Falcon DBPS
Peak Flow Results

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - With Existing Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
ET010	0.15	38	67	90	140	170	200
ET020	0.21	73	130	170	260	310	360
ET030	0.20	45	81	110	170	210	240
ET040	0.15	28	53	72	120	140	170
ET050	0.12	37	67	89	140	170	200
ET060	0.29	110	190	250	380	450	530
ET070	0.25	94	160	220	330	400	460
ET080	0.29	110	190	250	380	450	520
ET090	0.12	26	46	61	95	110	130
ET100	0.05	11	22	31	50	61	72
ET110	0.23	24	53	76	130	160	200
ET120	0.11	11	24	34	59	74	89
ET130	0.13	11	23	33	57	71	85
ET140	0.27	16	33	48	82	100	120
ET150	0.18	17	37	53	91	110	140
ET160	0.19	19	39	55	92	110	140
FS010	0.12	6	17	26	48	61	75
JET010	0.15	29	49	64	110	130	150
JET020	0.36	74	130	170	270	330	390
JET030	0.56	97	180	250	410	500	580
JET040	0.71	27	85	140	380	500	570
JET050	0.83	11	38	88	210	380	530
JET060	1.11	13	32	68	210	300	430
JET070	1.36	94	170	220	350	420	480
JET080	1.66	15	38	61	200	270	350
JET090	1.78	26	47	81	200	290	390
JET100	1.83	27	49	83	200	290	390
JET110	2.05	40	85	120	210	320	440
JET120	2.16	49	110	160	270	340	450
JET130	0.13	11	23	33	57	71	85
JET140	0.40	26	55	80	140	170	200
JET152	2.57	51	120	180	350	500	650
JET154	2.74	62	140	200	370	530	680
JET160	2.93	66	150	230	410	550	710
JFS010_OUTLET	0.12	6	17	26	48	61	75
JMT010	0.29	1	11	25	62	120	160
JMT020	0.09	26	47	64	100	120	140
JMT030	0.25	50	94	130	200	250	290
JMT040	0.56	110	240	330	520	620	750
JMT050	0.67	120	280	380	590	710	850
JMT060	1.16	130	310	430	700	850	1,000

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
ET010	0.15	38	0	0	0	0	200
ET020	0.21	73	0	0	0	0	360
ET030	0.20	45	0	0	0	0	240
ET040	0.15	28	0	0	0	0	170
ET050	0.12	37	0	0	0	0	200
ET060	0.29	110	0	0	0	0	530
ET070	0.25	94	0	0	0	0	460
ET080	0.29	110	0	0	0	0	520
ET090	0.12	26	0	0	0	0	130
ET100	0.05	11	0	0	0	0	72
ET110	0.23	24	0	0	0	0	200
ET120	0.11	11	0	0	0	0	89
ET130	0.13	11	0	0	0	0	85
ET140	0.27	16	0	0	0	0	120
ET150	0.18	17	0	0	0	0	140
ET160	0.19	19	0	0	0	0	140
FS010	0.12	6	0	0	0	0	75
JET010	0.15	29	0	0	0	0	150
JET020	0.36	9	0	0	0	0	200
JET030	0.56	45	0	0	0	0	270
JET040	0.71	10	0	0	0	0	260
JET050	0.83	10	0	0	0	0	250
JET060	1.11	13	0	0	0	0	360
JET070	1.36	94	0	0	0	0	640
JET080	1.66	15	0	0	0	0	260
JET090	1.78	31	0	0	0	0	300
JET100	1.83	32	0	0	0	0	300
JET110	2.05	42	0	0	0	0	350
JET120	2.16	50	0	0	0	0	400
JET130	0.13	11	0	0	0	0	85
JET140	0.40	26	0	0	0	0	200
JET152	2.57	55	0	0	0	0	560
JET154	2.74	62	0	0	0	0	590
JET160	2.93	67	0	0	0	0	640
JFS010_OUTLET	0.12	6	0	0	0	0	75
JMT010	0.29	5	0	0	0	0	99
JMT020	0.09	26	0	0	0	0	140
JMT030	0.25	50	0	0	0	0	290
JMT040	0.56	110	0	0	0	0	750
JMT050	0.67	120	0	0	0	0	850
JMT060	1.16	27	0	0	0	0	730

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Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - With Existing Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
JMT070	1.36	150	350	490	800	980	1,200
JMT080	1.42	86	330	490	810	980	1,200
JMT090	0.04	9	15	18	25	29	32
JMT102	1.46	91	330	500	820	1,000	1,200
JMT104	0.04	9	15	18	25	29	32
JMT106	1.52	92	320	490	820	1,000	1,200
JMT110	1.64	94	320	500	830	1,000	1,200
JWT010	0.14	9	21	32	58	73	89
JWT020	0.07	4	10	15	27	34	42
JWT030	0.14	9	20	30	55	69	85
JWT042	0.28	15	37	57	110	140	170
JWT044	0.46	24	59	89	170	210	260
JWT050	0.85	43	110	170	310	390	480
JWT070	0.17	14	33	49	87	110	130
JWT080	1.09	54	140	210	400	500	610
JWT090	1.43	68	160	250	480	610	730
JWT110	1.63	77	170	280	530	690	840
JWT120	1.77	85	190	300	570	730	920
JWT140	0.13	32	59	80	130	150	180
JWT150	0.36	15	19	39	97	140	170
JWT160	0.47	35	64	85	130	160	190
JWT172	2.24	99	210	320	600	760	960
JWT174	2.36	100	210	330	610	780	990
JWT180	2.46	100	220	330	620	800	1,000
JWT190	0.06	4	7	12	26	35	43
JWT200	2.82	110	230	360	690	890	1,200
JWT210	3.09	120	250	400	760	990	1,300
JWT220	0.19	47	85	110	180	210	250
JWT232	3.28	120	260	410	790	1,000	1,400
JWT234	3.47	130	270	420	810	1,000	1,400
JWT240	3.55	83	200	380	770	940	1,100
JWT250	3.70	85	210	390	780	950	1,100
JWT260	3.84	86	210	390	790	970	1,100
JWT270	0.03	11	20	27	41	49	57
JWT280	0.27	33	70	100	170	210	250
JWT292	3.87	86	210	390	790	970	1,100
JWT294	4.13	96	210	400	800	990	1,100
JWT296	5.88	160	410	620	1,100	1,400	1,700
JWT300	0.10	12	26	36	62	76	92
JWT310	6.25	160	420	640	1,100	1,400	1,700
JWT320	6.46	160	410	630	1,100	1,400	1,700

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
JMT070	1.36	31	0	0	0	0	840
JMT080	1.42	32	0	0	0	0	820
JMT090	0.04	1	0	0	0	0	19
JMT102	1.46	33	0	0	0	0	840
JMT104	0.04	1	0	0	0	0	19
JMT106	1.52	33	0	0	0	0	840
JMT110	1.64	34	0	0	0	0	860
JWT010	0.14	9	0	0	0	0	89
JWT020	0.07	4	0	0	0	0	42
JWT030	0.14	9	0	0	0	0	85
JWT042	0.28	15	0	0	0	0	170
JWT044	0.46	24	0	0	0	0	260
JWT050	0.85	43	0	0	0	0	480
JWT070	0.17	14	0	0	0	0	130
JWT080	1.09	42	0	0	0	0	510
JWT090	1.43	47	0	0	0	0	620
JWT110	1.63	51	0	0	0	0	680
JWT120	1.77	55	0	0	0	0	710
JWT140	0.13	32	0	0	0	0	180
JWT150	0.36	10	0	0	0	0	180
JWT160	0.47	35	0	0	0	0	190
JWT172	2.24	65	0	0	0	0	840
JWT174	2.36	65	0	0	0	0	840
JWT180	2.46	66	0	0	0	0	850
JWT190	0.06	0	0	0	0	0	2
JWT200	2.82	72	0	0	0	0	910
JWT210	3.09	81	0	0	0	0	1,000
JWT220	0.19	47	0	0	0	0	250
JWT232	3.28	84	0	0	0	0	1,100
JWT234	3.47	89	0	0	0	0	1,100
JWT240	3.55	42	0	0	0	0	970
JWT250	3.70	64	0	0	0	0	980
JWT260	3.84	70	0	0	0	0	1,000
JWT270	0.03	11	0	0	0	0	57
JWT280	0.27	33	0	0	0	0	250
JWT292	3.87	73	0	0	0	0	1,000
JWT294	4.13	95	0	0	0	0	1,000
JWT296	5.88	77	0	0	0	0	1,500
JWT300	0.10	12	0	0	0	0	92
JWT310	6.25	79	0	0	0	0	1,500
JWT320	6.46	80	0	0	0	0	1,500

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Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - With Existing Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
JWT330	0.33	32	68	98	170	210	250
JWT352	9.69	210	530	820	1,400	2,000	2,400
JWT354	10.30	230	560	870	1,500	2,000	2,500
JWT360	0.07	7	15	21	37	46	55
JWT372	10.36	230	560	860	1,500	2,000	2,500
JWT374_OUTLET	10.58	230	560	860	1,500	2,000	2,500
MT010	0.29	28	58	82	140	170	210
MT020	0.09	26	47	64	100	120	140
MT030	0.16	39	73	100	160	190	230
MT040	0.31	95	160	220	330	390	460
MT050	0.12	17	33	46	76	92	110
MT060	0.19	30	59	83	140	170	200
MT070	0.20	25	50	69	110	140	170
MT080	0.06	62	92	110	150	170	190
MT090	0.04	40	59	73	100	110	130
MT100	0.06	17	30	40	63	75	88
MT110	0.12	19	36	50	81	99	120
Paint Brush Hills Pond #4	0.15	29	49	64	110	130	150
Paint Brush Hills Pond A	0.10	10	18	24	64	97	130
Paint Brush Hills Pond B1	0.36	51	100	140	190	210	270
Paint Brush Hills Pond B2	0.36	15	19	39	97	140	170
Paint Brush Hills Pond C	0.19	11	14	23	56	74	160
Regional Pond MN	1.42	86	330	490	810	980	1,200
Regional Pond WU Diversion	3.55	83	230	380	770	1,000	1,300
Regional Pond WU North	3.55	110	270	420	810	1,100	1,400
Regional Pond WU South	3.55	55	170	340	730	900	1,000
RET020	0.15	29	49	64	100	130	150
RET030	0.36	71	130	170	270	320	380
RET040	0.56	95	180	250	400	490	580
RET050	0.71	27	85	140	370	490	570
RET060	0.83	11	38	88	210	370	530
RET070	1.11	13	32	68	210	300	430
RET080	1.36	65	120	170	270	340	420
RET090	1.66	15	38	61	200	270	350
RET100	1.78	26	47	81	200	290	390
RET110	1.83	27	49	83	200	290	390
RET120	2.05	39	84	120	210	320	430
RET140	0.13	11	23	33	57	70	85
RET152	2.16	49	110	150	270	340	450
RET154	0.40	26	55	80	140	170	200
RET156	2.57	50	120	180	350	500	650

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
JWT330	0.33	32	0	0	0	0	250
JWT352	9.69	130	0	0	0	0	2,100
JWT354	10.30	140	0	0	0	0	2,100
JWT360	0.07	7	0	0	0	0	55
JWT372	10.36	140	0	0	0	0	2,100
JWT374_OUTLET	10.58	140	0	0	0	0	2,100
MT010	0.29	28	0	0	0	0	210
MT020	0.09	26	0	0	0	0	140
MT030	0.16	39	0	0	0	0	230
MT040	0.31	95	0	0	0	0	460
MT050	0.12	17	0	0	0	0	110
MT060	0.19	30	0	0	0	0	200
MT070	0.20	25	0	0	0	0	170
MT080	0.06	62	0	0	0	0	190
MT090	0.04	40	0	0	0	0	130
MT100	0.06	17	0	0	0	0	88
MT110	0.12	19	0	0	0	0	120
Paint Brush Hills Pond #4	0.15	29	0	0	0	0	150
Paint Brush Hills Pond A	0.10	7	0	0	0	0	140
Paint Brush Hills Pond B1	0.36	51	0	0	0	0	270
Paint Brush Hills Pond B2	0.36	10	0	0	0	0	180
Paint Brush Hills Pond C	0.19	3	0	0	0	0	140
Regional Pond MN	1.42	32	0	0	0	0	820
Regional Pond R1	5.88	77	0	0	0	0	1,500
Regional Pond R2	10.36	140	0	0	0	0	2,100
Regional Pond WU Diversion	3.55	47	0	0	0	0	1,100
Regional Pond WU North	3.55	71	0	0	0	0	1,100
Regional Pond WU South	3.55	22	0	0	0	0	930
RET020	0.15	29	0	0	0	0	150
RET030	0.36	9	0	0	0	0	190
RET040	0.56	45	0	0	0	0	270
RET050	0.71	10	0	0	0	0	260
RET060	0.83	10	0	0	0	0	250
RET070	1.11	13	0	0	0	0	360
RET080	1.36	65	0	0	0	0	520
RET090	1.66	15	0	0	0	0	260
RET100	1.78	30	0	0	0	0	300
RET110	1.83	32	0	0	0	0	300
RET120	2.05	42	0	0	0	0	350
RET140	0.13	11	0	0	0	0	85
RET152	2.16	49	0	0	0	0	400

