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 stormwater discharge rates through new or increased detention storage were modeled in the SWMM hydrologic model to determine the magnitude of this new or increased storage on discharge rates. The projects analyzed in the SWMM model were: JM9100, JM9500, LR9005A, LR9005C, LR9010B, LR9013D, LR9102, LR9110, 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. The following tables present the pollutant loadings and flow reductions for the WMAs, watersheds and the overall for both watersheds.

Table 6-1 Johnny Moore Creek Pollutant Loading and Flow Reductions by WMA

WMA	Area (ac)	Scenario[3]	Runoff Volume (in)[1]		Peak Flow (cfs/ac)[1]		TSS	TN	TP
			2 Year	10 Year	2 Year	10 Year	(lb/ac/yr)[2]	(lb/ac/yr)[2]	(lb/ac/yr)[2]
Johnny Moore Creek	3373.7	Existing Condition	1.23	2.93	0.15	0.43	236.16	1.91	0.35
		Future Without Projects	1.26	2.97	0.16	0.45	246.04	2.42	0.42
		Future With 10-year Projects	1.22	2.90	0.15	0.44	120.89	2.28	0.37
		Reduction (10-year Plan)	0.04 (3%)	0.07 (2%)	0.01 (3%)	0.01 (2%)	125.15 (51%)	0.14 (6%)	0.05 (11%)
		Future With 25-year Projects	N/A	N/A	N/A	N/A	120.87	2.28	0.37
		Reduction (25-year Plan)	N/A	N/A	N/A	N/A	125.17 (51%)	0.14 (6%)	0.05 (11%)

[1] Flow is cumulative
[2] Loads are representative of individual land area contributions
[3] 25-year projects were not evaluated in the hydrologic model

Table 6-2 Little Rocky Run Pollutant Loading and Flow Reductions by WMA

WMA	Area (ac)	Scenario[3]	Runoff Volume (in)[1]		Peak Flow (cfs/ac)[1]		TSS	TN	TP
			2 Year	10 Year	2 Year	10 Year	(lb/ac/yr)[2]	(lb/ac/yr)[2]	(lb/ac/yr)[2]
Little Rocky Run - Lower	2211.74	Existing Condition	1.69	3.60	0.30	0.84	157.56	5.34	0.67
		Future Without Projects	1.70	3.62	0.31	0.86	159.98	5.50	0.68
		Future With 10-year Projects	1.70	3.61	0.30	0.85	139.99	5.27	0.64
		Reduction (10-year Plan)	0.00 (0%)	0.01 (0%)	0.01 (1%)	0.01 (1%)	19.99 (12%)	0.23 (4%)	0.04 (6%)
		Future With 25-year Projects	N/A	N/A	N/A	N/A	97.03	5.12	0.61
		Reduction (25-year Plan)	N/A	N/A	N/A	N/A	62.95 (39%)	0.38 (7%)	0.07 (11%)
Little Rocky Run - Upper	2329.46	Existing Condition	1.37	3.04	0.14	0.41	229.23	4.59	0.66
		Future Without Projects	1.41	3.09	0.15	0.43	230.47	4.71	0.67
		Future With 10-year Projects	1.40	3.08	0.14	0.41	187.42	4.44	0.63
		Reduction (10-year Plan)	0.01 (0%)	0.01 (0%)	0.01 (2%)	0.02 (3%)	43.05 (19%)	0.27 (6%)	0.04 (7%)
		Future With 25-year Projects	N/A	N/A	N/A	N/A	172.79	4.26	0.61
		Reduction (25-year Plan)	N/A	N/A	N/A	N/A	57.68 (25%)	0.45 (10%)	0.06 (10%)

[1] Flow is cumulative
[2] Loads are representative of individual land area contributions
[3] 25-year projects were not evaluated in the hydrologic model

Table 6-3 Johnny Moore Creek Overall Pollutant Loading and Flow Reductions

Watershed	Area (ac)	Scenario[3]	Runoff Volume (in)[1]		Peak Flow (cfs/ac)[1]		TSS	TN	TP
			2 Year	10 Year	2 Year	10 Year	(lb/ac/yr)[2]	(lb/ac/yr)[2]	(lb/ac/yr)[2]
Johnny Moore Creek	3373.65	Existing Condition	1.23	2.93	0.15	0.43	236.16	1.91	0.35
		Future Without Projects	1.26	2.97	0.16	0.45	246.04	2.42	0.42
		Future With 10-year Projects	1.22	2.90	0.15	0.44	120.89	2.28	0.37
		Reduction (10-year Plan)	0.04 (3%)	0.07 (2%)	0.01 (3%)	0.01 (2%)	125.15 (51%)	0.14 (6%)	0.05 (11%)
		Future With 25-year Projects	N/A	N/A	N/A	N/A	120.87	2.28	0.37
		Reduction (25-year Plan)	N/A	N/A	N/A	N/A	125.17 (51%)	0.14 (6%)	0.05 (11%)

