

# Miller Creek Greenway Concept Report



APPENDIX



**Stormwater Wetland Volume Calculator**

Updated: 11/24/09 JSA  
 Checker: SJS

Directions: Use for sizing/designing stormwater wetlands by either the KCSWDM or the DOE Manual.  
 Fill in the numbers in the shaded cells. The remaining cells calculate automatically.

**Requirements:**

Basic Wetpond Volume = 117,409 cu ft (2009 KCSWDM Equ. 6-13, 6-14)  
 Total Surface Area = 39,136 sq ft (volume/3-ft average depth)  
 First Cell Volume = 39,136 cu ft (1/3 of Volume)  
 First Cell Top Area = 9,784 sq ft (volume/4-ft depth in first cell)  
 Wetland Cell Surface Area = 29,352 sq ft (total surface area - first cell surface area)

**Proposed Facility Design**

**First Cell - Wetpond**

	Elevation	Area (sf)	Partial Volume (cf)	Total Volume (cf)
top of sed:	78	4,500		
	79	5,341	-	-
	80	6,254	5,797	5,797
	81	7,239	6,746	12,544
	82	8,296	7,767	20,311
	83	9,425	8,860	29,172
	84	10,626	10,025	39,197

**Area Okay**                      **Volume Okay**

**Second and Third Cell - Wetland**

	Elevation	Contour Area (sf)	Partial Volume (cf)	Total Volume (cf)	Partial Area (sf)	Average Depth (ft)	Area by Depth	Percent of Depth
	80	-	-	-	-	-	-	0.0%
	81	5,000	2,500	2,500	5,000	3.5	17,500	50.0%
	82	10,000	7,500	10,000	5,000	2.5	12,500	33.3%
	83	15,000	12,500	22,500	5,000	1.5	7,500	25.0%
	83.5	20,000	8,750	31,250	5,000	0.75	3,750	16.9%
	84	29,500	12,375	43,625	9,500	0.25	2,375	32.2%

**Area Okay**

Total Surface Area (sq ft) = 40,126 **SA Okay**

Total Area by Depth Average Depth (ft) 43625 1.48 **Depth Okay** ← Average must be btw 1.25 and 1.75 feet

**Detention Design**

Depth	Elevation	Area (sf)	Area (AC)	Partial Volume (cf)	Total Volume (cf)	Total Volume (AC-FT)	
0.0	84.0	40,126	0.92	-	-	-	
0.5	84.5	53,000	1.22	23,281	23,281	0.53	
1.0	85.0	54,390	1.25	26,848	50,129	1.15	
2.0	86.0	57,225	1.31	55,808	105,937	2.43	13.22 Max detention Volume from MGSFlood
3.0	87.0	60,132	1.38	58,678	164,615	3.78	
4.0	88.0	63,110	1.45	61,621	226,236	5.19	
5.0	89.0	66,161	1.52	64,635	290,871	6.68	
6.0	90.0	69,283	1.59	67,722	358,593	8.23	
7.0	91.0	72,478	1.66	70,881	429,474	9.86	
8.0	92.0	75,745	1.74	74,111	503,585	11.56	84226.07
9.0	93.0	79,083	1.82	77,414	580,999	13.34	2.01 <- total acres inculciding 15' Buffer

**Total Volume Okay**

**Stormwater Wetland Volume Calculator**

Updated: 11/24/09 JSA  
 Checker: SJS

Directions: Use for sizing/designing stormwater wetlands by either the KCSWDM or the DOE Manual.  
 Fill in the numbers in the shaded cells. The remaining cells calculate automatically.

**Requirements:**

Basic Wetpond Volume = 186,202 cu ft (2009 KCSWDM Equ. 6-13, 6-14)  
 Total Surface Area = 62,067 sq ft (volume/3-ftaverage depth)  
 First Cell Volume = 62,067 cu ft (1/3 of Volume)  
 First Cell Top Area = 15,517 sq ft (volume/4-ft depth in first cell)  
 Wetland Cell Surface Area = 46,551 sq ft (total surface area - first cell surface area)

**Proposed Facility Design**

**First Cell - Wetpond**

	Elevation	Area (sf)	Partial Volume (cf)	Total Volume (cf)
	78	8,200		
top of sed:	79	9,323	-	-
	80	10,517	9,920	9,920
	81	11,784	11,151	21,071
	82	13,123	12,453	33,524
	83	14,533	13,828	47,352
	84	16,016	15,275	62,626