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Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - With Existing Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
RET162	2.74	59	130	200	360	530	680
RET164	2.93	66	150	230	410	550	710
RMT030	0.09	25	47	63	100	120	140
RMT040	0.25	49	93	130	200	250	290
RMT050	0.56	110	240	330	520	620	750
RMT062	0.29	1	11	25	62	110	160
RMT064	0.67	120	270	370	590	710	850
RMT070	1.16	130	310	430	690	840	1,000
RMT080	1.36	150	350	490	800	980	1,200
RMT090	0.04	9	15	18	25	29	32
RMT102	1.42	86	320	490	800	980	1,200
RMT104	0.04	9	15	18	25	29	32
RMT106	1.46	91	320	490	810	990	1,200
RMT112	1.52	92	310	490	810	990	1,200
RMT114	1.64	94	320	500	830	1,000	1,200
RWT030	0.07	4	10	15	27	34	42
RWT042	0.14	9	20	30	54	69	85
RWT044	0.14	9	21	32	57	73	89
RWT046	0.28	15	37	57	110	140	170
RWT054	0.46	24	59	89	170	210	260
RWT080	0.17	14	33	48	87	110	130
RWT092	0.85	43	110	170	310	390	480
RWT094	1.09	54	140	210	400	500	610
RWT122	1.43	68	160	250	480	610	730
RWT124	1.63	77	170	280	530	690	840
RWT150	0.13	32	59	79	130	150	180
RWT160	0.36	15	19	39	97	140	170
RWT172	1.77	85	190	300	570	730	920
RWT174	0.47	35	63	84	130	160	180
RWT176	2.24	98	210	320	600	760	960
RWT180	2.36	100	210	330	610	780	990
RWT202	2.46	100	220	330	620	800	1,000
RWT204	0.06	4	7	12	26	34	43
RWT210	2.82	110	230	360	690	890	1,200
RWT232	3.09	120	250	400	760	990	1,300
RWT234	0.19	47	84	110	180	210	250
RWT236	3.28	120	260	410	790	1,000	1,400
RWT240	3.47	130	270	420	810	1,000	1,400
RWT240_Diversion Reach	0.00	30	37	38	38	39	39
RWT250	3.55	83	200	380	770	940	1,100
RWT260	3.70	85	210	380	780	950	1,100

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
RET154	0.40	26	0	0	0	0	200
RET156	2.57	55	0	0	0	0	560
RET162	2.74	60	0	0	0	0	590
RET164	2.93	66	0	0	0	0	630
RMT030	0.09	25	0	0	0	0	140
RMT040	0.25	49	0	0	0	0	290
RMT050	0.56	110	0	0	0	0	750
RMT062	0.29	5	0	0	0	0	99
RMT064	0.67	120	0	0	0	0	850
RMT070	1.16	27	0	0	0	0	730
RMT080	1.36	31	0	0	0	0	840
RMT090	0.04	1	0	0	0	0	19
RMT102	1.42	32	0	0	0	0	820
RMT104	0.04	1	0	0	0	0	19
RMT106	1.46	33	0	0	0	0	830
RMT112	1.52	33	0	0	0	0	840
RMT114	1.64	34	0	0	0	0	860
RWT030	0.07	4	0	0	0	0	42
RWT042	0.14	9	0	0	0	0	85
RWT044	0.14	9	0	0	0	0	89
RWT046	0.28	15	0	0	0	0	170
RWT054	0.46	24	0	0	0	0	260
RWT080	0.17	14	0	0	0	0	130
RWT092	0.85	43	0	0	0	0	480
RWT094	1.09	42	0	0	0	0	510
RWT122	1.43	47	0	0	0	0	620
RWT124	1.63	51	0	0	0	0	680
RWT150	0.13	32	0	0	0	0	180
RWT160	0.36	10	0	0	0	0	180
RWT172	1.77	54	0	0	0	0	710
RWT174	0.47	35	0	0	0	0	190
RWT176	2.24	65	0	0	0	0	840
RWT180	2.36	65	0	0	0	0	840
RWT202	2.46	66	0	0	0	0	850
RWT204	0.06	0	0	0	0	0	2
RWT210	2.82	71	0	0	0	0	910
RWT232	3.09	80	0	0	0	0	1,000
RWT234	0.19	47	0	0	0	0	250
RWT236	3.28	84	0	0	0	0	1,100
RWT240	3.47	87	0	0	0	0	1,100
RWT240_Diversion Reach	0.00	24	0	0	0	0	39

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Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - With Existing Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
RWT291	3.84	86	210	390	790	970	1,100
RWT292	0.03	11	20	26	41	49	57
RWT294	0.27	33	70	100	170	210	250
RWT295	3.87	86	210	390	790	970	1,100
RWT296	4.13	94	210	400	800	990	1,100
RWT312	0.10	12	25	36	61	76	91
RWT314	5.88	160	400	620	1,100	1,400	1,700
RWT320	6.25	160	400	620	1,100	1,400	1,700
RWT344	0.33	32	68	97	170	210	250
RWT352	6.46	160	400	620	1,100	1,400	1,700
RWT354	9.69	210	530	820	1,400	2,000	2,400
RWT372	10.30	230	560	860	1,500	2,000	2,500
RWT374	0.07	7	15	21	36	45	55
RWT376	10.36	230	550	850	1,500	2,000	2,500
The Meadows Pond #1	0.06	4	7	12	26	35	43
The Meadows Pond #2	0.29	1	11	25	62	120	160
Woodmen Hills Pond #1 North	0.71	88	180	260	420	500	570
Woodmen Hills Pond #1 South	0.71	27	85	140	380	500	570
Woodmen Hills Pond #2	0.83	11	38	88	210	380	530
Woodmen Hills Pond #3	1.11	13	32	68	210	300	430
Woodmen Hills Pond #4	1.66	15	38	61	200	270	350
Woodmen Hills Pond #5	0.04	9	15	18	25	29	32
Woodmen Hills Pond H	0.56	110	240	330	520	620	750
WT010	0.14	9	21	32	58	73	89
WT020	0.07	4	10	15	27	34	42
WT030	0.08	9	20	29	50	62	75
WT040	0.19	9	22	33	60	76	93
WT050	0.19	17	37	54	93	120	140
WT060	0.20	14	30	44	77	96	120
WT070	0.17	14	33	49	87	110	130
WT080	0.07	9	19	27	45	56	67
WT090	0.15	22	46	65	110	140	160
WT100	0.19	56	100	140	210	260	300
WT110	0.19	22	47	67	110	140	170
WT120	0.05	8	16	22	37	46	55
WT130	0.10	35	61	81	120	150	170
WT140	0.13	32	59	80	130	150	180
WT150	0.23	49	86	110	180	210	250
WT160	0.11	35	64	85	130	160	180
WT170	0.12	21	43	60	99	120	140
WT180	0.10	8	17	25	43	54	66

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
RWT250	3.55	42	0	0	0	0	970
RWT260	3.70	62	0	0	0	0	980
RWT291	3.84	70	0	0	0	0	1,000
RWT292	0.03	11	0	0	0	0	57
RWT294	0.27	33	0	0	0	0	250
RWT295	3.87	73	0	0	0	0	1,000
RWT296	4.13	93	0	0	0	0	1,000
RWT312	0.10	12	0	0	0	0	91
RWT314	5.88	77	0	0	0	0	1,500
RWT320	6.25	79	0	0	0	0	1,500
RWT344	0.33	32	0	0	0	0	250
RWT352	6.46	80	0	0	0	0	1,500
RWT354	9.69	130	0	0	0	0	2,100
RWT372	10.30	140	0	0	0	0	2,100
RWT374	0.07	7	0	0	0	0	55
RWT376	10.36	140	0	0	0	0	2,100
Sub Regional Pond SR1	1.09	42	0	0	0	0	510
Sub Regional Pond SR2	2.36	65	0	0	0	0	840
Sub Regional Pond SR3	2.82	72	0	0	0	0	910
Sub Regional Pond SR4	1.16	27	0	0	0	0	730
Sub Regional Pond SR6	0.36	9	0	0	0	0	200
The Meadows Pond #1	0.06	0	0	0	0	0	2
The Meadows Pond #2	0.29	5	0	0	0	0	99
Woodmen Hills Pond #1 North	0.71	61	0	0	0	0	260
Woodmen Hills Pond #1 South	0.71	10	0	0	0	0	260
Woodmen Hills Pond #2	0.83	10	0	0	0	0	250
Woodmen Hills Pond #3	1.11	13	0	0	0	0	360
Woodmen Hills Pond #4	1.66	15	0	0	0	0	260
Woodmen Hills Pond #5	0.04	1	0	0	0	0	19
Woodmen Hills Pond H	0.56	110	0	0	0	0	750
WT010	0.14	9	0	0	0	0	89
WT020	0.07	4	0	0	0	0	42
WT030	0.08	9	0	0	0	0	75
WT040	0.19	9	0	0	0	0	93
WT050	0.19	17	0	0	0	0	140
WT060	0.20	14	0	0	0	0	120
WT070	0.17	14	0	0	0	0	130
WT080	0.07	9	0	0	0	0	67
WT090	0.15	22	0	0	0	0	160
WT100	0.19	56	0	0	0	0	300
WT110	0.19	22	0	0	0	0	170

Falcon DBPS
Peak Flow Results

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - With Existing Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
WT190	0.06	11	23	31	51	63	75
WT200	0.30	25	52	74	130	160	190
WT210	0.27	32	60	81	130	160	190
WT220	0.19	47	85	110	180	210	250
WT230	0.20	71	120	160	250	300	350
WT240	0.08	36	61	79	120	140	160
WT250	0.15	63	110	140	210	250	290
WT260	0.14	10	21	30	52	64	78
WT270	0.03	11	20	27	41	49	57
WT280	0.27	33	70	100	170	210	250
WT290	0.10	15	31	44	75	92	110
WT300	0.10	12	26	36	62	76	92
WT310	0.28	31	67	96	170	210	250
WT320	0.21	27	56	80	140	170	200
WT330	0.33	32	68	98	170	210	250
WT340	0.28	19	40	57	98	120	150
WT350	0.30	38	79	110	190	230	280
WT360	0.07	7	15	21	37	46	55
WT370	0.21	7	23	38	76	99	120

Hydrologic Element	Area (sq mi)	Future Peak Flows (cfs) - Sub Regional Detention					
		2-year	5-year	10-year	25-year	50-year	100-year
WT120	0.05	8	0	0	0	0	55
WT130	0.10	35	0	0	0	0	170
WT140	0.13	32	0	0	0	0	180
WT150	0.23	49	0	0	0	0	250
WT160	0.11	35	0	0	0	0	180
WT170	0.12	21	0	0	0	0	140
WT180	0.10	8	0	0	0	0	66
WT190	0.06	11	0	0	0	0	75
WT200	0.30	25	0	0	0	0	190
WT210	0.27	32	0	0	0	0	190
WT220	0.19	47	0	0	0	0	250
WT230	0.20	71	0	0	0	0	350
WT240	0.08	36	0	0	0	0	160
WT250	0.15	63	0	0	0	0	290
WT260	0.14	10	0	0	0	0	78
WT270	0.03	11	0	0	0	0	57
WT280	0.27	33	0	0	0	0	250
WT290	0.10	15	0	0	0	0	110
WT300	0.10	12	0	0	0	0	92
WT310	0.28	31	0	0	0	0	250
WT320	0.21	27	0	0	0	0	200
WT330	0.33	32	0	0	0	0	250
WT340	0.28	19	0	0	0	0	150
WT350	0.30	38	0	0	0	0	280
WT360	0.07	7	0	0	0	0	55
WT370	0.21	7	0	0	0	0	120

