DRAINAGE REPORT
SUPPLEMETAL
USD 259 4th Addition
WICHITA, SEDGWICK COUNTY, KANSAS

July 12, 2010

7-12-10

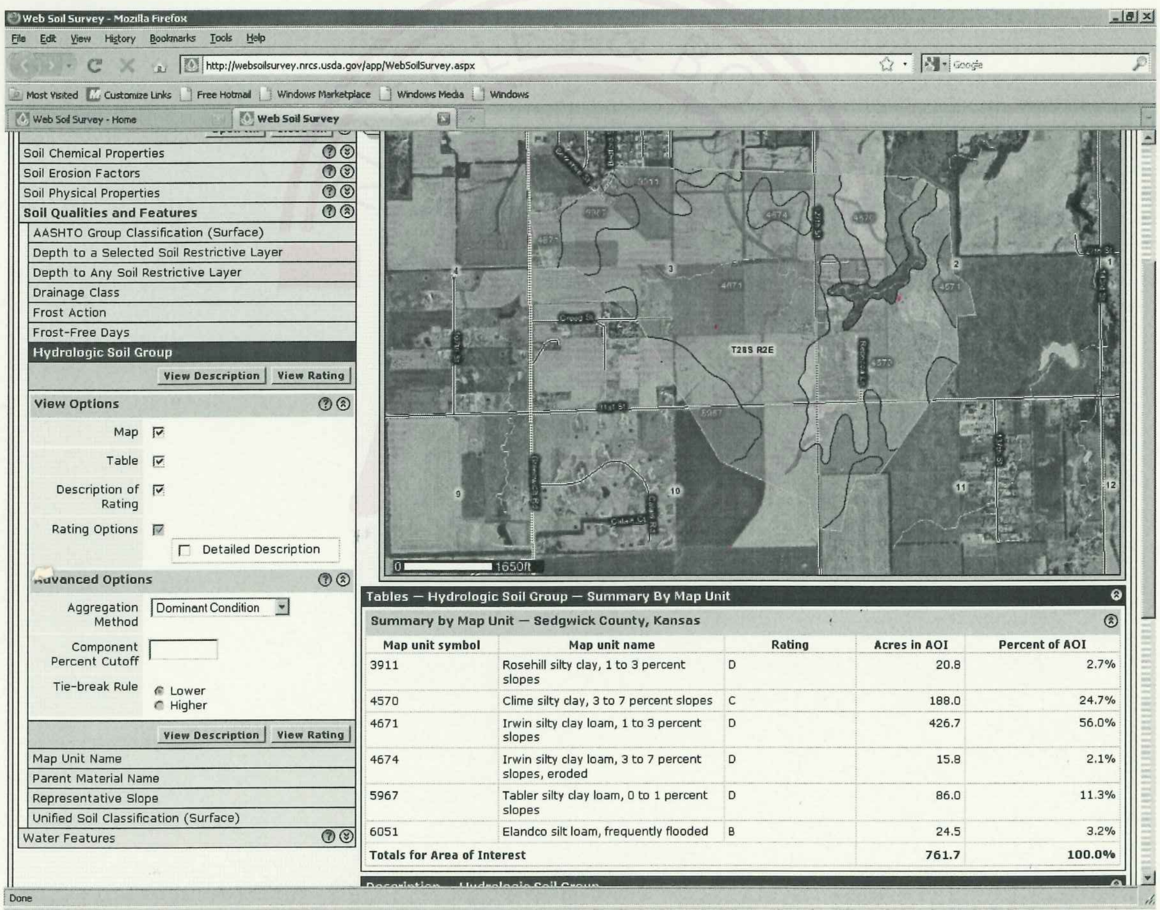
Ruggles & Bohm P.A.

Engineering, Surveying, Land Planning

This report is intended to supplement the information already provided in the Drainage Report for USD 259 4th Addition dated May 7, 2010. The information contained below investigates the impact of the development on the downstream conditions, specifically at the dam structure designated DSG-0148 located in the NW ¼ of Sec. 2, T28S, R2E. An additional reason to take a closer look at the downstream conditions is that there is an additional 6 acres from the NE ¼ of Sec. 3, T28S, R2E, known as the Occidental site in the original report. The dam structure data and tributary area was taken from LIDAR information.

