6. Benefits of Plan Implementation

The benefits of plan implementation were analyzed through the modeling. Projects in the 10-year implementation plan that could impact the stormwater runoff were modeled in the SWMM hydrologic model to determine the magnitude of increased storage on discharge rates. The projects analyzed in the SWMM model were: JM9100, JM9500, LR9005A, LR9005C, LR9013D, LR9102, LR9114, LR9115, and LR9509.

These discharge changes were then input into the HEC-RAS hydraulic model to assess any changes to flooding elevations. The changes to flood elevations as a result of the projects were minimal.

All project impacts on nitrogen, phosphorus and sediment pollutant loadings were modeled in the STEPL spreadsheet. Table 6-1 shows the flow reductions for each WMA and for each watershed.

Table 6-1 Volume, Flow, and Pollutant Loading Table

WMA	Area (ac)	Scenario	Runoff Volume (in/yr)[1]		Peak Flow (cfs/ac)[1]		TSS	TN	TP
			2 Year	10 Year	2 Year	10 Year	(t/ac/yr)[2]	(lb/ac/yr)[2]	(lb/ac/yr)[2]
Little Rocky Run – Upper	2211.7	Existing Condition	1.28	3.04	0.14	0.42	0.08	5.29	0.65
		Future Without Projects	1.32	3.08	0.15	0.44	0.08	5.37	0.67
		Future With Projects	1.31	3.08	0.15	0.43	0.07	4.99	0.63
		Reduction (10-year Plan)	0.01	0.01	0.00	0.01	0.01	0.32	0.02
		Reduction (25-year Plan)	0.01	0.01	0.00	0.01	0.01	0.38	0.03
Little Rocky Run – Lower	2141.4	Existing Condition	1.43	3.22	0.15	0.43	0.14	5.00	0.72
		Future Without Projects	1.45	3.25	0.16	0.43	0.13	4.99	0.72
		Future With Projects	1.42	3.21	0.15	0.42	0.09	4.46	0.61
		Reduction (10-year Plan)	0.04	0.05	0.01	0.01	0.01	0.44	0.07
		Reduction (25-year Plan)	0.04	0.05	0.01	0.01	0.04	0.53	0.10
Johnny Moore Creek	3212.9	Existing Condition	1.25	3.05	0.16	0.45	0.12	1.81	0.32
		Future Without Projects	1.28	3.08	0.17	0.47	0.12	2.21	0.36
		Future With Projects	1.17	2.93	0.15	0.44	0.08	2.13	0.33
		Reduction (10-year Plan)	0.11	0.15	0.02	0.03	0.04	0.08	0.03
		Reduction (25-year Plan)	0.11	0.15	0.02	0.03	0.04	0.08	0.03

Watershed	Area (ac)	Scenario	Runoff Volume (in/yr)[1]		Peak Flow (cfs/ac)[1]		TSS	TN	TP
			2 Year	10 Year	2 Year	10 Year	(t/ac/yr)[2]	(lb/ac/yr)[2]	(lb/ac/yr)[2]
Little Rocky Run	4353.1	Existing Condition	1.43	3.22	0.15	0.43	0.21	10.28	1.36
		Future Without Projects	1.45	3.25	0.16	0.43	0.22	10.36	1.38
		Future With Projects	1.42	3.21	0.15	0.42	0.17	9.45	1.25
		Reduction (10-year Plan)	0.04	0.05	0.01	0.01	0.02	0.76	0.10
		Reduction (25-year Plan)	0.04	0.05	0.01	0.01	0.05	0.91	0.13
Johnny Moore Creek	3212.9	Existing Condition	1.25	3.05	0.16	0.45	0.12	1.81	0.32
		Future Without Projects	1.28	3.08	0.17	0.47	0.12	2.21	0.36
		Future With Projects	1.17	2.93	0.15	0.44	0.08	2.13	0.33
		Reduction (10-year Plan)	0.11	0.15	0.02	0.03	0.04	0.08	0.03
		Reduction (25-year Plan)	0.11	0.15	0.02	0.03	0.04	0.08	0.03

[1] Flow is cumulative, [2] Loads are representative of individual land area contributions

6.1 Cost Benefit Analysis

The cost benefit analysis was performed as a simple ratio of the project benefit divided by a cost factor for the 10-year implementation plan. The benefit value was the project composite score that was used in the project ranking. The project composite score represents a composite of environmental indicators and other factors such as pollutant removal. The composite score for some projects were adjusted to account for feasibility issues. The cost factor was calculated by scaling the project costs to match the numerical range of the project composite scores. The results of the cost benefit analysis for the 10-year implementation plan (including all regional pond alternatives) are shown in Table 6-2.