Falcon DBPS

Peak Flows at Points of Interest

Location	HEC-HMS Element	Area	Historical Flows (cfs)		Sub Regional	
		(sq mi)	2-year	100-year	2-year	100-year
West Tributary						
Raygor Rd.	JWT030	0.14	6	75	9	85
Stapleton Rd.	JWT120	1.77	58	750	55	710
Woodmen Rd.	JWT210	3.09	80	1,000	81	1,000
HWY 24	JWT250	3.70	84	1,100	64	980
Falcon Hwy.	JWT260	3.84	86	1,100	70	1,000
Garrett Rd.	JWT320	6.46	110	1,500	80	1,500
East Blaney Rd.	JWT354	10.30	110	1,700	140	2,100
Upstream of Bennett Ranch Tributary	JWT374_Outlet	10.58	110	1,700	140	2,100
Middle Tributary						
Woodmen Hills Dr.	JMT010	0.29	1	57	5	99
Woodmen Rd.	JMT070	1.36	24	350	31	840
Hwy. 24	JMT106	1.52	24	360	33	840
Falcon Hwy.	JMT110	1.64	22	360	34	860
Confluence with West Tributary	RMT114	1.64	22	360	34	860
East Tributary						
Stapleton Dr.	JET020	0.36	20	200	9	200
Woodmen Hills Dr.	JET040	0.71	19	240	10	260
Eastonville Rd.	JET060	1.11	19	260	13	360
Hwy. 24	JET090	1.78	17	260	31	300
Pinto Pony Rd.	JET100	1.83	17	260	32	300
Falcon Hwy.	JET120	2.16	17	270	50	400
Garrett Rd.	JET160	2.93	18	300	67	640
Confluence with West Tributary	RET164	2.93	18	300	66	630

Falcon DBPS

Steady Flow Data

West Tributary

Hydrologic Element	HEC-RAS Section	Peak Flows w/ Sub Regional Detention (cfs)					
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
JWT010	47452.3	9					89
JWT044	44818.8	24					260
JWT050	42418.0	43					480
RWT092	40018.8	43					480
JWT090	39218.8	47					620
JWT110	37218.8	51					680
JWT120	36496.2	55					710
RWT172 + WT170	34399.0	75					850
JWT174	31572.0	65					840
JWT180	31149.0	66					850
RWT202 + WT200	27507.0	91					1040
JWT210	24630.0	81					1000
JWT234	21713.0	89					1100
Pond WU North Inflow	19803.0	96					1110
Pond WU South Inflow	18554.8	47					932
JWT240	17784.0	42					970
JWT260	17399.7	70					1000
RWT295	14577.8	73					1000
RWT296 + WT290	14177.8	108					1110
RWT314 + WT310	12902.3	108					1750
JWT320	10857.5	80					1500
RWT352 + WT350	8227.4	118					1780
JWT352	5544.6	130					2100
RWT372	5379.9	140					2100
JWT374_OUT	3777.8	140					2100

Middle Tributary

Hydrologic Element	HEC-RAS Section	Peak Flows w/ Sub Regional Detention (cfs)					
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
MT010	15477.3	28					210
RMT62 + MT60	14907.6	35					299
JMT070	9228.6	31					840
Reg Pond MN Inflow	6738.8	31					824
JMT080	6346.7	32					820
RMT102	6210.5	32					820
JMT106	5363.0	33					840
JMT110	4905.9	34					860
RMT114	1489.7	34					860

Falcon DBPS

Steady Flow Data

East Tributary

Hydrologic Element	HEC-RAS Section	Peak Flows w/ Sub Regional Detention (cfs)					
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
ET010	32631.8	38					200
RET020 + ET020	31304.7	102					510
JET030	26646.3	45					270
WH POND #1 NORTH INFLOW	23184.6	61					260
WH POND #2 INFLOW	21057.8	37					270
WH POND #3 INFLOW	19619	105					530
JET070	17786.6	94					640
WH POND #4 INFLOW	15716.6	110					790
JET090	14440	31					300
JET100	14092	32					300
JET110	12092	42					350
JET120	9292	50					400
JET154	8087.7	62					590
JET160	5003.4	67					640
RET164	1984.9	66					630

Falcon DBPS

EURV/WQCV Elevation Within Exising Pond Grading (Sub Regional Alternative)

Paint Brush Hills Pond C

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	7194.0	0.0	3524	0.08	0.00	0.00
	7196.0	2.0	34432	0.79	0.87	0.87
EURV	7197.2	3.2	56977	1.31	1.31	2.18
	7198.0	4.0	70646	1.62	1.11	3.28
100-yr	7200.0	6.0	81277	1.87	3.49	6.77
Spillway	7202.0	8.0	94041	2.16	4.02	10.80

Paint Brush Hills Pond A

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	7144.0	0.0	2301	0.05	0.00	0.00
	7146.0	2.0	32617	0.75	0.80	0.80
WQCV	7146.3	2.3	34366	0.79	0.19	0.99
100-yr	7148.0	4.0	46611	1.07	1.63	2.62
Spillway	7150.0	6.0	52403	1.20	2.27	4.89

Paint Brush Hills Pond B2

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	7140.0	0.0	6171	0.14	0.00	0.00
	7142.0	2.0	33600	0.77	0.91	0.91
	7144.0	4.0	72649	1.67	2.44	3.35
	7146.0	6.0	99742	2.29	3.96	7.31
EURV	7146.1	6.1	100025	2.30	0.15	7.46
100-yr	7148.0	8.0	108583	2.49	4.64	12.09
Spillway	7150.0	10.0	117383	2.69	5.19	17.28
	7152.0	12.0	125020	2.87	5.56	22.84

The Meadows Pond #1

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	7010.0	0.0	2872	0.07	0.00	0.00
EURV	7011.0	1.0	13523	0.31	0.19	0.19
	7012.0	2.0	23756	0.55	0.42	0.6113
	7014.0	4.0	43274	0.99	1.54	2.15
100-yr	7015.0	5.0	52520	1.21	1.10	3.25
Spillway	7016.0	6.0	61765	1.42	1.31	4.56

The Meadows Pond #2

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	7004.0	0.0	1202	0.03	0.00	0.00
	7006.0	2.0	46729	1.07	1.10	1.10
EURV	7006.5	2.5	48770	1.12	0.52	1.62
	7008.0	4.0	55287	1.27	1.82	3.44
	7010.0	6.0	67516	1.55	2.82	6.2615
100-yr	7011.0	7.0	78848	1.81	1.68	7.94
Spillway	7012.0	8.0	90179	2.07	1.94	9.88

Regional Pond MN

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	6850.0	0.0	72765	1.67	0.00	0.00
WQCV	6851.4	1.4	79229	1.82	2.45	2.45
	6852.0	2.0	81967	1.88	1.10	3.55
100-yr	6854.0	4.0	91240	2.09	3.98	7.53
Spillway	6856.0	6.0	100323	2.30	4.40	11.93

Woodmen Hills Pond #5

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	6850.0	0.0	14889	0.34	0.00	0.00
	6852.0	2.0	48165	1.11	1.45	1.45
EURV	6852.5	2.5	52649	1.21	0.54	1.99
100-yr	6854.0	4.0	67245	1.54	2.11	4.10
Spillway	6856.0	6.0	77625	1.78	3.33	7.42

Woodmen Hills Pond #1 North

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	6952.0	0.0	7633	0.18	0.00	0.00
	6954.0	2.0	23810	0.55	0.72	0.72
100-yr	6960.0	8.0	73999	1.70	6.74	7.13
	6962.0	10.0	91244	2.09	3.79	10.92
	6964.0	12.0	115044	2.64	4.74	15.66

100-yr retrofit only at this pond

Woodmen Hills Pond #1 South

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	6948.0	0.0	23810	0.55	0.00	0.00
	6950.0	2.0	61448	1.41	1.96	1.96
	6952.0	4.0	76242	1.75	3.16	5.12
EURV	6952.5	4.5	77872	1.79	0.84	5.96
100-yr	6954.0	6.0	83106	1.91	3.66	8.78
Spillway	6956.0	8.0	89660	2.06	3.97	12.74
	6958.0	10.0	117602	2.70	4.76	17.50

Woodmen Hills Pond #2

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	6926.0	0.0	68500	1.57	0.00	0.00
EURV	6926.8	0.8	83025	1.91	1.36	1.36
	6928.0	2.0	105743	2.43	2.64	4.00
100-yr	6930.0	4.0	119783	2.75	5.18	9.18
Spillway	6932.0	6.0	147832	3.39	6.14	15.32
	6934.0	8.0	190507	4.37	7.77	23.09

Woodmen Hills Pond #3

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	6900.0	0.0	125010	2.87	0.00	0.00
WQCV	6900.7	0.7	163665	3.76	2.26	2.26
100-yr	6902.0	2.0	238533	5.48	6.09	8.35
	6904.0	4.0	289267	6.64	12.12	20.46

Woodmen Hills Pond #4

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	6856.0	0.0	95635	2.20	0.00	0.00
	6858.0	2.0	254580	5.84	8.04	8.04
EURV	6858.7	2.7	289343	6.64	4.35	12.39
	6860.0	4.0	354329	8.13	9.63	22.02
100-yr	6862.0	6.0	448586	10.30	18.43	40.45
Spillway	6864.0	--	--	--	--	60.00

Added 2-yr control because sub-regional results were greater than results with only existing detention in place

Existing spillway elevation needs to be raised. Corresponding storage was assumed.

Regional Pond WU

Stage	Elevation (ft)	Height (ft)	Storage			
			Area		Volume	
			(ft^2)	(acres)	(ac-ft)	(cum ac-ft)
	6822.0	0.0	21261	0.49	0.00	0.00
EURV	6826.8	4.8	196910	4.52	0.81	13.97
100-yr	6832.0	10.0	229251	5.26	1.05	39.54
Spillway	6834.0	12.0	242670	5.57	1.11	50.38

Notes:

1) Elevation of the EURV/WQCV was interpolated based on the existing pond grading
2) 100-yr WSE set at spillway elevation of existing pond
3) Volume calculated using the average end method

Falcon DBPS

Sub Regional Pond Drainage & Impervious Area

Pond	DA (ft2)	DA (Acres)	Impervious Area (ft2)	% Impervious
Sub Regional Pond SR1	30,622,649	703	831,542	3%
Paint Brush Hills Pond C	5,234,130	120	982,938	19%
Paint Brush Hills Pond A	2,811,615	65	832,760	30%
Paint Brush Hills Pond B1 & B2	10,050,309	231	3,095,805	31%
Sub Regional Pond SR2	17,141,776	394	1,300,551	8%
The Meadows Pond #1	1,601,777	37	127,495	8%
Sub Regional Pond SR3	11,154,554	256	805,816	7%
Regional Pond WU	20,333,432	467	5,914,148	29%
Woodmen Hills Pond H	15,479,390	355	4,492,233	29%
The Meadows Pond #2	8,081,678	186	902,796	11%
Sub Regional Pond SR4	8,717,356	200	1,238,224	14%
Regional pond MN	7,343,530	169	2,065,458	28%
Woodmen Hills Pond #5	1,212,993	28	773,858	64%
Regional Pond R1	23,851,242	548	3,448,795	14%
Paint Brush Hills Pond #4	4,045,968	93	1,167,110	29%
Sub Regional Pond SR6	5,943,070	136	1,971,083	33%
Woodmen Hills Pond #1 North & South	9,842,788	226	2,585,592	26%
Woodmen Hills Pond #2	3,267,140	75	623,185	19%
Woodmen Hills Pond #3	7,957,332	183	1,741,407	22%
Woodmen Hills Pond #4	15,092,968	346	5,150,148	34%
Sub Regional Pond SR5	29,299,647	673	2,287,324	8%
Regional Pond R2	52,661,473	1,209	1,520,507	3%

Notes

1) Areas calculated in ArcMap
2) These values are used for calculating the required EURV/WQCV only
3) Some values incude the drainage areas contributing to upstream ponds where that pond was not able to provide an EURV/WQCV

Falcon DBPS

Sub Regional Ponds (Including Existing Detention Ponds)