**Area Okay**                      **Volume Okay**

**Second and Third Cell - Wetland**

Elevation	Contour Area (sf)	Partial Volume (cf)	Total Volume (cf)	Partial Area (sf)	Average Depth (ft)	Area by Depth	Percent of Depth
80	-	-	-	-	-	-	0.0%
81	3,000	1,500	1,500	3,000	3.5	10,500	30.0%
82	10,000	6,500	8,000	7,000	2.5	17,500	28.0%
83	25,000	17,500	25,500	15,000	1.5	22,500	42.9%
83.5	35,000	15,000	40,500	10,000	0.75	7,500	21.3%
84	47,000	20,500	61,000	12,000	0.25	3,000	25.5%

**Area Okay**

Total Surface Area (sq ft) = 63,016  
**SA Okay**

Total Area by Depth  
 Average Depth (ft)

61000  
 1.30 ← Average must be btw 1.25 and 1.75 feet  
**Depth Okay**

**Detention Design**

Depth	Elevation	Area (sf)	Area (AC)	Partial Volume (cf)	Total Volume (cf)	Total Volume (AC-FT)
0.0	84.0	63,016	1.45	-	-	-
0.5	84.5	82,500	1.89	36,379	36,379	0.84
1.0	85.0	84,232	1.93	41,683	78,062	1.79
2.0	86.0	87,751	2.01	85,992	164,054	3.77
3.0	87.0	91,342	2.10	89,546	253,600	5.82
4.0	88.0	95,005	2.18	93,173	346,773	7.96
5.0	89.0	98,739	2.27	96,872	443,645	10.18
6.0	90.0	102,546	2.35	100,643	544,288	12.50
7.0	91.0	106,425	2.44	104,485	648,774	14.89
8.0	92.0	110,376	2.53	108,400	757,174	17.38
9.0	93.0	114,398	2.63	112,387	869,561	19.96

19.89 Total detention Volume from MGSFlood

2.86 <- total acres inculciding 15' Buffer

**Total Volume Okay**

**Stormwater Wetland Volume Calculator**

Updated: 11/24/09 JSA  
 Checker: SJS

Directions: Use for sizing/designing stormwater wetlands by either the KCSWDM or the DOE Manual.  
 Fill in the numbers in the shaded cells. The remaining cells calculate automatically.

**Requirements:**

Basic Wetpond Volume = 68,280 cu ft (2009 KCSWDM Equ. 6-13, 6-14)  
 Total Surface Area = 22,760 sq ft (volume/3-ft average depth)  
 First Cell Volume = 22,760 cu ft (1/3 of Volume)  
 First Cell Top Area = 5,690 sq ft (volume/4-ft depth in first cell)  
 Wetland Cell Surface Area = 17,070 sq ft (total surface area - first cell surface area)

**Proposed Facility Design**

**First Cell - Wetpond**

	Elevation	Area (sf)	Partial Volume (cf)	Total Volume (cf)
	78	1,900		
top of sed:	79	2,459	2,180	2,180
	80	3,090	2,775	4,954
	81	3,793	3,442	8,396
	82	4,568	4,181	12,577
	83	5,415	4,992	17,568
	84	6,334	5,875	23,443

**Area Okay**                      **Volume Okay**

**Second and Third Cell - Wetland**

	Elevation	Contour Area (sf)	Partial Volume (cf)	Total Volume (cf)	Partial Area (sf)	Average Depth (ft)	Area by Depth	Percent of Depth
	80	-	-	-	-	-	-	0.0%
	81	2,000	1,000	1,000	2,000	3.5	7,000	33.3%
	82	6,000	4,000	5,000	4,000	2.5	10,000	38.1%
	83	10,500	8,250	13,250	4,500	1.5	6,750	32.1%
	83.5	14,000	6,125	19,375	3,500	0.75	2,625	20.5%
	84	17,100	7,775	27,150	3,100	0.25	775	18.1%

**Area Okay**

Total Surface Area (sq ft) = 23,434  
**SA Okay**

Total Area by Depth  
 Average Depth (ft)

