00	2.423	16.644	32.640		
544.50	2.526	17.881	40.983		
545.00	2.631	19.170	47.696		
545.50	2.698	20.502	53.790		
546.00	2.765	21.867	57.987		

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
530.00	0.000	0.000
530.50	0.000	0.000
531.00	0.000	0.000
531.50	0.000	0.000
532.00	0.000	0.000
532.50	0.000	0.000
533.00	0.000	0.000
533.50	0.000	0.000
534.00	0.000	0.000
534.50	0.000	0.000
535.00	0.000	0.000
535.50	0.000	0.000
536.00	0.000	0.000
536.50	0.000	0.000
537.00	0.000	0.000
537.50	0.000	0.000
538.00	0.000	0.000
538.50	0.000	0.000
539.00	0.000	0.000
539.50	0.000	0.000

Elevation (ft)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
540.00	0.000	0.000
540.50	0.000	0.000
541.00	0.000	0.000
541.50	(3)>2.224	2.224
542.00	(3)>6.287	6.287
542.50	(3)>11.541	11.541
543.00	(3)>17.776	17.776
543.50	(3)>24.832	24.832
544.00	(3)>32.640	32.640
544.50	(3)>40.983	40.983
545.00	(5)>47.696	47.696
545.50	(5)>53.790	53.790
546.00	(6)>57.987	57.987

Structure #4 (Culvert)

Primary Road 4, Culvert C-1

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
70.00	2.00	0.0240	4.00	0.00	0.90

Culvert Results:

Design Discharge = 32.33 cfs

Minimum pipe diameter: 1 - 30 inch pipe(s) required

Structure #1 (Culvert)

Primary Road 4 Culvert C-2

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
60.00	2.00	0.0240	19.00	0.00	0.90

Culvert Results:

Design Discharge = 1,229.48 cfs

Minimum pipe diameter: 1 - 120 inch pipe(s) required

Structure #2 (Culvert)

Primary Road 3 Culvert C-1

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
60.00	2.00	0.0240	25.00	1.00	0.90

Culvert Results:

Design Discharge = 1,451.61 cfs

Minimum pipe diameter: 1 - 120 inch pipe(s) required

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#3	1	4.100	0.148	0.111	0.400	55.000	M	1.24	0.170
	2	69.200	0.122	0.000	0.000	79.000	F	152.20	12.189
	3	0.850	0.001	0.000	0.000	100.000	F	2.77	0.296
	Σ	**74.150**						**155.17**	**12.655**
#4	1	2.000	0.039	0.018	0.352	79.000	M	4.40	0.352
	2	1.300	0.061	0.000	0.000	55.000	M	0.80	0.066
	Σ	**77.450**						**32.33**	**13.073**
#1	1	361.000	0.236	0.122	0.404	79.000	M	491.11	51.483
	2	1,027.000	0.566	0.000	0.000	55.000	M	180.34	41.706
	3	105.000	0.097	0.558	0.400	67.000	M	144.33	11.020
	4	277.000	0.132	0.196	0.384	81.000	F	561.60	50.945
	Σ	**1,770.000**						**1,229.48**	**155.154**
#2	1	181.000	0.080	0.242	0.383	79.000	M	398.09	31.882
	2	182.000	0.196	0.000	0.000	55.000	M	51.51	7.432
	3	130.000	0.070	0.231	0.385	81.000	F	303.88	24.667
	Σ	**2,340.450**						**1,451.61**	**232.207**

