

## SECTION 7: CALCULATING LOAD REDUCTIONS

Load reduction calculations were estimated for nitrogen, phosphorus and Total Suspended Solids (TSS) based on the potential BMPs that can be implemented within the Sugar Creek Watershed. Nitrogen and phosphorus compose the nutrient loading portion of this plan's analysis and TSS loading composes the sediment loading estimates. The four critical areas were identified by the Steering Committee as having existing nitrogen, phosphorus and TSS loading problems based on nutrient and sediment issues. Total loads of nitrogen, phosphorus and TSS were modeled for each critical area using L-THIA. Pollution load reductions were estimated for nitrogen, phosphorus and TSS. The L-THIA model estimates the runoff volume and nonpoint source pollutant loadings.

Resulting loads were established for each critical area in units of pounds for nutrients and tons for sediment. For each critical area, the total load per year and the total load per acre per year are provided (Exhibits 39 through 42). Table 38 shows current loads and target loads for each of the critical areas. Based on the results of the pollution load modeling of existing conditions, calculations were then made to project what load per year of total nitrogen, total phosphorus and TSS would exist in the year 2030 if all of the target concentration goals were achieved. A linear transgression was used to denote what loading targets would be needed to achieve five and ten year goals based on the Steering Committee's approach for implementing pollutant load reductions in a consistently linear fashion over time.

Tables 39 through 41 portray the pollutant load reductions and BMP costs to achieve the reductions for each critical area over time. The reductions were calculated by applying all of the 20 BMPs selected by the Steering Committee to three primary landcover types (urban, pastureland, and cropland) in proportions appropriate to the corresponding proportions of landcover in each critical area. An average BMP reduction value was derived from eight BMPs for urban areas and from twelve BMPs for agricultural areas. Agricultural areas were derived by combining both cropland and pasture land. Drainage areas were assumed for necessary BMPs, as site specific values could not be measured. Cost estimates of BMPs needed to be implemented within each of the critical areas in order to accomplish the five, ten, and twenty year goals were determined using the lowest cost BMPs for each landcover; \$400/acre for urban, \$20/acre for pasture, and \$10/acre for cropland. The costs and reductions were also calculated assuming that many of the applied BMPs benefit an upland drainage area. Cost estimates are valued in current 2009 pricing, and do not have a multiplier to reflect inflation over time. This decision was made so that the costs provided by this plan can be interpreted accurately in the future without having to calculate off of inaccurate inflation rate projections.

Margin of Safety (MOS) corrections were applied to values of phosphorus and TSS, so that practical cost estimates to accomplish these goals could be forecast. There was no MOS applied to the modeling values of nitrogen loading estimates.

**Table 38. Current and Target Loads for Each Critical Area**

<b>Critical Area</b>	<b>Name</b>	<b>Acreage</b>	<b>Current Nitrogen Load lbs/year</b>	<b>Target Nitrogen Load lbs/year</b>	<b>Current Phosphorus Load lbs/year</b>	<b>Target Phosphorus Load lbs/year</b>	<b>Current TSS Load tons/year</b>	<b>Target TSS Load tons/year</b>
1	Sugar Creek – Pee Dee Ditch	13,257	86,218	64,664	3,379	2,703	1,393	1,045
2	Sugar Creek – Marsh & Trees Ditch	15,541	101,250	75,938	3,970	3,176	1,638	1,228
3	Sugar Creek – Barrett Ditch	14,091	86,718	65,038	3,391	2,713	1,396	1,047
4	Sugar Creek – Boyd and Leary Weber Ditch	21,571	123,884	92,913	4,827	3,862	1,987	1,490