Pond Description					EURV/WQCV				
Modeling Order	Name	Pond Type[1]	Location	Inflow Hydrograph[2]	Drainage Area (Acres)[3]	% Impervious (Future)[4]	Stage (ft)[5]	Storage (AF)[6]	Release Rate (cfs)[7]
1	Sub Regional Pond SR1	Sub Regional	West Tributary	JWT080	703	3%	7218.0	1.57	2.60
1	Paint Brush Hills Pond C	On-site	West Tributary	WT100	120	19%	7197.2	2.18	2.93
1	Paint Brush Hills Pond A	On-site	West Tributary	WT130	65	30%	7146.3	0.99	1.65
1	Paint Brush Hills Pond B1	On-site	West Tributary	Paint Brush Hills Pond B1	N/A Place EURV in d/s Paint Brush Hills Pond B2				
1	Paint Brush Hills Pond B2	On-site	West Tributary	Paint Brush Hills Pond B2	231	31%	7146.1	7.46	17.37
2	Sub Regional Pond SR2	Sub Regional	West Tributary	JWT174	394	8%	7080.8	2.05	2.88
1	The Meadows Pond #1	On-site	West Tributary	WT190	37	8%	7011.0	0.19	0.12
3	Sub Regional Pond SR3	Sub Regional	West Tributary	JWT200	256	7%	6941.3	1.03	1.48
4	Regional Pond WU South	Regional	West Tributary	Regional Pond WU South	467	29%	6826.8	13.97	29.90
~~1~~	~~Woodmen Hills Pond H~~	~~Sub Regional~~	~~Middle Tributary~~	~~Woodmen Hills Pond H~~	~~355~~	~~29%~~	~~N/A~~	~~10.62~~	~~N/A~~
1	The Meadows Pond #2	On-site	Middle Tributary	MT010	186	11%	7006.5	1.62	1.83
2	Sub Regional Pond SR4	Sub Regional	Middle Tributary	JMT060	555	24%	6896.6	7.28	24.40
3	Regional Pond MN	Regional	Middle Tributary	Regional Pond MN	169	28%	6851.4	2.45	3.25
1	Woodmen Hills Pond #5	On-site	Middle Tributary	MT090	28	64%	6852.5	1.99	2.25
5	Regional Pond R1	Regional	West Tributary @ N	JWT296	548	14%	6760.3	6.72	12.31
~~1~~	~~Paint Brush Hills Pond #4~~	~~On-site~~	~~East Tributary~~	~~ET010~~	~~93~~	~~29%~~		~~2.78~~	
1	Sub Regional Pond SR6	Sub Regional	East Tributary	~~JET020~~	229	31%	7100.0	7.39	16.34
2	Woodmen Hills Pond #1 North	Sub Regional	East Tributary	Woodmen Hills Pond #1 North	N/A Place EURV in d/s Woodmen Hills Pond #1 South. Use Existing SSD curve up to 100-yr stage.				
3	Woodmen Hills Pond #1 South	Sub Regional	East Tributary	Woodmen Hills Pond #1 South	226	26%	6952.5	5.96	10.86
4	Woodmen Hills Pond #2	Sub Regional	East Tributary	Woodmen Hills Pond #2	75	19%	6926.8	1.36	0.67
5	Woodmen Hills Pond #3	Sub Regional	East Tributary	Woodmen Hills Pond #3	183	22%	6900.7	2.26	1.58
6	Woodmen Hills Pond #4	Sub Regional	East Tributary	Woodmen Hills Pond #4	346	34%	6858.7	12.39	16.88
~~7~~	~~Sub Regional Pond SR5~~	~~Sub Regional~~	~~East Tributary~~	~~JET152~~	~~673~~	~~8%~~			
8	Regional Pond R2	Regional	West Tributary d/s	JWT372	1,882	5%	6639.3	3.13	15.00

Notes

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[2] From the Falcon_DBPS HEC-HMS model

[3] Only includes area draining directly to the pond. This does not include the area draining to an upstream detention pond if one exists. This column is for sizing the EURV/WQCV only.

[4] Calculated in ArcMap using the existing impervious area coverage and average impervious area values for undeveloped land with known future land use

[5] Corresponds to the stage within the existing pond grading given the required storage volume or the stage within the proposed pond with an assumed triangular pond grading

[6] Calculated using UDFCD criteria. Watershed is primarily covered by HSG B soils in the developed condition.

[7] Calculated using UDFCD EURV criteria for a 72-hr drain time or UDFCD WQCV criteria for a 40-hr drain time

[8] Estimated based on the intersection of the 100-yr release rate with the desending portion of the Developed 100-yr hydrograph. For proposed ponds the maximum pond volume was set based on a maximum depth of 10ft within the approximated grading.

[9] According to existing pond volume estimates calculated in this DBPS based on pond volume at the spillway elevation. See the Hydrology Section for assumptions on storage volume.

[10] Developed flows account for existing and proposed upstream detention

[11] Targeted the release of the historical 100-yr flow where possible given storage constraints. In some instances released flows are higher or lower depending on the available storage volume in existing detention ponds. This number was modified from the initial estiamte based on modeling results. All release rates reflect a 100-yr WSE that is at the spillway elevation (no spillway overtopping).

[12] Corresponds to stage/storage at an elevation of 2ft above the 100-yr stage or where existing pond grading limits stage.

[13] Set at the 100-yr release rate + the peak 100-yr inflow

Falcon DBPS

Sub Regional Ponds (Including Existing Detention Ponds)

Pond Description					100-yr						Spillway Overtopping		
Modeling Order	Name	Pond Type[1]	Location	Inflow Hydrograph[2]	Stage (ft)[5]	Required Storage (AF)[8]	Constructed Storage (AF)[9]	Developed Q_{100} (cfs)[10]	Historical Q_{100} (cfs)[2]	Release Rate (cfs)[11]	Stage (ft)[12]	Storage (AF)[12]	Release Rate (cfs)[13]
1	Sub Regional Pond SR1	Sub Regional	West Tributary	JWT080	7224.8	11.03	Proposed Pond	610.6	509	513	7226.8	15.18	1,124
1	Paint Brush Hills Pond C	On-site	West Tributary	WT100	7,200	6.77	6.77	303	200	144	7202	10.80	447
1	Paint Brush Hills Pond A	On-site	West Tributary	WT130	7,148	2.62	2.62	173	97	142	7150	4.89	315
1	Paint Brush Hills Pond B1	On-site	West Tributary	Paint Brush Hills Pond B1	Use existing SSD curve. Provide additional 100-yr control in Paint Brush Hills Pond B2.								
1	Paint Brush Hills Pond B2	On-site	West Tributary	Paint Brush Hills Pond B2	7,148	12.09	12.09	267	171	191	7150	17.28	458
2	Sub Regional Pond SR2	Sub Regional	West Tributary	JWT174	N/A	N/A	Proposed Pond	842	952	N/A	7083	4.21	844
1	The Meadows Pond #1	On-site	West Tributary	WT190	7,015	3.25	3.25	75	14	2.2	7016	4.56	77
3	Sub Regional Pond SR3	Sub Regional	West Tributary	JWT200	N/A	N/A	Proposed Pond	908	988	N/A	6943.3	1.97	909
4	Regional Pond WU South	Regional	West Tributary	Regional Pond WU South	6,832	39.54	39.54	1,069	1,057	932	6834	50.38	2,001
~~1~~	~~Woodmen Hills Pond H~~	~~Sub Regional~~	~~Middle Tributary~~	~~Woodmen Hills Pond H~~	~~N/A~~	~~18.65~~	~~2.66~~	~~748~~	~~288~~	~~288~~	~~N/A~~	~~N/A~~	~~1,036~~
1	The Meadows Pond #2	On-site	Middle Tributary	MT010	7,011	7.94	7.94	206	57	99	7012	9.88	305
2	Sub Regional Pond SR4	Sub Regional	Middle Tributary	JMT060	6,898	19.37	Proposed Pond	1,016	328	727	6900	43.33	1,743
3	Regional Pond MN	Regional	Middle Tributary	Regional Pond MN	6,854	7.53	7.53	854	355	825	6856	11.93	1,679
1	Woodmen Hills Pond #5	On-site	Middle Tributary	MT090	6,854	4.10	4.10	127	19	19	6856	7.42	146
5	Regional Pond R1	Regional	West Tributary @ N	JWT296	6,766	25.00	Proposed Pond	1,560	1,431	1,505	6768	32.00	3,065
~~1~~	~~Paint Brush Hills Pond #4~~	~~On-site~~	~~East Tributary~~	~~ET010~~		~~5.91~~	~~1.34~~	~~198~~	~~86~~	~~86~~			~~284~~
1	Sub Regional Pond SR6	Sub Regional	East Tributary	~~JET020~~	7,102	11.82	Proposed Pond	385	198	195	7104	16.44	580
2	Woodmen Hills Pond #1 North	Sub Regional	East Tributary	Woodmen Hills Pond #1 North	6,960	7.13	7.13	388	242	264	Use existing SSD after 100-yr stage.		
3	Woodmen Hills Pond #1 South	Sub Regional	East Tributary	Woodmen Hills Pond #1 South	6,954	8.78	8.78	264	242	261	6958	17.50	525
4	Woodmen Hills Pond #2	Sub Regional	East Tributary	Woodmen Hills Pond #2	6,930	9.18	9.18	270	246	250	6934	23.09	520
5	Woodmen Hills Pond #3	Sub Regional	East Tributary	Woodmen Hills Pond #3	6,902	8.35	8.35	530	255	360	6904	20.46	890
6	Woodmen Hills Pond #4	Sub Regional	East Tributary	Woodmen Hills Pond #4	6,862	40.45	44.20	789	251	259	6864	60.00	1,048
~~7~~	~~Sub Regional Pond SR5~~	~~Sub Regional~~	~~East Tributary~~	~~JET152~~									~~0~~
8	Regional Pond R2	Regional	West Tributary d/s	JWT372	6,644	7.90	Proposed Pond	2,235	1,674	2,233	6646	16.00	4,468

Notes

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[4] Calculated in ArcMap using the existing impervious area coverage and average impervious area values for undeveloped land with known future land use

[5] Corresponds to the stage within the existing pond grading given the required storage volume or the stage within the proposed pond with an assumed triangular pond grading

[6] Calculated using UDFCD criteria. Watershed is primarily covered by HSG B soils in the developed condition.

[7] Calculated using UDFCD EURV criteria for a 72-hr drain time or UDFCD WQCV criteria for a 40-hr drain time

[8] Estimated based on the intersection of the 100-yr release rate with the desending portion of the Developed 100-yr hydrograph. For proposed ponds the maximum pond volume was set based on a maximum depth of 10ft within the approximated grading.

[9] According to existing pond volume estimates calculated in this DBPS based on pond volume at the spillway elevation. See the Hydrology Section for assumptions on storage volume.

[10] Developed flows account for existing and proposed upstream detention

[11] Targeted the release of the historical 100-yr flow where possible given storage constraints. In some instances released flows are higher or lower depending on the available storage volume in existing detention ponds. This number was modified from the initial estiamte based on modeling results. All release rates reflect a 100-yr WSE that is at the spillway elevation (no spillway overtopping).

[12] Corresponds to stage/storage at an elevation of 2ft above the 100-yr stage or where existing pond grading limits stage.

[13] Set at the 100-yr release rate + the peak 100-yr inflow

Falcon DBPS

Sub Regional Ponds (Including Existing Detention Ponds)

Pond Description					Pond Type	Design Notes
Modeling Order	Name	Pond Type[1]	Location	Inflow Hydrograph[2]		
~~1~~	~~Sub Regional Pond SR1~~	~~Sub Regional~~	~~West Tributary~~	~~JWT080~~	~~WQCV+100-yr~~	~~No EURV required per UDFCD criteria. Used WQCV instead to control low flows.~~
1	Paint Brush Hills Pond C	On-site	West Tributary	WT100	EURV+100-yr	Enough room for EURV, release less than historical Q100 to maximize pond volume
1	Paint Brush Hills Pond A	On-site	West Tributary	WT130	WQCV+100-yr	Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Release more than historical Q100 due to pond volume limitations.
1	Paint Brush Hills Pond B1	On-site	West Tributary	Paint Brush Hills Pond B1	Existing configuration	Use existing SSD curve without modification. Provide additional 100-yr control and EURV in Pond B2 as the outlet structure in this pond will be easier to retrofit.
1	Paint Brush Hills Pond B2	On-site	West Tributary	Paint Brush Hills Pond B2	EURV+100-yr	Enough room for EURV, released more than historical Q100 due to pond volume limitations
2	Sub Regional Pond SR2	Sub Regional	West Tributary	JWT174	EURV only	Only using EURV. 100-yr flow is already less than historic upstream of this location.
1	The Meadows Pond #1	On-site	West Tributary	WT190	EURV+100-yr	Enough room for EURV, release less than historical Q100 to maximize pond volume
3	Sub Regional Pond SR3	Sub Regional	West Tributary	JWT200	EURV only	Only using EURV. 100-yr flow is already less than historic upstream of this location.
4	Regional Pond WU South	Regional	West Tributary	Regional Pond WU South	EURV+100-yr	Enough room for EURV, released less than historical to optimize pond volume
~~1~~	~~Woodmen Hills Pond H~~	~~Sub Regional~~	~~Middle Tributary~~	~~Woodmen Hills Pond H~~	~~Existing configuration~~	NO RETROFIT. Pond is grossly undersized. Can't do anything as there isn't enough pond volume to even control the 2-year. Recommend, but not design, on-site detention u/s of pond? Major problem - pond is off MT main stem and therefore overtopping deficiencies were not identified but this road crossing will likely overtop. Try and incorporate WQCV in proposed Sub Regional Pond SR4 downstream.
1	The Meadows Pond #2	On-site	Middle Tributary	MT010	EURV+100-yr	Enough room for EURV, released more than historical Q100 due to pond volume limitations
2	Sub Regional Pond SR4	Sub Regional	Middle Tributary	JMT060	WQCV+100-yr	Included Woodmen Hills Pond H DA. Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Released more than historical Q100 due to pond volume limitations at the proposed pond site.
3	Regional Pond MN	Regional	Middle Tributary	Regional Pond MN	WQCV+100-yr	Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Release more than historical Q100 due to pond volume limitations.
1	Woodmen Hills Pond #5	On-site	Middle Tributary	MT090	EURV+100-yr	Enough room for EURV, release less than historical Q100 to maximize pond volume
5	Regional Pond R1	Regional	West Tributary @ N	JWT296	EURV+100-yr	Enough room for EURV, released more than historical Q100 due to pond volume limitations
~~1~~	~~Paint Brush Hills Pond #4~~	~~On-site~~	~~East Tributary~~	~~ET010~~	~~Existing configuration~~	NO RETROFIT. Pond is grossly undersized. Can't do anything as there isn't enough pond volume to even control the 2-year. Recommend, but not design, on-site detention u/s of pond. Try and incorporate EURV in proposed Sub Regional Pond SR6 downstream.
1	Sub Regional Pond SR6	Sub Regional	East Tributary	~~JET020~~	EURV+100-yr	Included DA to Paint Brush Hills Pond #4 in EURV. Released at historical 100-yr.
2	Woodmen Hills Pond #1 North	Sub Regional	East Tributary	Woodmen Hills Pond #1 North	100-yr	Placing EURV in #1 south. Use #1 north as 100-yr attenuation. Reduce 100-yr as much as possible given storage constraints. Use existing SSD up to, and after, 100-yr stage.
3	Woodmen Hills Pond #1 South	Sub Regional	East Tributary	Woodmen Hills Pond #1 South	EURV only	Enough room for EURV. Pond only has enough volume to detain the EURV but not the 100-yr. This is acceptable since the 100-yr flow at this point is 264 cfs and the historical flow is 242 cfs.
4	Woodmen Hills Pond #2	Sub Regional	East Tributary	Woodmen Hills Pond #2	EURV+100-yr	Enough room for EURV. Pond also can be retrofit to release the ~ historical 100-yr flow. The depth of the EURV is 0.8ft. UDFCD criteria says 1ft is the minimum depth. Assume this is ok at this point.
5	Woodmen Hills Pond #3	Sub Regional	East Tributary	Woodmen Hills Pond #3	WQCV+100-yr	Used WQCV instead. Using an EURV resulted in very little depth between the EURV WSE and the 100-yr WSE which may result in an infeasible outlet structure configuration. Release more than historical Q100 due to pond volume limitations.
6	Woodmen Hills Pond #4	Sub Regional	East Tributary	Woodmen Hills Pond #4	EURV+100-yr	
~~7~~	~~Sub Regional Pond SR5~~	~~Sub Regional~~	~~East Tributary~~	~~JET152~~	~~Not using pond~~	Not an effective location. Only ~1.5AF of storage available and EURV required at this location is ~3.5AF.
8	Regional Pond R2	Regional	West Tributary d/s	JWT372	EURV only	Only using EURV. Included DA from Sub Regional Pond SR5 in EURV. Had to increase discharge to 15 cfs, which was above what was calculated using UDFCD criteria, because drain time was much greater than 72-hr. Not enough available storage volume for 100-yr control.