Table 6-2 Cost Benefit Analysis Results – 10-year Implementation Plan

Project	Project Type	Final Adjusted Composite Score (B)	Project Cost	Scaled Cost Factor (C)	CBA: Final Score/ Scaled Cost Factor (B / C)	Rank by CBA
LR9005C	BMP/LID	5.34	$ 350,000	3.78	1.413	1
LR9100	Stormwater Pond Retrofit	4.07	$ 100,000	2.89	1.407	2
LR9514	BMP/LID	3.90	$ 100,000	2.89	1.347	3
LR9110	Stormwater Pond Retrofit	3.97	$ 120,000	2.97	1.339	4
LR9117	Stormwater Pond Retrofit	3.58	$ 40,000	2.68	1.334	5
LR9013D	Stormwater Pond Retrofit	4.22	$ 180,000	3.18	1.328	6
LR9508	BMP/LID	3.76	$ 90,000	2.86	1.315	7
LR9114	Stormwater Pond Retrofit	3.56	$ 60,000	2.75	1.295	8
LR9111	Stormwater Pond Retrofit	3.69	$ 100,000	2.89	1.276	9
LR9510	BMP/LID	4.37	$ 260,000	3.46	1.262	10
LR9204	Stream Restoration	3.69	$ 110,000	2.93	1.260	11

Project	Project Type	Final Adjusted Composite Score (B)	Project Cost	Scaled Cost Factor (C)	CBA: Final Score/ Scaled Cost Factor (B / C)	Rank by CBA
LR9109	Stormwater Pond Retrofit	3.37	$ 40,000	2.68	1.257	12
LR9005A	Stormwater Pond Retrofit	4.16	$ 230,000	3.36	1.241	13
LR9102	Stormwater Pond Retrofit	4.11	$ 220,000	3.32	1.239	14
LR9010A	BMP/LID	3.63	$ 110,000	2.93	1.237	15
LR9527	BMP/LID	3.69	$ 130,000	3.00	1.230	16
LR9521	BMP/LID	3.44	$ 90,000	2.86	1.203	17
LR9504	BMP/LID	3.39	$ 80,000	2.82	1.201	18
JM9400	Culvert Retrofit	3.45	$ 120,000	2.97	1.163	19
JM9100	Stormwater Pond Retrofit	3.74	$ 200,000	3.25	1.150	20
LR9526	BMP/LID	3.44	$ 130,000	3.00	1.146	21
LR9522	BMP/LID	3.77	$ 220,000	3.32	1.136	22
LR9106	Stormwater Pond Retrofit	3.59	$ 190,000	3.21	1.116	23
LR9115	Stormwater Pond Retrofit	3.86	$ 290,000	3.57	1.083	24
LR9013C	Stormwater Pond Retrofit	3.09	$ 90,000	2.86	1.082	25
JM9202	Stream Restoration	3.97	$ 320,000	3.67	1.081	26
LR9509	BMP/LID	3.28	$ 140,000	3.04	1.080	27
LR9516	BMP/LID	3.99	$ 330,000	3.71	1.076	28
LR9524	BMP/LID	3.42	$ 210,000	3.28	1.041	29
LR9010B	Stormwater Pond Retrofit	3.41	$ 240,000	3.39	1.007	30
LR9103	Stormwater Pond Retrofit Stream Restoration	4.28	$ 490,000	4.28	1.000	31
LR9209	Stream Restoration	3.87	$ 380,000	3.89	0.996	32
LR9203	Stream Restoration	3.45	$ 310,000	3.64	0.949	33
LR9013B	Stormwater Pond Retrofit	3.11	$ 210,000	3.28	0.947	34
JM9201	Stream Restoration	3.77	$ 420,000	4.03	0.936	35
LR9013A	Stormwater Pond Retrofit	3.29	$ 280,000	3.53	0.932	36
LR9005B	Stormwater Pond Retrofit	2.54	$ 70,000	2.79	0.911	37
LR9205	Stream Restoration	3.78	$ 510,000	4.35	0.870	38
JM9500	BMP/LID	2.56	$ 120,000	2.97	0.863	39
LR9207	Stream Restoration	3.67	$ 650,000	4.84	0.758	40
LR9208	Stream Restoration	3.87	$ 800,000	5.38	0.720	41
LR9523	BMP/LID	3.12	$ 510,000	4.35	0.718	42
LR9201	Stream Restoration	3.91	$ 830,000	5.48	0.713	43
JM9203	Stream Restoration	3.53	$ 770,000	5.27	0.669	44
JM9200	Stream Restoration	3.50	$ 770,000	5.27	0.664	45
LR9202	Stream Restoration	3.38	$ 820,000	5.45	0.621	46
			$ 12,830,000			

