Appendix Z-2 - Alternative 1A Quantification of Water Quality Benefits

Comparisons of Modeled flows and Loads at HMR - Project Alt.1A

Runoff Volumes

	Existing Stormwater excess (cf)				20-yr BMP Stormwater excess (cf)				Project Stormwater excess (cf)			
Project Area	**1994**	**1995**	**2003**	**2006**	**1994**	**1995**	**2003**	**2006**	**1994**	**1995**	**2003**	**2006**
North	86,621	1,063,148	431,469	1,085,104	171,630	1,400,068	601,656	1,423,045	15,267	721,804	252,700	692,972
South	12,311	431,985	151,781	419,998	63,416	672,421	279,629	686,063	0	285,213	87,806	232,741
Mtn	9,094	121,508	46,399	116,377	10,871	156,245	59,657	163,245	19,404	145,140	50,629	119,981
TSB Rd	44,495	359,373	153,662	336,298	58,588	466,268	201,326	462,409	54,127	450,751	189,746	426,323
Overall	154,514	1,978,010	785,314	1,959,783	306,499	2,696,997	1,144,271	2,736,768	90,793	1,604,903	582,885	1,474,022

Decreased volumes over 20-yr BMP design

	Project Stormwater decrease over 20-yr BMP (cf)							
Project Area	**1994**	Fraction	**1995**	Fraction	**2003**	Fraction	**2006**	Fraction
North	156,363	91.1%	678,263	48.4%	348,956	58.0%	730,073	51.3%
South	63,416	100.0%	387,208	57.6%	191,823	68.6%	453,322	66.1%
Mtn	-8,533	-78.5%	11,105	7.1%	9,028	15.1%	43,264	26.5%
TSB Rd	4,461	7.6%	15,517	3.3%	11,580	5.8%	36,086	7.8%
Overall	217,700	71.0%	1,094,089	40.6%	563,389	49.2%	1,264,751	46.2%

Sediment Loads

	Existing Stormwater load (kg)				20-yr BMP Stormwater load (kg)				Project Stormwater load (kg)			
Project Area	**1994**	**1995**	**2003**	**2006**	**1994**	**1995**	**2003**	**2006**	**1994**	**1995**	**2003**	**2006**
North	246,584	3,749,270	1,496,700	3,715,798	511,488	4,448,699	1,905,269	4,352,857	15,734	688,260	237,997	693,640
South	56,549	1,851,045	651,730	1,800,059	172,342	2,263,700	924,871	2,254,841	0	250,157	79,280	219,359
Mtn	15,353	475,818	166,708	461,902	21,493	491,426	177,498	497,680	28,649	187,886	68,063	162,855
TSB Rd	98,685	1,324,050	522,235	1,260,036	100,199	1,209,091	492,269	1,125,043	72,542	510,820	219,642	491,384
Overall	419,165	7,402,179	2,839,377	7,239,801	807,515	8,414,911	3,501,910	8,232,426	118,919	1,639,118	606,986	1,569,243

Decreased loads over 20-yr BMP design

	Project Stormwater load decrease over 20-yr BMP (kg)							
Project Area	**1994**	Fraction	**1995**	Fraction	**2003**	Fraction	**2006**	Fraction
North	495,753	96.9%	3,760,439	84.5%	1,667,271	87.5%	3,659,217	84.1%
South	172,342	100.0%	2,013,543	88.9%	845,591	91.4%	2,035,482	90.3%
Mtn	-7,156	-33.3%	303,540	61.8%	109,435	61.7%	334,825	67.3%
TSB Rd	27,657	27.6%	698,271	57.8%	272,627	55.4%	633,659	56.3%
Overall	690,590	85.5%	6,777,788	80.5%	2,896,927	82.7%	6,665,189	81.0%

Comparisons of Modeled flows and Loads at HMR - Alt 1

Runoff Volumes

	Existing Stormwater excess (cf)				20-yr BMP Stormwater excess (cf)				Project Stormwater excess (cf)			
Project Area	**1994**	**1995**	**2003**	**2006**	**1994**	**1995**	**2003**	**2006**	**1994**	**1995**	**2003**	**2006**
North	86,621	1,063,148	431,469	1,085,104	176,359	1,423,567	612,899	1,444,862	11,130	696,946	240,951	662,489
South	12,311	431,985	151,781	419,998	91,653	762,996	326,481	771,149	6,420	380,941	132,462	352,956
Mtn	9,094	121,508	46,399	116,377	10,871	156,245	59,657	163,245	19,404	145,140	50,629	119,981
TSB Rd	44,495	359,373	153,662	336,298	58,588	466,268	201,326	462,409	54,127	450,751	189,746	426,323
Overall	154,514	1,978,010	785,314	1,959,783	339,466	2,811,071	1,202,365	2,843,670	93,076	1,675,773	615,791	1,563,755