Hydrology

The tributary area of the dam in the existing condition is 772 acres. The model of USD 259 4th Addition includes 380.1 acres, thus the remaining 391.9 acres is added to the model as an additional sub-basin.. Soil type and Hydrologic group is taken from the NCSS Soil Survey web site as shown below.



Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3911	Rosehill silty clay, 1 to 3 percent slopes	D	20.8	2.7%
4570	Clime silty clay, 3 to 7 percent slopes	C	188.0	24.7%
4671	Irwin silty clay loam, 1 to 3 percent slopes	D	426.7	56.0%
4674	Irwin silty clay loam, 3 to 7 percent slopes, eroded	D	15.8	2.1%
5967	Tabler silty clay loam, 0 to 1 percent slopes	D	86.0	11.3%
6051	Elandco silt loam, frequently flooded	B	24.5	3.2%
Totals for Area of Interest			761.7	100.0%

The HEC-RAS model was created by extending the original of the USD 259 4th Addition. The original model terminated at 127th street east while the model for this supplemental report includes the 391.9 of additional tributary discussed above, with a CN of 79 and a time of concentration of 112 min. The existing dam structure and resultant detention pond are discussed below.

Existing Pond

The table below shows the data entered into the HEC-HMS pond model and used to calculate stage storage data;

Elevation	Area (ac.)	Elevation	Area (ac.)
1324	13.73	1330	41.38
1325	16.10	1331	45.71
1326	19.88	1332	50.26
1327	23.83	1333	24.57
1328	28.00	1334	59.01
1329	36.60	1335	65.47

The existing pond outlet structures consist of a culvert pipe and an overflow weir. The culvert is assumed to be a 24" CMP, length and approximate flow data is taken from LIDAR and aerial photographs. The weir has an overflow elevation of 1332 and an approximate width of 170'.

Results

The comparison point for the analysis is the outlet of DSG-0148. The results of the calculations are quantified in the table below;

Design Storm	Existing (cfs)	Proposed (cfs)
2-yr	26.6	27.0
5-yr	31.8	31.9
10-yr	32.8	32.9
25-yr	34.2	34.3
100-yr	188.5	191.0

The analysis demonstrates that the effects of the development are nearly negligible. There is a slight increase in peak runoff due to a larger volume of runoff flowing to the pond, which slightly increases the runoff volume stored within the pond. The increase can be attributed to the additional 6 acres of tributary area from the Occidental site as discussed previously. The remaining tributary area from the Occidental site drains essentially to the east, crossing Pawnee a couple of times in the process. The two tributaries again intersect at a point approximately ¼ of a mile downstream of the outlet, then once again cross Pawnee as an unnamed tributary to Spring Branch.

Although it has not been analyzed or calculated in this report, it is reasonable to conclude that the slight increase shown in the peak outlet release from DSG-0148 may be more than offset by the reduction in runoff found in the Occidental tributary area. Therefore, the runoff is likely unaffected or reduced as the two tributary areas rejoin.

Project: Project 1 Simulation Run: Exist 002-yr

Start of Run:	01Jan2010, 12:00	Basin Model:	Exist
End of Run:	02Jan2010, 12:10	Meteorologic Model:	002-yr
Compute Time:	12Jul2010, 09:03:46	Control Specifications:	Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
Downstream Pond	0.61230	203.9	02Jan2010, 01:1
Diversion Channel	0.21810	137.7	02Jan2010, 00:3
South Basin	0.16450	131.0	02Jan2010, 00:2
Offisite South	0.04734	37.7	02Jan2010, 00:2
South	0.42994	290.3	02Jan2010, 00:3
Reach-1	0.42994	289.6	02Jan2010, 00:3
Downstream Trib.	0.16400	137.5	02Jan2010, 00:2
127th St E.	0.59394	405.0	02Jan2010, 00:3
Reach-2	0.59394	400.0	02Jan2010, 01:0
DSG-0148	1.20624	26.6	02Jan2010, 11:2

Project: Project 1 Simulation Run: Exist 005-yr

Start of Run: 01Jan2010, 12:00 Basin Model: Exist
End of Run: 02Jan2010, 12:10 Meteorologic Model: 005-yr
Compute Time: 12Jul2010, 09:03:53 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
Downstream Pond	0.61230	315.7	02Jan2010, 01:0
Diversion Channel	0.21810	199.6	02Jan2010, 00:3
South Basin	0.16450	189.3	02Jan2010, 00:2
Offisite South	0.04734	54.5	02Jan2010, 00:2
South	0.42994	419.6	02Jan2010, 00:2
Reach-1	0.42994	418.8	02Jan2010, 00:3
Downstream Trib.	0.16400	198.0	02Jan2010, 00:2
127th St E.	0.59394	583.7	02Jan2010, 00:3
Reach-2	0.59394	576.1	02Jan2010, 01:0
DSG-0148	1.20624	31.8	02Jan2010, 12:1