27150  
 1.59 ← Average must be btw 1.25 and 1.75 feet  
**Depth Okay**

**Detention Design**

Depth	Elevation	Area (sf)	Area (AC)	Partial Volume (cf)	Total Volume (cf)	Total Volume (AC-FT)
0.0	84.0	23,434	0.54	-	-	-
0.5	84.5	57,000	1.31	20,109	20,109	0.46
1.0	85.0	58,441	1.34	28,860	48,969	1.12
2.0	86.0	61,378	1.41	59,910	108,879	2.50
3.0	87.0	64,387	1.48	62,883	171,762	3.94
4.0	88.0	67,468	1.55	65,928	237,690	5.46
5.0	89.0	70,621	1.62	69,045	306,735	7.04

**Total Volume Okay**

**7.03** Total detention Volume from MGSFlood

1.81 <- total acres including 15' Buffer

**Stormwater Wetland Volume Calculator**

Updated: 11/24/09 JSA  
 Checker: SJS

Directions: Use for sizing/designing stormwater wetlands by either the KCSWDM or the DOE Manual.  
 Fill in the numbers in the shaded cells. The remaining cells calculate automatically.

**Requirements:**

Basic Wetpond Volume = 245,489 cu ft (2009 KCSWDM Equ. 6-13, 6-14)  
 Total Surface Area = 81,830 sq ft (volume/3-ft average depth)  
 First Cell Volume = 81,830 cu ft (1/3 of Volume)  
 First Cell Top Area = 20,457 sq ft (volume/4-ft depth in first cell)  
 Wetland Cell Surface Area = 61,372 sq ft (total surface area - first cell surface area)

**Proposed Facility Design**

**First Cell - Wetpond**

	Elevation	Area (sf)	Partial Volume (cf)	Total Volume (cf)
	78	11,500		
top of sed:	79	12,823	12,161	12,161
	80	14,218	13,520	25,682
	81	15,685	14,951	40,633
	82	17,223	16,454	57,087
	83	18,834	18,029	75,116
	84	20,517	19,676	94,791

**Area Okay**                      **Volume Okay**

**Second and Third Cell - Wetland**

Elevation	Contour Area (sf)	Partial Volume (cf)	Total Volume (cf)	Partial Area (sf)	Average Depth (ft)	Area by Depth	Percent of Depth
80	-	-	-	-	-	-	0.0%
81	10,000	5,000	5,000	10,000	3.5	35,000	40.0%
82	25,000	17,500	22,500	15,000	2.5	37,500	50.0%
83	30,000	27,500	50,000	5,000	1.5	7,500	11.1%
83.5	45,000	18,750	68,750	15,000	0.75	11,250	24.2%
84	62,000	26,750	95,500	17,000	0.25	4,250	27.4%

**Area Okay**

Total Surface Area (sq ft) = 82,517  
**SA Okay**

Total Area by Depth  
 Average Depth (ft)

95500  
 1.54 ← Average must be btw 1.25 and 1.75 feet  
**Depth Okay**

**Detention Design**

Depth	Elevation	Area (sf)	Area (AC)	Partial Volume (cf)	Total Volume (cf)	Total Volume (AC-FT)
0.0	84.0	82,517	1.89	-	-	-
0.5	84.5	130,000	2.98	53,129	53,129	1.22
1.0	85.0	132,172	3.03	65,543	118,672	2.72
2.0	86.0	136,571	3.14	134,372	253,044	5.81
3.0	87.0	141,042	3.24	138,806	391,850	9.00
4.0	88.0	145,584	3.34	143,313	535,163	12.29
5.0	89.0	150,199	3.45	147,892	683,055	15.68
6.0	90.0	154,886	3.56	152,542	835,597	19.18
7.0	91.0	159,644	3.66	157,265	992,862	22.79
8.0	92.0	164,475	3.78	162,060	1,154,922	26.51
9.0	93.0	169,378	3.89	166,926	1,321,848	30.35

**Total Volume Okay**

**30.3** Total detention Volume from MGSFlood

4.18 <- total acres including 15' Buffer

181949.277



### Stormwater Wetland Volume Calculator

Updated: 11/24/09 JSA  
 Checker: SJS

Directions: Use for sizing/designing stormwater wetlands by either the KCSWDM or the DOE Manual.  
 Fill in the numbers in the shaded cells. The remaining cells calculate automatically.