Decreased volumes over 20-yr BMP design

	Project Stormwater decrease over 20-yr BMP (cf)							
Project Area	**1994**	Fraction	**1995**	Fraction	**2003**	Fraction	**2006**	Fraction
North	165,229	93.7%	726,621	51.0%	371,948	60.7%	782,373	54.1%
South	85,233	93.0%	382,055	50.1%	194,019	59.4%	418,193	54.2%
Mtn	-8,533	-78.5%	11,105	7.1%	9,028	15.1%	43,264	26.5%
TSB Rd	4,461	7.6%	15,517	3.3%	11,580	5.8%	36,086	7.8%
Overall	248,384	73.2%	1,137,293	40.5%	588,577	49.0%	1,281,922	45.1%

Sediment Loads

	Existing Stormwater load (kg)				20-yr BMP Stormwater load (kg)				Project Stormwater load (kg)			
Project Area	**1994**	**1995**	**2003**	**2006**	**1994**	**1995**	**2003**	**2006**	**1994**	**1995**	**2003**	**2006**
North	246,584	3,749,270	1,496,700	3,715,798	520,583	4,489,815	1,925,338	4,387,778	10,339	652,201	222,518	646,511
South	56,549	1,851,045	651,730	1,800,059	249,545	2,420,741	1,023,528	2,411,095	9,479	372,205	131,627	368,548
Mtn	15,353	475,818	166,708	461,902	21,493	491,426	177,498	497,680	28,649	187,886	68,063	162,855
TSB Rd	98,685	1,324,050	522,235	1,260,036	100,199	1,209,091	492,269	1,125,043	72,542	510,820	219,642	491,384
Overall	419,165	7,402,179	2,839,377	7,239,801	893,813	8,613,068	3,620,637	8,423,602	123,003	1,725,107	643,854	1,671,304

Decreased loads over 20-yr BMP design

	Project Stormwater load decrease over 20-yr BMP (kg)							
Project Area	**1994**	Fraction	**1995**	Fraction	**2003**	Fraction	**2006**	Fraction
North	510,243	98.0%	3,837,614	85.5%	1,702,820	88.4%	3,741,267	85.3%
South	240,065	96.2%	2,048,536	84.6%	891,901	87.1%	2,042,547	84.7%
Mtn	-7,156	-33.3%	303,540	61.8%	109,435	61.7%	334,825	67.3%
TSB Rd	27,657	27.6%	698,271	57.8%	272,627	55.4%	633,659	56.3%
Overall	772,804	86.5%	6,889,956	80.0%	2,978,786	82.3%	6,754,304	80.2%

Comparisons of Modeled flows and Loads at HMR -
Differences between Alternatives 1 & 1A