Table 39. Five Year Loading Objectives to be Achieved by 2015																										
		Nitrogen							Phosphorus							Total Suspended Sediment										
		Total Nitrogen Load	Reduction to Meet Objective*	BMPs Required to meet Nitrogen Goals (acres)					Total Phosphorus Load	Reduction to Meet Objective*	BMPs Required to meet Phosphorus Goals (acres)					TSS Load	Reduction to Meet Objective	BMPs Required to meet TSS Goals (acres)								
Critical Area	Acreage	lbs/year	lbs/year	Urban	Cropland	Pasture	Total BMP Acres	Total Cost	lbs/year	lbs/year	Urban	Cropland	Pasture	Total BMP Acres	Total Cost	tons/year	tons/year	Urban	Cropland	Pasture	Total BMP Acres	Total Cost				
1	13,257	86,218	16,166	104	1,629	39	1,772	\$58,770	3,379	676	25	431	9	465	\$14,298	1,393	261	132	2,062	50	2,244	\$74,415				
2	15,541	101,250	18,985	123	1,913	46	2,081	\$69,045	3,970	794	29	497	11	537	\$16,685	1,638	307	155	2,417	59	2,630	\$87,238				
3	14,091	86,718	16,260	105	1,638	40	1,782	\$59,070	3,391	678	26	455	10	491	\$15,148	1,396	262	140	2,191	53	2,385	\$79,073				
4	21,571	123,884	23,228	137	2,088	61	2,285	\$76,695	4,827	966	36	1,405	23	1,464	\$28,805	1,987	373	176	2,631	113	2,919	\$99,055				
							7,920	\$263,580								2,957	\$74,936								10,178	\$339,781

Table 40. Ten Year Loading Objectives to be Achieved by 2020																										
		Nitrogen							Phosphorus							Total Suspended Sediment										
		Total Nitrogen Load	Reduction to Meet Objective*	BMPs Required to meet Nitrogen Goals (acres)					Total Phosphorus Load	Reduction to Meet Objective*	BMPs Required to meet Phosphorus Goals (acres)					TSS Load	Reduction to Meet Objective	BMPs Required to meet TSS Goals (acres)								
Critical Area	Acreage	lbs/year	lbs/year	Urban	Cropland	Pasture	Total BMP Acres	Total Cost	lbs/year	lbs/year	Urban	Cropland	Pasture	Total BMP Acres	Total Cost	tons/year	tons/year	Urban	Cropland	Pasture	Total BMP Acres	Total Cost				
1	13,257	86,218	32,332	209	3,257	79	3,544	\$117,540	3,379	1,352	49	863	19	930	\$28,595	1,393	523	264	4,123	100	4,487	\$148,830				
2	15,541	101,250	37,969	245	3,825	92	4,162	\$138,090	3,970	1,588	58	994	22	1,073	\$33,370	1,638	614	310	4,834	117	5,260	\$174,475				
3	14,091	86,718	32,519	210	3,276	79	3,565	\$118,140	3,391	1,357	52	911	20	982	\$30,295	1,396	524	281	4,383	106	4,769	\$158,145				
4	21,571	123,884	46,457	273	4,176	122	4,571	\$153,390	4,827	1,931	72	2,810	46	2,927	\$57,610	1,987	745	353	5,261	225	5,839	\$198,110				
							15,842	\$527,160								5,912	\$149,870								20,355	\$679,560

Table 41. Twenty Year Objectives to be Achieved by 2030																										
		Nitrogen							Phosphorus							Total Suspended Sediment										
		Total Nitrogen Load	Reduction to Meet Objective*	BMPs Required to meet Nitrogen Goals (acres)					Total Phosphorus Load	Reduction to Meet Objective*	BMPs Required to meet Phosphorus Goals (acres)					TSS Load	Reduction to Meet Objective	BMPs Required to meet TSS Goals (acres)								
Critical Area	Acreage	lbs/year	lbs/year	Urban	Cropland	Pasture	Total BMP Acres	Total Cost	lbs/year	lbs/year	Urban	Cropland	Pasture	Total BMP Acres	Total Cost	tons/year	tons/year	Urban	Cropland	Pasture	Total BMP Acres	Total Cost				
1	13,257	86,218	64,664	417	6,514	157	7,088	\$235,080	3,379	2,703	98	1,725	37	1,860	\$57,190	1,393	1,045	528	8,246	200	8,974	\$297,660				
2	15,541	101,250	75,938	490	7,650	184	8,324	\$276,180	3,970	3,176	115	1,988	43	2,146	\$66,740	1,638	1,228	619	9,667	234	10,520	\$348,950				
3	14,091	86,718	65,038	419	6,552	158	7,129	\$236,280	3,391	2,713	104	1,821	39	1,964	\$60,590	1,396	1,047	561	8,765	212	9,538	\$316,290				
4	21,571	123,884	92,913	546	8,352	243	9,141	\$306,780	4,827	3,862	143	5,620	91	5,854	\$115,220	1,987	1,490	705	10,522	450	11,677	\$396,220				
							31,682	\$1,054,320								11,824	\$299,740								40,709	\$1,359,120

\* Margin of Safety (MOS) was applied in calculating these values.