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[6] Calculated using UDFCD criteria. Watershed is primarily covered by HSG B soils in the developed condition.

[7] Calculated using UDFCD EURV criteria for a 72-hr drain time or UDFCD WQCV criteria for a 40-hr drain time

[8] Estimated based on the intersection of the 100-yr release rate with the desending portion of the Developed 100-yr hydrograph. For proposed ponds the maximum pond volume was set based on a maximum depth of 10ft within the approximated grading.

[9] According to existing pond volume estimates calculated in this DBPS based on pond volume at the spillway elevation. See the Hydrology Section for assumptions on storage volume.

[10] Developed flows account for existing and proposed upstream detention

[11] Targeted the release of the historical 100-yr flow where possible given storage constraints. In some instances released flows are higher or lower depending on the available storage volume in existing detention ponds. This number was modified from the initial estiamte based on modeling results. All release rates reflect a 100-yr WSE that is at the spillway elevation (no spillway overtopping).

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Falcon DBPS

Sub Regional Reach Alternative Screening

Screening Parameter			Notes
Protect in Place			If the reach is currently in a stable condition and if the detained condition flows are less than, or equal to, the existing conditions flows
Max. 2-yr Channel Shear Stress	1.41	lb/ft2	based on average calculated shear stress for existing reaches that are stable, outside of the Black Forest, and that are not roadside ditches
Max. 100-yr Floodplain Shear Stress	1.49	lb/ft2	based on the floodplain shear stress for existing reaches that are stable, outside of the Black Forest, and that are not roadside ditches
Max. Stable Slope for NCD	0.015	ft/ft	Calculated average slope for existing reaches that are stable, outside of the Black Forest, and that are not roadside ditches = 0.017 ft/ft.
Max. 2-yr Channel Shear Stress (Black Forest)	0.80	lb/ft2	based on average calculated shear stress for existing reaches that are stable, within the Black Forest, and that are not roadside ditches
Max. 100-yr Floodplain Shear Stress (Black Forest)	0.84	lb/ft2	based on the floodplain shear stress for existing reaches that are stable,within the Black Forest, and that are not roadside ditches
Max. Stable Slope for NCD (Black Forest)	0.025	ft/ft	Calculated average slope for existing reaches that are stable, within the Black Forest, and that are not roadside ditches = 0.025 ft/ft.
Required Width for NCD			Required width = belt width. Estimated using Equation 32 in Table 7.7 for Belt Width in Stream Corridor Restoration, Federal Interagency Stream Restoration Working Group 1998 (Rev 2001). Adopted as Part 653 of the National Engineering Handbook, USDA-Natural Resources Conservation Service.
Min. 3-ft Drop Structure Spacing	100	ft	Estimated based on aesthetics
Maximum Exposed Structure Height (Small Drops)	3	ft	A maximum structure height of 3 ft will be exposed at the Target Slope while an additional 3 ft will be keyed in below grade
Pool-to-Pool Spacing for NCD	7	Mult. of $W_{Low\ Flow}$	Hydraulic Design of Stream Restoration Projects (TR-01-28), USACE 2001. Using 7*WLow Flow (range is 5-7). multiplier
Maximum Exposed Structure Height (NCD)	1.5	ft	A maximum boulder height of 1 ft would be exposed or a maximum exposed riffle drop height of 1ft would be used. 2

Reach	Manning's n-value[1]	Location Notes	Stable Reach?[2]	Reach Length (ft)	Drainage Area (mi^2)	Reach Slope (ft/ft)[3]	Q_2[4] (cfs)	Q_{100}[4] (cfs)	$Q_{Low\ Flow}$[5] (cfs)	$W_{Low\ Flow}$[6] (ft)	Low Flow Design Slope[7] (ft/ft)	Returned to Historical Flows?	2-yr Channel Shear Stress (lb/ft^2)[8]	100-yr Floodplain Shear Stress (lb/ft^2)[8]	Available Width (ft)[9]	Required Width (ft)[10]	# of 3-ft Drops[11]	Distance Between 3-ft Drops	Reach Alternative
RET020	0.05			1,915	0.15	0.025	29	150	48	18	0.0079	No	1.72	1.01	244	95	6.0	319	Small Drop Structures w/ Toe Protection
RET030	0.07			5,042	0.36	0.015	9	190	69	21	0.0078	Yes	3.37	2.81	40	113	7.0	720	Small Drop Structures w/ Toe Protection
RET040	0.07			1,820	0.56	0.021	45	270	82	23	0.0075	No	3.17	1.49	73	124	5.0	364	Small Drop Structures w/ Toe Protection
RET050	0.07		Yes	1,772	0.71	0.022	10	260	90	24	0.0038	Yes	3.43	2.26	71	129	11.0	161	Protect In Place
RET060	0.05		Yes	1,718	0.83	0.013	10	250	96	24	0.0038	Yes	1.71	3.07	148	133	6.0	286	Protect In Place
RET070	0.07		Yes	2,085	1.11	0.020	13	360	107	26	0.0036	Yes	3.38	2.54	194	141	12.0	174	Protect In Place
RET080	0.07		Yes	1,451	1.36	0.005	65	520	116	27	0.0034	No	2.50	3.77	235	146	1.0	1451	Protect In Place
RET090	0.07		Yes	343	1.66	0.006	15	260	126	28	0.0038	Yes	1.95	1.28	48	152	1.0	343	Protect In Place
RET100	0.03			1,791	1.78	0.022	30	300	129	28	0.0075	No	0.74	0.72	214	154	5.0	358	Small Drop Structures w/ Toe Protection
RET110	0.03			2,751	1.83	0.016	32	300	131	28	0.0075	No	0.88	0.28	54	155	4.0	688	Small Drop Structures w/ Toe Protection
RET120	0.03			1,379	2.05	0.005	42	350	137	29	0.0037	No	0.48	0.25	164	158	1.0	1379	Natural Channel Design
RET140	0.03	Roadside Ditch		4,052	0.13	0.013	11	85	47	18	0.0041	No	0.31	0.41	20	94	13.0	312	Roadside Ditch Improvement
RET152	0.03			2,030	2.16	0.019	49	400	140	29	0.0072	No	0.64	0.72	84	160	5.0	406	Small Drop Structures w/ Toe Protection
RET154	0.05		Yes	2,357	0.40	0.013	26	200	72	22	0.0039	No	0.16	0.38	200	116	8.0	295	Natural Channel Design
RET156	0.03		Yes	942	2.57	0.008	55	560	149	30	0.0034	No	0.51	0.37	107	165	2.0	471	Natural Channel Design
RET162	0.05			3,256	2.74	0.011	60	590	153	30	0.0066	No	1.83	1.61	219	167	3.0	1085	Small Drop Structures w/ Toe Protection
RET164	0.03	Roadside Ditch		2,072	2.93	0.013	66	630	157	30	0.0033	No	0.73	1.11	19	169	7.0	296	Roadside Ditch Improvement
RMT030	0.03	Roadside Ditch	Yes	3,636	0.09	0.020	25	140	40	17	0.0040	No	0.43	0.96	20	87	20.0	182	Protect In Place
RMT040	0.03	Roadside Ditch	Yes	1,310	0.25	0.009	49	290	59	20	0.0037	No	0.54	1.06	32	106	3.0	437	Protect In Place
RMT050	0.03			1,568	0.56	0.019	110	750	82	23	0.0062	No	1.19	1.55	53	123	4.0	392	Small Drop Structures w/ Toe Protection
RMT062	0.05		Yes	5,688	0.29	0.020	5	99	63	20	0.0081	No	2.10	0.94	58	109	12.0	474	Small Drop Structures w/ Toe Protection
RMT064	0.05			3,358	0.67	0.016	120	850	88	24	0.0060	No	0.84	1.96	65	128	6.0	560	Small Drop Structures w/ Toe Protection
RMT070	0.05		Yes	1,065	1.16	0.011	27	730	109	26	0.0031	No	0.82	2.01	196	142	3.0	355	Protect In Place
RMT102	0.07		Yes	1,021	1.42	0.023	32	820	118	27	0.0061	No	1.96	1.24	138	147	3.0	340	Small Drop Structures w/ Toe Protection
RMT104	0.05		Yes	874	0.04	0.015	1	19	30	15	0.0083	No	0.18	0.67	63	76	1.0	874	Small Drop Structures w/ Toe Protection
RMT106	0.07		Yes	226	1.46	0.004	33	830	120	27	0.0030	No	2.96	0.77	55	148	1.0	226	Small Drop Structures w/ Toe Protection
RMT112	0.07		Yes	3,372	1.52	0.015	33	840	121	27	0.0060	No	2.71	1.88	111	149	6.0	562	Small Drop Structures w/ Toe Protection
RMT114	0.05		Yes	1,667	1.64	0.018	34	860	125	27	0.0060	No	1.79	1.05	119	151	4.0	417	Small Drop Structures w/ Toe Protection
RWT030	0.05	Black Forest	Yes	2,078	0.07	0.023	4	42	36	16	0.0041	No	0.35	0.77	28	82	14.0	148	Protect In Place
RWT042	0.05	Black Forest	Yes	1,554	0.14	0.026	9	85	48	18	0.0041	No	0.40	0.89	50	95	12.0	130	Protect In Place
RWT044	0.05	Black Forest	Yes	2,448	0.14	0.028	9	89	47	18	0.0041	No	1.23	1.02	33	94	20.0	122	Protect In Place
RWT046	0.05	Black Forest	Yes	2,393	0.28	0.023	15	170	62	20	0.0039	No	1.23	0.69	51	108	16.0	150	Protect In Place
RWT054	0.05	Black Forest		2,497	0.46	0.023	24	260	76	22	0.0076	No	1.46	0.87	67	119	7.0	357	Small Drop Structures w/ Toe Protection
RWT080	0.05			3,494	0.17	0.027	14	130	51	19	0.0080	No	0.40	1.26	40	98	12.0	291	Small Drop Structures w/ Toe Protection
RWT092	0.03			626	0.85	0.019	43	480	97	25	0.0069	No	0.75	0.63	41	134	2.0	313	Small Drop Structures w/ Toe Protection
RWT094	0.03			2,145	1.09	0.013	42	510	107	26	0.0034	No	0.75	0.66	94	140	7.0	306	Natural Channel Design
RWT122	0.03			518	1.43	0.014	47	620	119	27	0.0033	Yes	0.38	0.99	106	148	2.0	259	Natural Channel Design
RWT124_upstream	0.03			1,246	1.63	0.018	51	680	125	27	0.0064	Yes	0.48	0.00	128	151	3.0	415	Small Drop Structures w/ Toe Protection
RWT124_downstream	0.03			1,039	1.63	0.018	51	680	125	27	0.0032	Yes	0.00	0.00	128	151	5.0	208	Protect In Place
RWT150	0.05		Yes	3,741	0.13	0.013	32	180	46	18	0.0039	No	0.53	0.87	106	93	12.0	312	Natural Channel Design
RWT160	0.05		Yes	1,566	0.36	0.020	10	180	69	21	0.0039	Yes	0.37	1.08	173	113	9.0	174	Protect In Place
RWT172	0.05		Yes	2,910	1.77	0.020	54	710	129	28	0.0032	Yes	1.13	1.04	150	154	17.0	171	Protect In Place
RWT174	0.05		Yes	1,871	0.47	0.016	35	190	76	22	0.0078	No	0.31	0.61	224	119	3.0	624	Small Drop Structures w/ Toe Protection
RWT176	0.03		Yes	279	2.24	0.014	65	840	142	29	0.0030	Yes	0.78	1.56	160	161	2.0	139	Protect In Place
RWT180	0.05		Yes	3,592	2.36	0.021	65	840	145	29	0.0030	Yes	0.48	0.93	135	162	22.0	163	Protect In Place
RWT202	0.05		Yes	2,964	2.46	0.022	66	850	147	29	0.0030	Yes	1.54	4.02	77	164	19.0	156	Protect In Place
RWT204	0.05		Yes	3,538	0.06	0.022	0	2	33	16	0.0042	Yes	0.00	0.23	92	80	21.0	168	Protect In Place
RWT210_upstream	0.03			2,132	2.82	0.014	71	910	155	30	0.0029	Yes	0.72	0.51	196	168	8.0	267	Natural Channel Design
RWT210_downstream	0.03			640	2.82	0.014	71	910	155	30	0.0029	Yes	0.72	0.51	196	168	11.0	252	Protect In Place
RWT232	0.05		Yes	2,034	3.09	0.019	80	1000	161	31	0.0028	Yes	1.34	0.30	99	171	12.0	170	Protect In Place
RWT234	0.05		Yes	2,129	0.19	0.020	47	250	53	19	0.0076	No	0.48	1.00	184	100	5.0	426	Small Drop Structures w/ Toe Protection
RWT240	0.05			2,344	3.47	0.006	87	1100	168	31	0.0027	No	2.94	0.03	112	175	3.0	781	Protect In Place
RWT240_Diversion Reach	0.07		Yes	928	3.47	0.013	24	39	168	31	0.0041	Yes	0.60	0.73	108	175	3.0	309	Protect In Place
RWT250	0.07		Yes	178	3.55	0.006	42	970	170	31	0.0028	Yes	1.73	0.00	35	175	1.0	178	Protect In Place
RWT260	0.05		Yes	2,189	3.70	0.016	62	980	172	32	0.0028	Yes	2.15	1.60	160	177	10.0	219	Protect In Place
RWT291	0.05		Yes	923	3.84	0.024	70	1000	175	32	0.0028	Yes	2.02	3.94	70	178	7.0	132	Protect In Place
RWT292	0.05		Yes	726	0.03	0.017	11	57	27	14	0.0041	No	0.19	0.36	44	72	4.0	181	Protect In Place
RWT294	0.05		Yes	544	0.27	0.015	33	250	61	20	0.0038	No	0.28	0.71	89	107	2.0	272	Protect In Place
RWT295	0.05		Yes	196	3.87	0.010	73	1000	176	32	0.0028	Yes	1.84	1.01	424	178	1.0	196	Protect In Place
RWT296	0.05			1,134	4.13	0.010	93	1000	180	32	0.0056	No	1.84	1.01	201	181	1.0	1134	Small Drop Structures w/ Toe Protection
RWT312	0.05		Yes	3,291	0.10	0.027	12	91	41	17	0.0040	No	0.41	0.88	162	88	25.0	132	Protect In Place
RWT314	0.05		Yes	2,273	5.88	0.016	77	1500	207	34	0.0023	Yes	2.51	3.84	165	193	11.0	207	Protect In Place
RWT320	0.05		Yes	2,352	6.25	0.010	79	1500	212	35	0.0023	Yes	2.36	3.83	86	195	6.0	392	Protect In Place
RWT344	0.03	Roadside Ditch	Yes	1,379	0.33	0.011	32	250	66	21	0.0038	No	0.26	0.89	17	111	4.0	345	Roadside Ditch Improvement
RWT352	0.05		Yes	3,003	6.46	0.013	80	1500	215	35	0.0023	Yes	1.84	2.93	123	197	11.0	273	Protect In Place
RWT354	0.05			16	9.69	0.011	130	2100	252	37	0.0018	No	0.01	0.64	39	212	1.0	16	Roadside Ditch Improvement
RWT372	0.07			1,377	10.30	0.020	140	2100	258	38	0.0036	No	5.35	4.15	147	215	4.0	344	Small Drop Structures w/ Toe Protection
RWT374	0.05		Yes	2,314	0.07	0.016	7	55	35	16	0.0041	No	0.27	0.59	125	82	10.0	231	Protect In Place
RWT376	0.05		Yes	2,483	10.36	0.011	140	2100	259	38	0.0018	No	2.50	2.08	89	215	8.0	310	Protect In Place