Project: Project 1 Simulation Run: Exist 010-yr

Start of Run: 01Jan2010, 12:00 Basin Model: Exist
End of Run: 02Jan2010, 12:10 Meteorologic Model: 010-yr
Compute Time: 12Jul2010, 09:03:59 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
Downstream Pond	0.61230	386.3	02Jan2010, 01:0
Diversion Channel	0.21810	237.4	02Jan2010, 00:3
South Basin	0.16450	224.7	02Jan2010, 00:2
Offisite South	0.04734	64.7	02Jan2010, 00:2
South	0.42994	499.4	02Jan2010, 00:2
Reach-1	0.42994	497.6	02Jan2010, 00:3
Downstream Trib.	0.16400	234.8	02Jan2010, 00:2
127th St E.	0.59394	692.4	02Jan2010, 00:3
Reach-2	0.59394	684.6	02Jan2010, 00:5
DSG-0148	1.20624	32.8	02Jan2010, 12:1

Project: Project 1 Simulation Run: Exist 025-yr

Start of Run: 01Jan2010, 12:00 Basin Model: Exist
End of Run: 02Jan2010, 12:10 Meteorologic Model: 025-yr
Compute Time: 12Jul2010, 09:04:05 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
Downstream Pond	0.61230	506.8	02Jan2010, 01:0
Diversion Channel	0.21810	300.7	02Jan2010, 00:3
South Basin	0.16450	284.2	02Jan2010, 00:2
Offisite South	0.04734	81.8	02Jan2010, 00:2
South	0.42994	633.3	02Jan2010, 00:2
Reach-1	0.42994	629.7	02Jan2010, 00:3
Downstream Trib.	0.16400	296.5	02Jan2010, 00:2
127th St E.	0.59394	874.6	02Jan2010, 00:3
Reach-2	0.59394	868.2	02Jan2010, 00:5
DSG-0148	1.20624	34.2	02Jan2010, 12:1

Project: Project 1 Simulation Run: Exist 100-yr

Start of Run:	01Jan2010, 12:00	Basin Model:	Exist
End of Run:	02Jan2010, 12:10	Meteorologic Model:	100-yr
Compute Time:	12Jul2010, 09:04:12	Control Specifications:	Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
Downstream Pond	0.61230	716.4	02Jan2010, 01:0
Diversion Channel	0.21810	408.7	02Jan2010, 00:3
South Basin	0.16450	385.3	02Jan2010, 00:2
Offisite South	0.04734	110.9	02Jan2010, 00:2
South	0.42994	861.7	02Jan2010, 00:2
Reach-1	0.42994	854.7	02Jan2010, 00:3
Downstream Trib.	0.16400	401.3	02Jan2010, 00:2
127th St E.	0.59394	1184.5	02Jan2010, 00:3
Reach-2	0.59394	1181.3	02Jan2010, 00:5
DSG-0148	1.20624	188.5	02Jan2010, 04:1

Project: Project 1

Simulation Run: Exist 100-yr Reservoir: DSG-0148

Start of Run:	01Jan2010, 12:00	Basin Model:	Exist
End of Run:	02Jan2010, 12:10	Meteorologic Model:	100-yr
Compute Time:	12Jul2010, 09:04:12	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	1884.6 (CFS)	Date/Time of Peak Inflow :	02Jan2010, 01:00
Peak Outflow :	188.5 (CFS)	Date/Time of Peak Outflow :	02Jan2010, 04:10
Total Inflow :	5.57 (IN)	Peak Storage :	265.5 (AC-FT)
Total Outflow :	1.64 (IN)	Peak Elevation :	1332.4 (FT)