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	9.80	25.00	255.00	2.500	0.028
		8. Large gullies, diversions, and low flowing streams	3.55	150.00	4,230.00	5.640	0.208
#1	**1**	**Time of Concentration:**					**0.236**
#1	2	1. Forest with heavy ground litter	5.00	20.00	400.00	0.560	0.198
		8. Large gullies, diversions, and low flowing streams	6.48	70.00	1,080.01	7.630	0.039
		9. Small streams flowing bankfull	1.26	150.00	11,940.00	10.080	0.329
#1	**2**	**Time of Concentration:**					**0.566**
#1	3	5. Nearly bare and untilled, and alluvial valley fans	8.96	30.00	335.00	2.990	0.031
		8. Large gullies, diversions, and low flowing streams	5.18	85.00	1,640.00	6.820	0.066
#1	**3**	**Time of Concentration:**					**0.097**
#1	4	5. Nearly bare and untilled, and alluvial valley fans	8.00	20.00	250.00	2.820	0.024
		8. Large gullies, diversions, and low flowing streams	5.82	165.00	2,835.00	7.230	0.108
#1	**4**	**Time of Concentration:**					**0.132**

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	1	3. Short grass pasture	11.11	30.00	270.00	2.660	0.028
		8. Large gullies, diversions, and low flowing streams	6.99	105.00	1,503.00	7.920	0.052
#2	**1**	**Time of Concentration:**					**0.080**
#2	2	1. Forest with heavy ground litter	12.96	35.00	270.00	0.910	0.082
		8. Large gullies, diversions, and low flowing streams	6.26	90.00	1,437.00	7.500	0.053
		9. Small streams flowing bankfull	1.00	20.00	1,996.00	9.000	0.061
#2	**2**	**Time of Concentration:**					**0.196**
#2	3	5. Nearly bare and untilled, and alluvial valley fans	6.67	20.00	300.00	2.580	0.032
		8. Large gullies, diversions, and low flowing streams	9.97	130.00	1,304.00	9.470	0.038
#2	**3**	**Time of Concentration:**					**0.070**
#3	1	1. Forest with heavy ground litter	5.00	15.00	300.00	0.560	0.148
#3	**1**	**Time of Concentration:**					**0.148**
#3	2	3. Short grass pasture	30.00	30.00	99.99	4.380	0.006
		8. Large gullies, diversions, and low flowing streams	4.76	130.00	2,733.00	6.540	0.116
#3	**2**	**Time of Concentration:**					**0.122**
#4	1	3. Short grass pasture	17.02	80.00	470.03	3.300	0.039
#4	**1**	**Time of Concentration:**					**0.039**
#4	2	1. Forest with heavy ground litter	12.12	20.00	165.01	0.880	0.052
		8. Large gullies, diversions, and low flowing streams	2.86	5.00	174.83	5.070	0.009
#4	**2**	**Time of Concentration:**					**0.061**

Subwatershed Muskingum Routing Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	9. Small streams flowing bankfull	0.63	20.00	3,162.05	7.150	0.122
#1	**1**	**Muskingum K:**					**0.122**
#1	3	8. Large gullies, diversions, and low flowing streams	2.82	80.00	2,835.06	5.030	0.156
		9. Small streams flowing bankfull	0.66	70.00	10,601.24	7.310	0.402
#1	**3**	**Muskingum K:**					**0.558**
#1	4	8. Large gullies, diversions, and low flowing streams	2.04	5.00	245.00	4.280	0.015
		9. Small streams flowing bankfull	0.40	15.00	3,725.00	5.710	0.181
#1	**4**	**Muskingum K:**					**0.196**
#2	1	8. Large gullies, diversions, and low flowing streams	2.56	20.00	780.00	4.800	0.045
		9. Small streams flowing bankfull	0.40	16.16	4,040.00	5.690	0.197
#2	**1**	**Muskingum K:**					**0.242**
#2	3	8. Large gullies, diversions, and low flowing streams	3.76	5.00	133.00	5.810	0.006
		9. Small streams flowing bankfull	0.40	18.44	4,610.00	5.690	0.225

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#2	**3**	**Muskingum K:**					**0.231**
#3	1	8. Large gullies, diversions, and low flowing streams	5.15	140.00	2,718.44	6.800	0.111
#3	**1**	**Muskingum K:**					**0.111**
#4	1	8. Large gullies, diversions, and low flowing streams	1.82	5.00	274.72	4.040	0.018
#4	**1**	**Muskingum K:**					**0.018**