[1] Flow is cumulative
[2] Loads are representative of individual land area contributions
[3] 25-year projects were not evaluated in the hydrologic model

Table 6-4 Little Rocky Run Overall Pollutant Loading and Flow Reductions

Watershed	Area (ac)	Scenario[3]	Runoff Volume (in)[1]		Peak Flow (cfs/ac)[1]		TSS	TN	TP
			2 Year	10 Year	2 Year	10 Year	(lb/ac/yr)[2]	(lb/ac/yr)[2]	(lb/ac/yr)[2]
Little Rocky Run	4541.20	Existing Condition	1.69	3.60	0.30	0.84	194.32	4.95	0.66
		Future Without Projects	1.70	3.62	0.31	0.86	196.14	5.10	0.68
		Future With 10-year Projects	1.70	3.61	0.30	0.85	164.32	4.85	0.63
		Reduction (10-year Plan)	0.00 (0%)	0.01 (0%)	0.01 (1%)	0.01 (1%)	31.82 (16%)	0.25 (5%)	0.05 (6%)
		Future With 25-year Projects	N/A	N/A	N/A	N/A	135.89	4.68	0.61
		Reduction (25-year Plan)	N/A	N/A	N/A	N/A	60.25 (31%)	0.42 (8%)	0.07 (10%)

[1] Flow is cumulative
[2] Loads are representative of individual land area contributions
[3] 25-year projects were not evaluated in the hydrologic model

Table 6-5 Overall Pollutant Loading and Flow Reductions

Watershed	Area (ac)	Scenario[3]	Runoff Volume (in)[1]		Peak Flow (cfs/ac)[1]		TSS	TN	TP
			2 Year	10 Year	2 Year	10 Year	(lb/ac/yr)[2]	(lb/ac/yr)[2]	(lb/ac/yr)[2]
Little Rocky Run and Johnny Moore Creek	7914.85	Existing Condition	1.49	3.31	N/A	N/A	212.16	3.66	0.53
		Future Without Projects	1.51	3.34	N/A	N/A	217.41	3.95	0.57
		Future With 10-year Projects	1.49	3.31	N/A	N/A	145.81	3.75	0.52
		Reduction (10-year Plan)	0.02 (1%)	0.03 (1%)	N/A	N/A	71.60 (33%)	0.20 (5%)	0.05 (8%)
		Future With 25-year Projects	N/A	N/A	N/A	N/A	129.49	3.65	0.51
		Reduction (25-year Plan)	N/A	N/A	N/A	N/A	87.92 (40%)	0.30 (8%)	0.06 (11%)

[1] Flow is cumulative
[2] Loads are representative of individual land area contributions
[3] 25-year projects were not evaluated in the hydrologic model

The plan benefits are improved habitat, improved stream conditions and increased pollutant removal. The cost of the 10-year plan is approximately $13 million and it is estimated that the 10-year implementation plan would remove 283 tons per year (33 percent) of sediment, 1,583 pounds per year (5 percent) of nitrogen and 317 pounds per year (8 percent) of phosphorus. The cost of the entire plan (10-year and 25-year implementation plans) is approximately $17.3 million. The pollutant removal of the entire plan is estimated at 348 tons per year (40 percent) of sediment, 2,374 pounds per year (8 percent) of nitrogen and 474 pounds per year (11 percent) of phosphorus. 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.

6.1 Cost/Benefit Analysis

The cost/benefit analysis was performed as a simple ratio of the project benefit divided by a cost factor. The benefit value was the project composite score used in the project ranking. The project composite score represents a composite of environmental indicators and other factors such as pollutant removal. The composite scores for some projects were adjusted to account for feasibility issues. The cost factor was calculated by scaling the project costs to match the numeric range of the project composite scores. The results of the cost/benefit analysis were compared to the adjusted composite scores. In situations where the cost benefit rank differed from the adjusted composite rank by more than 25 percent, a cost-based modification of +/- 0.25 was applied to the adjusted composite score and the projects were re-ranked. This resulted in a modified project ranking reflecting cost considerations which are provided in more detail in the Project Prioritization Technical Memorandum in Appendix B.