Project: Project 1 Simulation Run: Prop 002-yr

Start of Run: 01Jan2010, 12:00 Basin Model: Proposed
End of Run: 02Jan2010, 12:10 Meteorologic Model: 002-yr
Compute Time: 12Jul2010, 09:04:37 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
Downstream Pond	0.61230	203.9	02Jan2010, 01:1
HS 4	0.11310	106.4	02Jan2010, 00:1
Offsite S.	0.04730	37.7	02Jan2010, 00:2
HS 3	0.02840	37.7	02Jan2010, 00:1
Pond 3	0.07570	56.3	02Jan2010, 00:2
Reach-2	0.07570	55.9	02Jan2010, 00:3
HS 1	0.00921	10.5	02Jan2010, 00:1
Occidental 2	0.00484	9.3	02Jan2010, 00:0
Pond 1	0.01405	2.2	02Jan2010, 01:0
HS 2	0.01360	14.8	02Jan2010, 00:1
Occidental 3	0.01480	28.5	02Jan2010, 00:0
Pond 2	0.02840	5.4	02Jan2010, 00:5
Road	0.04245	7.6	02Jan2010, 00:5
Reach-1	0.04245	7.6	02Jan2010, 01:0
Pond 4	0.23125	151.7	02Jan2010, 00:3
Diversion Channel	0.20800	131.4	02Jan2010, 00:3
Total South	0.43925	283.1	00:30
Reach-4	0.43925	274.5	00:30
Downstream Trib.	0.164	137.5	00:20
127th St.	0.60325	390.0	00:30
Reach-3	0.60325	386.3	01:00
DSG-0148	1.21555	27.0	12:10

Project: Project 1 Simulation Run: Prop 005-yr

Start of Run:	01Jan2010, 12:00	Basin Model:	Proposed
End of Run:	02Jan2010, 12:10	Meteorologic Model:	005-yr
Compute Time:	12Jul2010, 09:04:57	Control Specifications:	Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
Downstream Pond	0.61230	315.7	02Jan2010, 01:0
HS 4	0.11310	151.9	02Jan2010, 00:1
Offsite S.	0.04730	54.4	02Jan2010, 00:2
HS 3	0.02840	51.3	02Jan2010, 00:1
Pond 3	0.07570	76.3	02Jan2010, 00:3
Reach-2	0.07570	76.0	02Jan2010, 00:3
HS 1	0.00921	14.9	02Jan2010, 00:1
Occidental 2	0.00484	12.0	02Jan2010, 00:0
Pond 1	0.01405	2.5	02Jan2010, 01:1
HS 2	0.01360	21.3	02Jan2010, 00:1
Occidental 3	0.01480	36.7	02Jan2010, 00:0
Pond 2	0.02840	10.5	02Jan2010, 00:4
Road	0.04245	12.9	02Jan2010, 00:4
Reach-1	0.04245	12.8	02Jan2010, 00:5
Pond 4	0.23125	212.4	02Jan2010, 00:2
Diversion Channel	0.20800	190.4	02Jan2010, 00:3
Total South	0.43925	401.3	00:30
Reach-4	0.43925	390.7	00:30
Downstream Trib.	0.164	198.0	00:20
127th St.	0.60325	555.6	00:30
Reach-3	0.60325	550.2	01:00
DSG-0148	1.21555	31.9	12:10

Project: Project 1 Simulation Run: Prop 010-yr

Start of Run: 01Jan2010, 12:00 Basin Model: Proposed
End of Run: 02Jan2010, 12:10 Meteorologic Model: 010-yr
Compute Time: 12Jul2010, 09:10:05 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
Downstream Pond	0.61230	386.3	02Jan2010, 01:0
HS 4	0.11310	179.5	02Jan2010, 00:1
Offsite S.	0.04730	64.6	02Jan2010, 00:2
HS 3	0.02840	59.5	02Jan2010, 00:1
Pond 3	0.07570	89.1	02Jan2010, 00:3
Reach-2	0.07570	88.5	02Jan2010, 00:3
HS 1	0.00921	17.5	02Jan2010, 00:0
Occidental 2	0.00484	13.6	02Jan2010, 00:0
Pond 1	0.01405	2.6	02Jan2010, 01:2
HS 2	0.01360	25.3	02Jan2010, 00:1
Occidental 3	0.01480	41.7	02Jan2010, 00:0
Pond 2	0.02840	16.0	02Jan2010, 00:3
Road	0.04245	18.5	02Jan2010, 00:3
Reach-1	0.04245	18.5	02Jan2010, 00:4
Pond 4	0.23125	249.7	02Jan2010, 00:2
Diversion Channel	0.20800	226.4	02Jan2010, 00:3