#### Requirements:

Basic Wetpond Volume = 65,666 cu ft (2009 KCSWDM Equ. 6-13, 6-14)  
 Total Surface Area = 21,889 sq ft (volume/3-ft average depth)  
 First Cell Volume = 21,889 cu ft (1/3 of Volume)  
 First Cell Top Area = 5,472 sq ft (volume/4-ft depth in first cell)  
 Wetland Cell Surface Area = 16,416 sq ft (total surface area - first cell surface area)

#### Proposed Facility Design

##### First Cell - Wetpond

	Elevation	Area (sf)	Partial Volume (cf)	Total Volume (cf)
	78	2,000		
top of sed:	79	2,573	-	-
	80	3,217	2,895	2,895
	81	3,934	3,576	6,471
	82	4,723	4,328	10,799
	83	5,583	5,153	15,952
	84	6,516	6,050	22,001

**Area Okay**                      **Volume Okay**

##### Second and Third Cell - Wetland

	Elevation	Contour Area (sf)	Partial Volume (cf)	Total Volume (cf)	Partial Area (sf)	Average Depth (ft)	Area by Depth	Percent of Depth
	80	-	-	-	-	-	-	0.0%
	81	1,000	500	500	1,000	3.5	3,500	20.0%
	82	5,000	3,000	3,500	4,000	2.5	10,000	40.0%
	83	10,000	7,500	11,000	5,000	1.5	7,500	33.3%
	83.5	15,000	6,250	17,250	5,000	0.75	3,750	30.3%
	84	16,500	7,875	25,125	1,500	0.25	375	9.1%

**Area Okay**

Total Surface Area (sq ft) = 23,016  
**SA Okay**

Total Area by Depth  
 Average Depth (ft)

25125  
 1.52 ← Average must be btw 1.25 and 1.75 feet  
**Depth Okay**

#### Detention Design

Depth	Elevation	Area (sf)	Area (AC)	Partial Volume (cf)	Total Volume (cf)	Total Volume (AC-FT)
0.0	84.0	23,016	0.53	-	-	-
0.5	84.5	27,000	0.62	12,504	12,504	0.29
1.0	85.0	27,995	0.64	13,749	26,253	0.60
2.0	86.0	30,039	0.69	29,017	55,270	1.27
3.0	87.0	32,155	0.74	31,097	86,366	1.98
4.0	88.0	34,342	0.79	33,248	119,615	2.75
5.0	89.0	36,602	0.84	35,472	155,087	3.56
6.0	90.0	38,934	0.89	37,768	192,855	4.43
7.0	91.0	41,338	0.95	40,136	232,991	5.35
8.0	92.0	43,814	1.01	42,576	275,566	6.33
9.0	93.0	46,361	1.06	45,087	320,654	7.36 <b>Total Volume Okay</b>

7.34 Total detention Volume from MGSFlood

1.22 <- total acres including 15 Buffer

**PROJECT: 31235**  
**DATE: 11/24/2009**

Volume Factor, f: 3  
 Rainfall, R: 0.49 in  
 0.04 ft

$V_r = (0.9A_i + 0.25A_{tg} + 0.1A_{tf} + 0.01A_o) * R$  (2009 KCSWDM Equ. 6-13)  
 Wetpool Volume = f \* V<sub>r</sub> (2009 KCSWDM Equ. 6-14)

	<b>Ai</b>	<b>Atg</b>	<b>Atf</b>	<b>Ao</b>	<b>Vr</b>	<b>Wetpool Volume</b>	
Basin	0.9	0.25	0.1	0.01	Ac-ft	Ac-ft	cf
PR	23.519	2.697	0	1.275	0.90	2.6953	117,409
1	38.449	0.019	0	5.015	1.42	4.2746	186,202
2	14.1	0	0	1.948	0.52	1.5675	68,280
3	50.738	0	0	3.022	1.88	5.6356	245,489
4	13.577	0	0	0.353	0.50	1.5075	65,666

	<b>PR</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Till Grass	2.697	0.019	0.000	0.000	0.000
Outwash Grass	1.275	5.015	1.948	3.022	0.353
Wetland	1.050	2.108	1.086	1.049	0.345
Impervious	23.519	38.449	14.100	50.738	13.577
Total Sum	28.541	45.592	17.134	54.809	14.274
Total Area	28.541	45.592	17.134	54.809	14.274
% check	100.000%	100.000%	100.000%	100.000%	100.000%