Notes

[1] Channel Manning's n-value determined in the Hydrology Section

[2] Reach appears to be stable in it's existing condition. Based on limited field observation and inspection of aerial photography. The entire reach has to be stable in order to be considered a stable reach.

[3] Reach length and slope for the main stem of each tributary were adjusted from the values reported in the Alternatives Analysis in order to correspond with the length, alignment, and slope of the center line delineated for the HEC-RAS models. Initially, the lengths and slopes were obtained from the reaches delineated in the Hydrology Section. Changes were not significant. No changes were made to the minor tributaries as they were not modeled with HEC-RAS.

[4] Peak flow with all proposed detention in place

[5] Referenced Technical Memorandum - Low Flow Estimation for Natural Channel Design dated April 9th, 2013 prepared for the udpated to the City DCM. QLow Flow with this equation is much higher than Q2. Assume this is OK because QLow Flow only impacts estimated stable slope.

[6] Referenced Section 3.1.1.1 in update to City DCM. This is the width that was used for all structure widths. Bankfull data for the Falcon Watershed correlated very well with bankfull data for the Jimmy Camp Creek Watershed. Using Low Flow channel width as outlined in DCM to provide a more conservative cost estimate.

[7] Referenced Section 3.1.2 in update to City DCM. Doubled Small Drops slopes as per phone conversation with Jeff Rice 2/21.

[8] From HEC-RAS for reaches that were modeled with HEC-RAS. From FlowMaster calculations for all other reaches.

[9] Measured in GIS. Estimated using the most restrictive location for each reach. Available reach width is constricted by: FEMA floodplain, adjacent property lines, ridges, minimizing potential earthwork, and the incised portion of the channel if it's extremely deep. Assuming the channel can only be filled if there is not an upstream reach present or where the reach is severely degraded and filling the reach will not obstruct flow in the upstream reach.

[10] Estimated using Equation 32 in Table 7.7 for Belt Width in Stream Corridor Restoration, Federal Interagency Stream Restoration Working Group 1998 (Rev 2001). Adopted as Part 653 of the National Engineering Handbook, USDA-Natural Resources Conservation Service. Using low flow channel width instead of bankfull channel width therefore this should be a conservative number.

Falcon DBPS

Pond Effectiveness

Hydrologic Element	Pond Type	Area (sq mi)	Inflow (cfs)[1]		Outflow (cfs)[1]		% Reduction		Estimated 100-yr Drain Time (hr)[2]	Benefits		
			2-year	100-year	2-year	100-year	2-year	100-year		2-yr Peak Flow Reduction (cfs)	100-yr Peak Flow Reduction (cfs)	EURV/WQCV
Paint Brush Hills Pond #4	Existing configuration	0.15	38	198	29	151	22%	24%	10	x	x	
Paint Brush Hills Pond A	WQCV+100-yr	0.10	35	173	7	142	81%	18%	45	x	x	x
Paint Brush Hills Pond B1	Existing configuration	0.36	80	423	51	267	36%	37%	25	x	x	
Paint Brush Hills Pond B2	EURV+100-yr	0.36	51	267	10	182	81%	32%	46	x	x	x
Paint Brush Hills Pond C	EURV+100-yr	0.19	56	303	3	144	95%	53%	57	x	x	x
Regional Pond MN	WQCV+100-yr	1.42	65	854	32	824	51%	3%	72	x		x
Regional Pond R1	EURV+100-yr	5.88	113	1,561	77	1,506	32%	3%	72	x		x
Regional Pond R2	EURV only	10.36	143	2,233	140	2,232	2%	0%	>72			x
Regional Pond WU South	EURV+100-yr	3.55	47	1,072	22	932	54%	13%	72	x	x	x
Sub Regional Pond SR1	WQCV+100-yr	1.09	54	611	42	513	22%	16%	51	x	x	x
Sub Regional Pond SR2	EURV only	2.36	65	842	65	839	0%	0%	72			x
Sub Regional Pond SR3	EURV only	2.82	72	908	72	907	1%	0%	>72			x
Sub Regional Pond SR4	WQCV+100-yr	1.16	133	1,016	27	727	80%	28%	56	x	x	x
Sub Regional Pond SR6	EURV+100-yr	0.36	74	385	9	195	87%	49%	47	x	x	x
The Meadows Pond #1	EURV+100-yr	0.06	11	75	0	2	97%	97%	72	x	x	x
The Meadows Pond #2	EURV+100-yr	0.29	28	206	5	99	81%	52%	62	x	x	x
Woodmen Hills Pond #1 North	100-yr	0.71	65	388	61	264	6%	32%	26		x	
Woodmen Hills Pond #1 South	EURV only	0.71	61	264	10	261	84%	1%	65	x		x
Woodmen Hills Pond #2	EURV+100-yr	0.83	37	270	10	250	72%	7%	>72	x		x
Woodmen Hills Pond #3	WQCV+100-yr	1.11	105	530	13	361	88%	32%	>72	x	x	x
Woodmen Hills Pond #4	EURV+100-yr	1.66	114	789	15	259	87%	67%	72	x	x	x
Woodmen Hills Pond #5	EURV+100-yr	0.04	40	127	1	19	96%	85%	58	x	x	x
Woodmen Hills Pond H	Existing configuration	0.56	142	748	108	752	24%	0%	26	x		

Notes:

1 From Falcon_DBPS_SubRegional.hms file

2 Assumed a 72-hr drain time if the remaining storage volume was less than 5% of total pond volume after 72 hour simultaion.

Existing ponds and 100-yr ponds do not have a targeted drain time.

Per a phone conversation with Ken MacKenzie on 02/04/2013, the simplified equations for EURV target a drain time of 72-hours, however, actual drain times could vary between ~40-72 hours.

Ponds were sized using simplified UDFCD equations for EURV and WQCV design. Detailed design (optimizing drain time scenarios) is not part of this scope.

Assume WQCV ponds are functioning properly if they drain between ~40 and ~72 hours.

Assume EURV ponds are functioning properly if they drain between ~48 and ~72 hours.

In instances where EURV ponds release faster than 72 hours, reducing pond discharge to meet the 72-hr drain time would not change the downstream reach alternative.