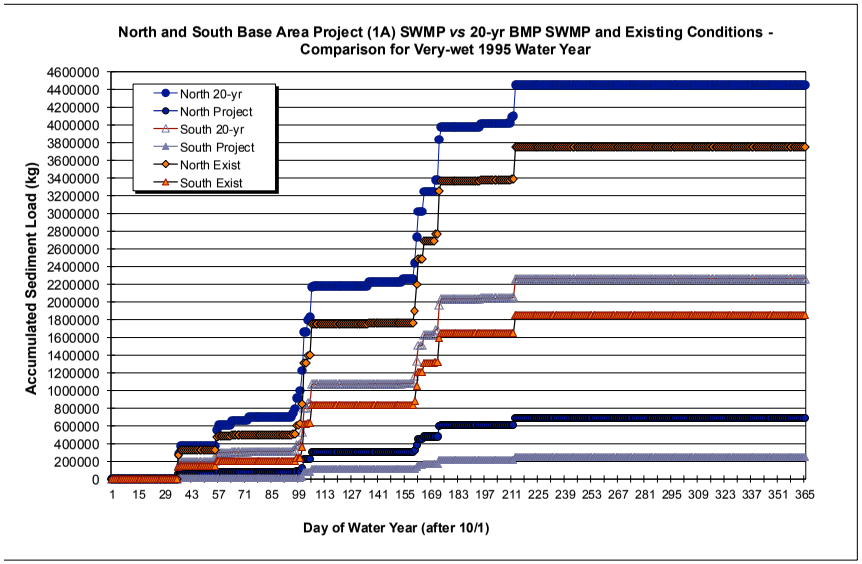
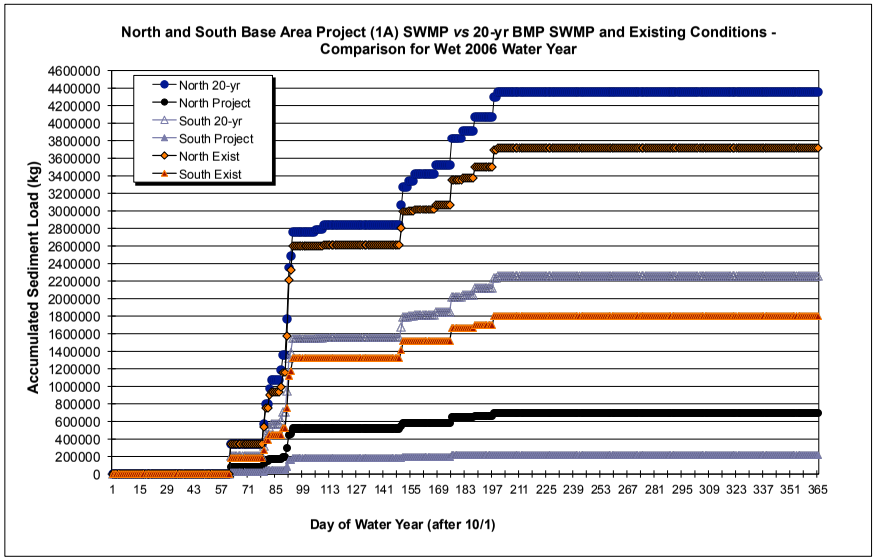
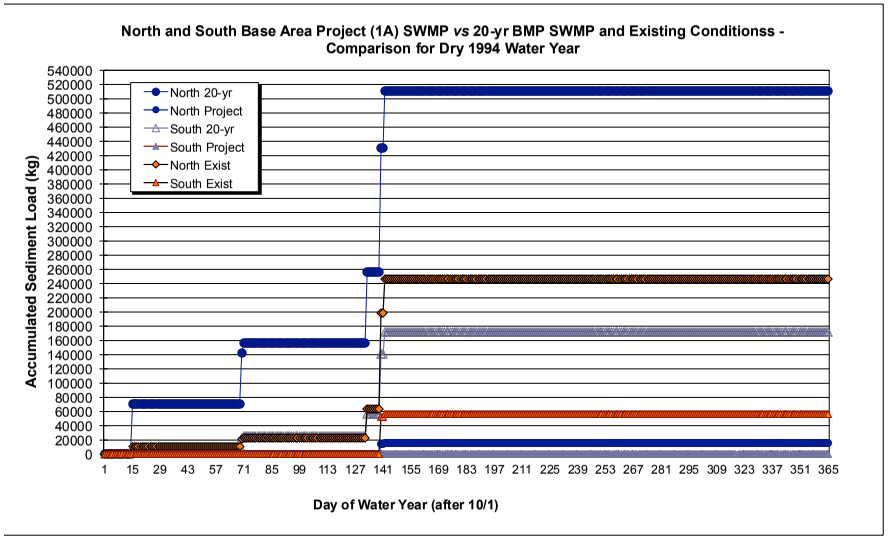
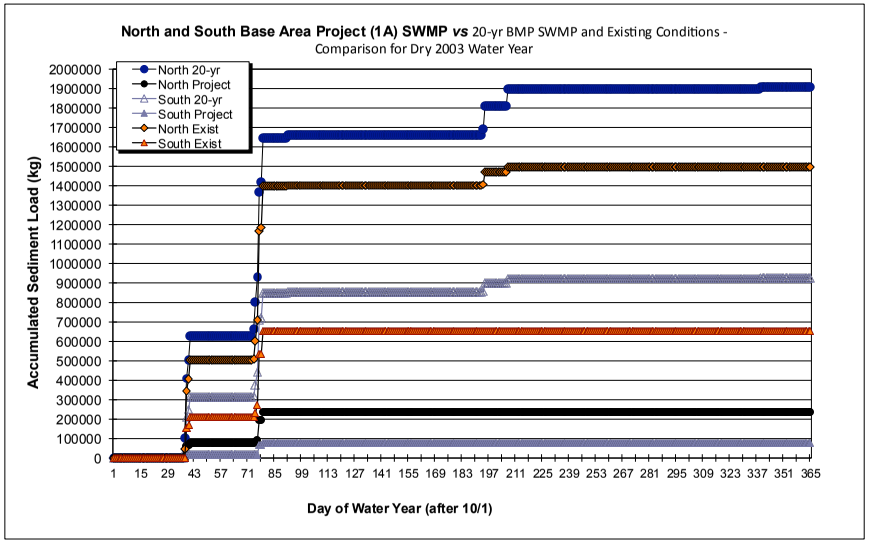
Change in project (1A vs 1) Stormwater excess (cf)

1994	**1995**	**2003**	**2006**
4,138	24,858	11,750	30,482
-6,420	-95,729	-44,655	-120,215

Change in project (1A vs 1) Stormwater load (kg)

1994	**1995**	**2003**	**2006**
5,395	36,059	15,479	47,129
-9,479	-122,048	-52,348	-149,189

Net Decrease in excess flows & loads between Projects 1 & 1A

	1994	**1995**	**2003**	**2006**
Flow (cf)	2,283	70,870	32,905	89,732
Load (kg)	4,084	85,989	36,868	102,061

Appendix Z-2. Alternative 1A - Quantificaiton of Water Quality Benefits