Total South	0.43925	476.0	00:30
Reach-4	0.43925	463.0	00:30
Downstream Trib.	0.164	234.8	00:20
127th St.	0.60325	657.8	00:30
Reach-3	0.60325	651.4	01:00
DSG-0148	1.21555	32.9	12:10

Project: Project 1 Simulation Run: Prop 025-yr

Start of Run: 01Jan2010, 12:00 Basin Model: Proposed
End of Run: 02Jan2010, 12:10 Meteorologic Model: 025-yr
Compute Time: 12Jul2010, 09:10:28 Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
Downstream Pond	0.61230	506.8	02Jan2010, 01:0
HS 4	0.11310	225.6	02Jan2010, 00:1
Offsite S.	0.04730	81.7	02Jan2010, 00:2
HS 3	0.02840	73.1	02Jan2010, 00:1
Pond 3	0.07570	110.5	02Jan2010, 00:3
Reach-2	0.07570	109.5	02Jan2010, 00:3
HS 1	0.00921	22.1	02Jan2010, 00:0
Occidental 2	0.00484	16.3	02Jan2010, 00:0
Pond 1	0.01405	2.7	02Jan2010, 01:4
HS 2	0.01360	31.9	02Jan2010, 00:1
Occidental 3	0.01480	50.0	02Jan2010, 00:0
Pond 2	0.02840	26.7	02Jan2010, 00:3
Road	0.04245	29.4	02Jan2010, 00:3
Reach-1	0.04245	28.5	02Jan2010, 00:3
Pond 4	0.23125	317.1	02Jan2010, 00:3
Diversion Channel	0.20800	286.8	02Jan2010, 00:3
Total South	0.43925	603.9	00:30
Reach-4	0.43925	587.3	00:30
Downstream Trib.	0.164	296.5	00:20
127th St.	0.60325	832.1	00:30
Reach -3	0.60325	824.1	01:00
DSG-0148	1.21555	34.3	12:10

Project: Project 1 Simulation Run: Prop 100-yr

Start of Run:	01Jan2010, 12:00	Basin Model:	Proposed
End of Run:	02Jan2010, 12:10	Meteorologic Model:	100-yr
Compute Time:	12Jul2010, 09:11:02	Control Specifications:	Control 1

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak
Downstream Pond	0.61230	716.4	02Jan2010, 01:0
HS 4	0.11310	303.9	02Jan2010, 00:1
Offsite S.	0.04730	110.8	02Jan2010, 00:2
HS 3	0.02840	96.2	02Jan2010, 00:1
Pond 3	0.07570	147.4	02Jan2010, 00:3
Reach-2	0.07570	145.7	02Jan2010, 00:3
HS 1	0.00921	30.0	02Jan2010, 00:0
Occidental 2	0.00484	20.9	02Jan2010, 00:0
Pond 1	0.01405	3.0	02Jan2010, 02:0
HS 2	0.01360	43.1	02Jan2010, 00:1
Occidental 3	0.01480	64.0	02Jan2010, 00:0
Pond 2	0.02840	46.8	02Jan2010, 00:2
Road	0.04245	49.6	02Jan2010, 00:2
Reach-1	0.04245	48.7	02Jan2010, 00:3
Pond 4	0.23125	435.3	02Jan2010, 00:3
Diversion Channel	0.20800	389.8	02Jan2010, 00:3
Total South	0.43925	825.1	00:30
Reach-4	0.43925	803.9	00:30
Doustream Trib	0.164	401.3	00:30
127th St.	0.60325	1133.7	00:30
Reach-3	0.60325	1122.3	01:00
DSG-0148	1.21555	191.0	4:20

Project: Project 1

Simulation Run: Prop 100-yr Reservoir: DSG-0148

Start of Run:	01Jan2010, 12:00	Basin Model:	Proposed
End of Run:	02Jan2010, 12:10	Meteorologic Model:	100-yr
Compute Time:	12Jul2010, 09:11:02	Control Specifications:	Control 1

Volume Units: IN

Computed Results

Peak Inflow :	1838.7 (CFS)	Date/Time of Peak Inflow :	02Jan2010, 01:00
Peak Outflow :	191.0 (CFS)	Date/Time of Peak Outflow :	02Jan2010, 04:20
Total Inflow :	5.57 (IN)	Peak Storage :	265.8 (AC-FT)
Total Outflow :	1.67 (IN)	Peak Elevation :	1332.4 (FT)