Falcon DBPS
Minor Tributary Shear Stress Calculations

Reach	Slope (ft/ft)[1]	2-yr			100-yr		
		Flow (cfs)[2]	Hydraulic Radius (ft)[3]	Shear Stress (lb/ft^2)[4]	Flow (cfs)[2]	Hydraulic Radius (ft)[3]	Shear Stress (lb/ft^2)[4]
RET154	0.013	26	0.19	0.16	200	0.46	0.38
RMT050	0.019	110	1	1.19	750	1.3	1.55
RMT064	0.016	120	0.84	0.84	850	1.95	1.96
RMT104	0.015	1	0.19	0.18	19	0.72	0.67
RWT030	0.023	4	0.24	0.35	42	0.53	0.77
RWT042	0.026	9	0.24	0.40	85	0.54	0.89
RWT080	0.027	14	0.24	0.40	130	0.75	1.26
RWT150	0.013	32	0.64	0.53	180	1.05	0.87
RWT160	0.020	10	0.29	0.37	180	0.85	1.08
RWT174	0.016	35	0.31	0.31	190	0.61	0.61
RWT204	0.022	0	0	0.00	2	0.17	0.23
RWT234	0.020	47	0.38	0.48	250	0.8	1.00
RWT240_Diversion Reach	0.013	24	0.74	0.60	39	0.9	0.73
RWT292	0.017	11	0.18	0.19	57	0.35	0.36
RWT294	0.015	33	0.31	0.28	250	0.78	0.71
RWT312	0.027	12	0.25	0.41	91	0.53	0.88
RWT374	0.016	7	0.27	0.27	55	0.59	0.59

Notes

[1] From routing parameters in Hydrology Section

[2] Design flow from Plan Development w/ Sub Regional Detention

[3] Calculated in FlowMaster based on cross section from existing topography

[4] Shear Stress = gamma*R*S where gamma = 62.4 lb/ft^3, R = hydraulic radius, and S = longitudinal slope

Falcon DBPS
Future Detention Pond Deficiency Analysis (overtopping only)

Pond	HEC-RAS River Station	Tributary	RAS 100-yr Flow (cfs)	Spillway Elevation (ft)[1]	RAS 100-yr WSE (ft)	HMS 100-yr WSE (ft)[2]	Overtopping[3]	RAS Overtopping	HMS Overtopping
Pond WU Outlet Structure	17840	West Tributary	1100	6832	6833	6832	YES	YES	NO
Paint Brush Hills Pond A Outlet Structure	N/A	West Tributary	N/A	7148	N/A	7148.7	YES	N/A	YES
Paint Brush Hills Pond B1 Outlet Structure	N/A	West Tributary	N/A	7158	N/A	7158.1	YES	N/A	YES
Paint Brush Hills Pond B2 Outlet Structure	N/A	West Tributary	N/A	7148	N/A	7148.4	YES	N/A	YES
Paint Brush Hills Pond C Outlet Structure	N/A	West Tributary	N/A	7200	N/A	7200.3	YES	N/A	YES
The Meadows Pond #1 Outlet Structure	N/A	West Tributary	N/A	7015	N/A	7013.0	NO	N/A	NO
The Meadows Pond #2 Outlet Structure	15205.815	Middle Tributary	210	7011	7005	7010	NO	NO	NO
Regional Pond MN Outlet Structure	6420.9204	Middle Tributary	850	6854	6854	6855	YES	YES	YES
Woodmen Hills Pond #5 Outlet Structure	N/A	Middle Tributary	N/A	6854	N/A	6853.6	NO	N/A	NO
Woodmen Hills Pond H Outlet Structure	N/A	Middle Tributary	N/A	6976	N/A	6978.0	YES	N/A	YES
Paint Brush Hills Pond #4 Outlet Structure	31486	East Tributary	200	7134	7136	7135	YES	YES	YES
Woodmen Hills Pond #1 North Outlet Structure	21604.86	East Tributary	390	6960	6962	6959	YES	YES	NO
Woodmen Hills Pond #1 South Outlet Structure	21169.19	East Tributary	390	6954	6948	6956	YES	NO	YES
Woodmen Hills Pond #2 Outlet Structure	19810.83	East Tributary	270	6930	6926	6932	YES	NO	YES
Woodmen Hills Pond #3 Outlet Structure	18205.02	East Tributary	530	6902	6903	6903	YES	YES	YES
Woodmen Hills Pond #4 Outlet Structure	14543.949	East Tributary	260	6860	6857	6862	YES	NO	YES

Notes:

[1] Based on topography

[2] In some cases the reported 100-yr flow is different between models because only a limited amount of flow change locations were used in the HEC-RAS model

[3] Assumed overtopping if either HEC-RAS or HEC-HMS indicated a 100-yr WSE above the spillway elevation

* The results of the 100-yr WSE varied greatly in some cases because of the way each of the programs calculates the water surface within a detention pond system. HEC-HMS calculates the water surface based on hydrologic routing using hydrograph. HEC-RAS calculates the water surface based on peak flow and culvert hydraulics.

** Potential deficiency is based on spillway overtopping only

*** "N/A" means pond was not on main tributary branch and was not modeled in HEC-RAS, but was modeled in HEC-HMS

Falcon DBPS

Sub Regional Detention Alternative[1]

Pond	Q_2 In (cfs)	Q_2 Out (cfs)	Q_{100} In (cfs)	Q_{100} Out (cfs)	Required Volume (AF)[2]	Land Requirement (ac)[3]	Construction Cost[4]	Land Cost[5]	Improvement Cost[6]	Total Cost
Paint Brush Hills Pond #4	38	29	200	150	1.34	0	$ -	$ -	$ -	$ -
Paint Brush Hills Pond A	35	7	170	140	2.62	0	$ -	$ -	$ 20,000	$ 20,000
Paint Brush Hills Pond B1	80	51	420	270	9.17	0	$ -	$ -	$ -	$ -
Paint Brush Hills Pond B2	51	10	270	180	12.09	0	$ -	$ -	$ 20,000	$ 20,000
Paint Brush Hills Pond C	56	3	300	140	6.77	0	$ -	$ -	$ 20,000	$ 20,000
Regional Pond MN	65	32	850	820	7.53	0	$ -	$ -	$ 20,000	$ 20,000
Regional Pond R1	110	77	1,600	1,500	25.00	18.8	$ 532,609	$ 940,420	$ -	$ 1,473,028
Regional Pond R2	140	140	2,200	2,200	3.13	5.1	$ 66,634	$ 255,974	$ -	$ 322,608
Regional Pond WU South	47	22	1,100	930	39.54	0		$ -	$ 20,000	$ 20,000
Sub Regional Pond SR1	54	42	610	510	11.03	3.4	$ 234,987	$ 170,782	$ -	$ 405,769
Sub Regional Pond SR2	65	65	840	840	2.05	5.2	$ 43,674	$ 257,529	$ -	$ 301,203
Sub Regional Pond SR3	72	72	910	910	1.03	0.6	$ 21,943	$ 27,609	$ -	$ 49,552
Sub Regional Pond SR4	130	27	1,000	730	19.37	20.5	$ 412,665	$ 1,022,834	$ -	$ 1,435,500
Sub Regional Pond SR6	74	9	390	200	11.82	6.69	$ 251,817	$ 334,260	$ -	$ 586,078
The Meadows Pond #1	11	0	70	0	3.25	0	$ -	$ -	$ 20,000	$ 20,000
The Meadows Pond #2	28	5	210	100	7.94	0	$ -	$ -	$ 20,000	$ 20,000
Woodmen Hills Pond #1 North	65	61	390	260	7.13	0	$ -	$ -	$ 20,000	$ 20,000
Woodmen Hills Pond #1 South	61	10	260	260	8.78	0	$ -	$ -	$ 20,000	$ 20,000
Woodmen Hills Pond #2	37	10	270	250	9.18	0	$ -	$ -	$ 20,000	$ 20,000
Woodmen Hills Pond #3	110	13	530	360	8.35	0	$ -	$ -	$ 20,000	$ 20,000
Woodmen Hills Pond #4	110	15	790	260	40.45	0	$ -	$ -	$ 240,000	$ 240,000
Woodmen Hills Pond #5	40	1	130	20	4.10	0	$ -	$ -	$ 20,000	$ 20,000
Woodmen Hills Pond H	140	110	750	750	2.66	0	$ -	$ -	$ -	$ -

Subtotal	$ 5,053,738
Engineering (15%)	$ 758,061
Contingency (20%)	$ 1,010,748
Total	$ 6,822,546

Notes

[1] Represents future hydrology with retrofit existing detention ponds and 7 new sub regional detention ponds

[2] Required volume to highest WSE, either EURV or 100-yr respectively, not including embankment

[3] Land requirement is based on approximate grading at spillway stage. Refer to Conceptual Plan GIS mapbook. Copied as value from GIS attribute.

[4] Based on $24,500/AF as documented in the Jimmy Camp Creek DBPS - FSD Costs Memo. The published value includes engineering costs - so dividing this cost by 1.15 to represent construction portion only.

[5] From Jeff Rice via comment letter on 5/24/13: Use $50,000/Ac. for land purchase costs, with a note that the actual current (2013) Parks fees are based on land value of $46,954/Ac.

[6] Includes costs to retrofit existing outlet structures for EURV/WQCV and 100-yr flood control. This costs assumes a plate can be placed over a low flow orifice and/or an opening be cut out of the existing drop structure OR 2 CDOT Type C inlets w/ 100LF of 48" RCP be used for the retrofit. Not all existing ponds are retrofit. Woodmen Hills Pond #4 improvement cost was taken directly from the March 2011 Wilson & Co. Pond 4 Assessment Report Preliminary Cost Estimates table for Alternative 2 on pg. 21.

Falcon DBPS

Crossing Upsize and Cost

Crossing	Location	Proposed Size						Length	Cost ($/LF)	Culvert Cost ($)	End Treatment			Total Culvert Cost ($)
		# of Cells	Diameter (ft.)	Diameter (in)	Rise (ft)	x	Span (ft)				Flared End	Headwall	Wingwall	
WT 14	Burgess Rd.	1	5	60				66	$ 253	$ 16,600		$ 3,244	$ 11,741	$ 31,585
WT 13	Pine Park Trl.	1	5	60				53	$ 253	$ 13,539		$ 3,244	$ 11,741	$ 28,525
Pond WU Inlet Structure	Tamlin Rd.	8		0	6	x	12	74	$ 8,637	$ 642,018			$ 16,392	$ 658,410
WT 6	Falcon Hwy.	5		0	6	x	12	43	$ 5,398	$ 233,383			$ 16,392	$ 249,775
WT 5	Meridian Rd.	1	3	36				43	$ 126	$ 5,431	$ 3,220			$ 8,651
WT 5-2	Meridian Rd.	25		0	3	x	10	43	$ 16,550	$ 713,283			$ 4,837	$ 718,121
WT 4	W. Condor Rd.	11		0	5	x	12	48	$ 10,704	$ 516,582			$ 11,741	$ 528,324
WT 3	Garrett Rd.	3		0	9	x	12	46	$ 4,014	$ 182,723			$ 35,569	$ 218,292
WT 1	Blaney Rd.	16		0	5	x	12	40	$ 15,570	$ 624,906			$ 11,741	$ 636,648
MT 7	Owl Ln.	9		0	2	x	4	58	$ 3,539	$ 204,974			$ 2,491	$ 207,465
MT 6	Woodmen Rd.	3	5	60				200	$ 759	$ 151,872		$ 2,564	$ 11,741	$ 166,177
MT 6-2	Woodmen Rd.	3	5	60				220	$ 759	$ 167,059		$ 2,564	$ 11,741	$ 181,365
MT 5-1	McLauglin Rd.	3		0	7	x	12	48	$ 3,528	$ 169,345			$ 21,753	$ 191,098
MT 2	Swingline Rd.	3		0	8	x	12	83	$ 3,786	$ 314,837			$ 28,310	$ 343,147
MT 1	Falcon Hwy.	11		0	4	x	12	45	$ 9,420	$ 425,111			$ 7,921	$ 433,032
ET 31	Stapleton Dr.	2		0	4	x	12	302	$ 1,713	$ 517,104			$ 7,921	$ 525,026
ET 19	Eastonville Rd.	1		0	7	x	10	39	$ 1,063	$ 41,587			$ 21,753	$ 63,340
ET 13	Pinto Pony Rd.	2		0	6	x	8	50	$ 1,713	$ 85,680			$ 28,310	$ 113,991
ET 11	Falcon Hwy.	2		0	6	x	8	40	$ 1,713	$ 67,956			$ 16,392	$ 84,348
ET 10	N. Condor Rd.	3		0	7	x	10	44	$ 3,188	$ 140,903			$ 21,753	$ 162,656
ET 9	Sunset Trl.	2		0	6	x	8	40	$ 1,713	$ 67,710			$ 16,392	$ 84,102
ET 4	Garrett Rd.	2		0	5	x	8	61	$ 1,546	$ 94,319			$ 11,741	$ 106,060
													Subtotal	$ 5,740,139
													Engineering/Construction Admin (15%)	$ 861,021
													Contingency (20%)	$ 1,148,028
													Total	**$ 7,749,187**

Note: does not include concrete aprons

Falcon DBPS

Natural Channel Design Costs

Reach	Reach Alternative	Reach Length (ft)	Reach Slope (ft/ft)	$W_{Low\ Flow}$ (ft)	Low Flow Design Slope (ft/ft)	# of Structures	Cost Per Structure	Total Structure Cost	Total Reach Cost
RET120	Natural Channel Design	1,379	0.005	29	0.0037	2	$ 36,399	$ 72,798	$ 72,798
RET154	Natural Channel Design	2,357	0.013	22	0.0039	14	$ 33,495	$ 468,927	$ 468,927
RET156	Natural Channel Design	942	0.008	30	0.0034	2	$ 36,861	$ 73,722	$ 73,722
RWT094	Natural Channel Design	2,145	0.013	26	0.0034	7	$ 35,173	$ 246,213	$ 246,213
RWT122	Natural Channel Design	518	0.014	27	0.0033	2	$ 35,684	$ 71,367	$ 71,367
RWT150	Natural Channel Design	3,741	0.013	18	0.0039	24	$ 31,895	$ 765,482	$ 765,482
RWT210_upstream	Natural Channel Design	2,132	0.014	30	0.0029	16	$ 37,063	$ 593,011	$ 593,011

Subtotal:	$ 2,291,521
Engineering/ Construction Admin (15%):	$ 343,728.20
Contingency(20%):	$ 458,304.26
Total:	$ 3,093,554

Notes:

1 24400 + 420(B). Row of 36" foot boulders + 36" boulder row on top, includes, excav, riprap banks, approach and toe, reveg.