The 25-year implementation plan cost benefit results are presented in Table 6-3.

Table 6-3 Cost Benefit Analysis Results – 25-year Implementation Plan

Project	Project Type	Final Adjusted Composite Score (B)	Project Cost	Scaled Cost Factor (C)	CBA: Final Score/ Scaled Cost Factor (B / C)	Rank by CBA
LR9515	BMP/LID	3.33	$ 80,000	3.33	3.330	47
LR9107	Stormwater Pond Retrofit	3.29	$ 80,000	3.29	3.286	48
LR9518	BMP/LID	3.28	$ 80,000	3.28	3.280	49
LR9517	BMP/LID	3.25	$ 80,000	3.25	3.250	50
JM9101	Stormwater Pond Retrofit	3.21	$ 80,000	3.21	3.214	51
LR9108	Stormwater Pond Retrofit	3.19	$ 80,000	3.19	3.193	52
LR9502	BMP/LID	3.11	$ 80,000	3.11	3.110	53
LR9700	Outfall Improvement	3.10	$ 80,000	3.10	3.100	54
LR9206	Stream Restoration	3.10	$ 80,000	3.10	3.100	55
LR9519	BMP/LID	3.10	$ 90,000	3.10	3.100	56
LR9112	Stormwater Pond Retrofit	3.08	$ 80,000	3.08	3.079	57
LR9507	BMP/LID	3.05	$ 80,000	3.05	3.050	58
LR9501	BMP/LID	3.03	$ 80,000	3.03	3.030	59
LR9512	BMP/LID	3.02	$ 90,000	3.02	3.020	60
LR9520	BMP/LID	2.94	$ 80,000	2.94	2.940	61
LR9113	Stormwater Pond Retrofit	3.16	$ 400,000	3.16	3.164	62
LR9101	Stormwater Pond Retrofit	2.95	$ 110,000	2.95	2.950	63
LR9505	BMP/LID	2.89	$ 80,000	2.89	2.890	64
LR9104	Stormwater Pond Retrofit	2.86	$ 80,000	2.86	2.857	65
LR9105	Stormwater Pond Retrofit	2.86	$ 90,000	2.86	2.857	66
LR9503	BMP/LID	2.79	$ 80,000	2.79	2.790	67
LR9506	BMP/LID	2.79	$ 80,000	2.79	2.790	68
LR9513	BMP/LID	2.62	$ 80,000	2.62	2.620	69
LR9525	BMP/LID	3.24	$ 1,120,000	3.24	3.240	70
LR9600	Flood Protection, Buffer Restoration	2.84	$ 800,000	2.84	2.843	71
JM9700	Outfall Improvement	2.46	$ 160,000	2.46	2.460	72
LR9500	BMP/LID	2.24	$ 80,000	2.24	2.240	73
			$ 4,380,000			

The total cost of the plan is approximately $17,210,000. The plan benefits are improved habitat, improved stream conditions and increased pollutant removal. In Little Rocky Run, pollutant loads are reduced below existing condition levels. In Johnny Moore Creek, the future land use changes are due to estate residential development. Because of private property constraints, it was difficult to fully address pollutant removal in these areas through the watershed management plan. As these properties are developed, on-site stormwater measures should be employed to control runoff and pollutant levels.