2 Width of drops = low flow channel width

3 Earthwork = $15/CY

4 Erosion Control Blanket = $12/SF

5 Revegetation = $0.50/SF

Falcon DBPS
Small Drop Cost

Reach	Reach Alternative	Reach Length (ft)	Reach Slope (ft/ft)	$W_{Low\ Flow}$ (ft)	Low Flow Design Slope (ft/ft)	# of Structures	Structure Height (ft)	Cost Per Structure	Total Structure Cost	Earthwork Length (ft)	Earthwork Average Width (ft)	Earthwork Depth (ft)	Earthwork Adjusted Depth (ft)	Earthwork (CY)	Earthwork Cost	Erosion Control Blanket (SY)	Erosion Control Blanket Cost	Revegetation (SF)	Revegetation Cost	Total Reach Cost
RET020	Small Drop Structures w/ Toe Protection	1,915	0.025	18	0.0079	6	6	$ 193,564	$ 1,161,384	963	4	1	0	143	$ 999	428	$ 5,136	3,852	$ 1,926	$ 1,169,444
RET030	Small Drop Structures w/ Toe Protection	5,042	0.015	21	0.0078	7	6	$ 200,035	$ 1,400,242	593	4	1	0	88	$ 1,318	264	$ 3,163	2,372	$ 1,186	$ 1,405,908
RET040	Small Drop Structures w/ Toe Protection	1,820	0.021	23	0.0075	5	6	$ 203,656	$ 1,018,282	1,130	12	4	0	2,009	$ 30,133	1,507	$ 18,080	13,560	$ 6,780	$ 1,073,275
RET100	Small Drop Structures w/ Toe Protection	1,791	0.022	28	0.0075	5	6	$ 214,267	$ 1,071,335	1,747	30	6	0	11,647	$ 174,700	5,823	$ 69,880	52,410	$ 26,205	$ 1,342,120
RET110	Small Drop Structures w/ Toe Protection	2,751	0.016	28	0.0075	4	6	$ 214,538	$ 858,152	1418; 1306	4; 30	2; 5	0	7,676	$ 115,136	4,984	$ 59,803	44,852	$ 22,426	$ 1,055,516
RET152	Small Drop Structures w/ Toe Protection	2,030	0.019	29	0.0072	5	6	$ 216,278	$ 1,081,390	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 1,081,390
RET162	Small Drop Structures w/ Toe Protection	3,256	0.011	30	0.0066	3	6	$ 218,820	$ 656,460	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 656,460
RMT050	Small Drop Structures w/ Toe Protection	1,568	0.019	23	0.0062	4	6	$ 203,547	$ 814,189	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 814,189
RMT062	Small Drop Structures w/ Toe Protection	5,688	0.020	20	0.0081	12	6	$ 198,427	$ 2,381,127	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 2,381,127
RMT064	Small Drop Structures w/ Toe Protection	3,358	0.016	24	0.0060	6	6	$ 205,185	$ 1,231,110	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 1,231,110
RMT102	Small Drop Structures w/ Toe Protection	1,021	0.023	27	0.0061	3	6	$ 212,027	$ 636,082	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 636,082
RMT104	Small Drop Structures w/ Toe Protection	874	0.015	15	0.0083	1	6	$ 186,349	$ 186,349	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 186,349
RMT106	Small Drop Structures w/ Toe Protection	226	0.004	27	0.0030	1	6	$ 212,322	$ 212,322	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 212,322
RMT112	Small Drop Structures w/ Toe Protection	3,372	0.015	27	0.0060	6	6	$ 212,690	$ 1,276,142	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 1,276,142
RMT114	Small Drop Structures w/ Toe Protection	1,667	0.018	27	0.0060	4	6	$ 213,423	$ 853,693	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 853,693
RWT054	Small Drop Structures w/ Toe Protection	2,497	0.023	22	0.0076	7	6	$ 202,076	$ 1,414,531	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 1,414,531
RWT080	Small Drop Structures w/ Toe Protection	3,494	0.027	19	0.0080	12	6	$ 194,670	$ 2,336,037	516	6	2	0	229	$ 3,440	344	$ 4,128	3,096	$ 1,548	$ 2,345,153
RWT092	Small Drop Structures w/ Toe Protection	626	0.019	25	0.0069	2	6	$ 207,217	$ 414,434	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 414,434
RWT124_upstream	Small Drop Structures w/ Toe Protection	1,246	0.018	27	0.0064	3	6	$ 213,351	$ 640,054	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 640,054
RWT174	Small Drop Structures w/ Toe Protection	1,871	0.016	22	0.0078	3	6	$ 202,112	$ 606,335	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 606,335
RWT234	Small Drop Structures w/ Toe Protection	2,129	0.020	19	0.0076	5	6	$ 195,373	$ 976,863	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 976,863
RWT296	Small Drop Structures w/ Toe Protection	1,134	0.010	32	0.0056	1	6	$ 223,458	$ 223,458	0	0	0	0	0	$ -	0	$ -	0	$ -	$ 223,458
RWT372	Small Drop Structures w/ Toe Protection	1,377	0.020	38	0.0036	4	6	$ 235,012	$ 940,048	406	6	2	0	180	$ 2,707	271	$ 3,248	2,436	$ 1,218	$ 947,221

Subtotal:	$ 22,943,176
Engineering/ Construction Admin(15%):	$ 3,441,476
Contingency(20%):	$ 4,588,635
Total:	$ 30,973,288

Notes:

1 Structure cost from Unit Cost Spreadsheet. 72400 + 880(B) + 13700(H) + 210(B)(H) 4H:1V slope,36" boulders, includes reveg, excav, 20' stilling basin, 20' width of riprap along banks and 10' at toe.
2 Drop height = 3 ft drop + 3 ft key
3 Width of drops = low flow channel width
4 Earthwork = $15/CY, 3/19/15 adjusted to $7/CY for unplatted, developer reach RET020
5 Erosion Control Blanket = $12/SF
6 Revegetation = $0.50/SF
7 Earthwork, Erosion Control Blanket, and Revegetation quantities calculated from GIS file "Estimated_Earthwork.shp"
8 Low Flow Design Slope and # of Structures adjusted per phone conversation with Jeff Rice and Graham Thompson 3/14/14.

Falcon DBPS

Roadside Ditch Improvements

Item	*Unit Cost*	*Unit*
Riprap	*$ 50*	*CY*
Erosion Control Blanket (includes staking)	*$ 0.90*	*SF*
Seeding	*$ 1,000*	*ACRE*
Topsoil	*$ 37*	*CY*
Earthwork	*$ 24*	*CY*

Reach	Length (ft)	d_{50} (ft)	Thickness (ft)[1]	Perimeter (ft)[2]	Riprap (yd^3)[3]	Mixing Soil (yd^3)[3]	Erosion Control Blanket (ft^2)[4]	Seeding (ac)[4]	Topsoil (yd^3)[5]	Earthwork (yd^3)[6]	Cost
RWT344	1,379	0.50	1	33	1,086	585	45,128	1.04	836	1,671	$ 167,006
RWT354	16	0.50	1	392	153	82	6,362	0.15	118	236	$ 23,544
RET140	4,052	0.50	1	16	1,596	859	86,551	1.99	1,603	3,206	$ 295,914
RET164	2,072	0.50	1	14	695	374	39,228	0.90	726	1,453	$ 132,703

Subtotal	$	619,166
Engineering (15%)	$	92,875
Contingency (20%)	$	123,833
Total	**$**	**835,874**

Notes

[1] 2*d50 Per Figure MD-13b in UDFCD DCM V1

[2] Apply to the ditch section between the EOA/Buffer and the tie point to existing ground

[3] 65% Riprap and 35% mixing soil per Per Figure MD-13b in UDFCD DCM V1. Assume Mixing Soil will be provided from over excavation for the riprap.

[4] Apply to the ditch section between the EOA and the tie point to existing ground

[5] Apply 6" over the ditch section between the EOA and the tie point to existing ground Per Figure MD-13b in UDFCD DCM V1

[6] Assume entire ditch needs to be modified due to existing erosion and required over excavation for the riprap

FALCON DBPS UNIT COSTS

July 2012

Item	Units	Unit Cost	Notes
Grade Controls			
Grouted Boulder Drop	EA	72400 + 880(B) + 13700(H) + 210(B)(H)	4H:1V slope,36" boulders, includes reveg, excav, 20' stilling basin, 20' width of riprap along banks and 10' at toe.
Natural Channel Grade Controls	EA	24400 + 420(B)	Row of 36" foot boulders + 36" boulder row on top, includes, excav, riprap banks, approach and toe, reveg.
Detention Facilities			
New Detention Facilities	AF	$50,000.00	UDFCD Master Planning Cost for complete facility (excavation, outlet, etc)
Full Spectrum/WQ Detention Retrofit	EA	$15,000 - $60,000	Highly variable - could be as simple as just a new grate ($1000). Costs range shown includes excav. of micropool.
Reinforced Concrete Pipe	LF	$0.0003(D^3) + 0.0061(D^2) + 2.606(D) + 10$	Regression Equation for 2012 UDFCD MP Pipe costs ($R^2 = 0.98$). Detailed costs below.
12-inch	LF	$45.90	
18-inch	LF	$68.85	
24-inch	LF	$91.79	
30-inch	LF	$114.73	
36-inch	LF	$137.68	
42-inch	LF	$160.63	
48-inch	LF	$183.58	
54-inch	LF	$206.53	
60-inch	LF	$229.47	
66-inch	LF	$252.42	
72-inch	LF	$393.38	
78-inch	LF	$426.16	
84-inch	LF	$458.95	
90-inch	LF	$491.73	
96-inch	LF	$524.51	
102-inch	LF	$780.20	
108-inch	LF	$826.10	
120-inch	LF	$917.89	
Concrete Box Culvert	LF	$-0.036(A^2) + 13.566(A) + 287$	Regression Equation for 2012 UDFCD MP Pipe costs ($R^2 = 0.96$). A = (Span) X (Rise). Range of data 4x4 to 12x10
Concrete Bridge Structures	SF	$175.00	Unit cost provided by Michael Burke
Earthwork			
Excavation & On-Site Placement as Fill	CY	$15.00	
Excavation & Off-Site Disposal	CY	$25.00	
Concrete and Structures			
Concrete (5,000 psi flat-work)	CY	$450.00	
Concrete (5,000 psi structural)	CY	$600.00	
Concrete Grout Cutoff Wall	SF	$75.00	$500/cy, 2' thickness
Sheet Pile Cutoff	SF	$60.00	Source - 2 recent CSU jobs
Boulders and Riprap			
Grouted Boulders	CY	$200.00	
Ungrouted Boulders	CY	$120.00	
Soil Riprap	CY	$100.00	
Plain Riprap	CY	$90.00	
Bedding for Riprap	CY	$60.00	
Revegetation			
Erosion Control Mat (2 Layer)	SY	$12.00	Koir 700+C125BN. Source - recent CSU job
Erosion Control Mat (1 layer)	SY	$6.00	C125BN. Source - recent CSU job
Wetland Plugs (10-T)	EA	$5.00	Source - recent CSU job
Shrubs (5 gallon)	EA	$45.00	Source - recent CSU job
Live Stakes	EA	$4.00	Source - recent CSU job
Trees (2" caliper)	EA	$600.00	Source - recent CSU job
Seeding (soil prep, amendments, seed, mulch)	SF	$0.50	Source - recent CSU job
Other Costs			
R.O.W. Acquisition (floodplain property only)	SF	$2.00	Cost provided by CSU
Permitting (404, floodplain development)	LS	$15,000.00	Per project.
Mobilization/Demobilization	Percentage	5%	
Traffic/Water/Sediment Control	Percentage	10%	
Engineering	Percentage	15%	UDFCD master planning value
Contingency	Percentage	25%	UDFCD master planning value

Variables

B = Channel bottom width (ft)
H = Drop Ht (ft)
D = Pipe diameter (inches)
A = RCB open area (span X rise)