

## Addendum

### (Replacing section 5.4.3 of the Draft Black Ross Water Quality Improvement Plan)

#### 5.5 End of Catchment Loads

In order to determine sources of pollutants and end of catchment loads for TSS and nutrients a modelling study was undertaken using input from the ACTFR water quality event monitoring (2006/07 and 2007/08 wet seasons) and other local water quality and climatic data. The sub catchment boundaries used for modelling purposes are shown in Figure 5-1. Modelled baseline loads for the Black Ross WQIP sub basins are shown in Table 5-11 without STPs and in Table 5-12 with STPs.

Table 5-11 Modelled Loads by WQIP Sub Basin (No STPs)

Sub Basin	No.	Area	Flow	TSS	TN	TP
		Hectares	ML/year	kg/year	kg/year	kg/year
Crystal Creek	1	22,629	239,443	5,513,449	90,122	9,383
Rollingstone Creek	2	21,822	144,387	1,603,046	40,448	4,021
Bluewater Creek	3	28,872	145,698	2,806,946	92,700	4,641
Black River	4	29,539	114,396	7,195,425	69,178	10,022
<b>Black Basin total</b>		105,291	643,925	17,118,866	292,448	28,067
Bohle River	5	33,194	131,708	9,295,613	78,328	14,146
Lower Ross River	6	13,244	53,714	4,205,854	33,120	6,981
Upper Ross River	7	74,929	196,870	8,108,550	100,444	12,784
Stuart Creek	8	11,024	47,483	1,650,930	18,956	2,959
Alligator Creek	9	27,490	104,834	2,104,936	42,716	4,811
<b>Ross Basin total</b>		159,882	534,608	25,365,882	273,565	41,680
Magnetic Island	10	4,815	27,390	342,217	6,286	944
<b>Black Ross Total</b>		267,559	1,205,923	42,826,965	572,299	70,690

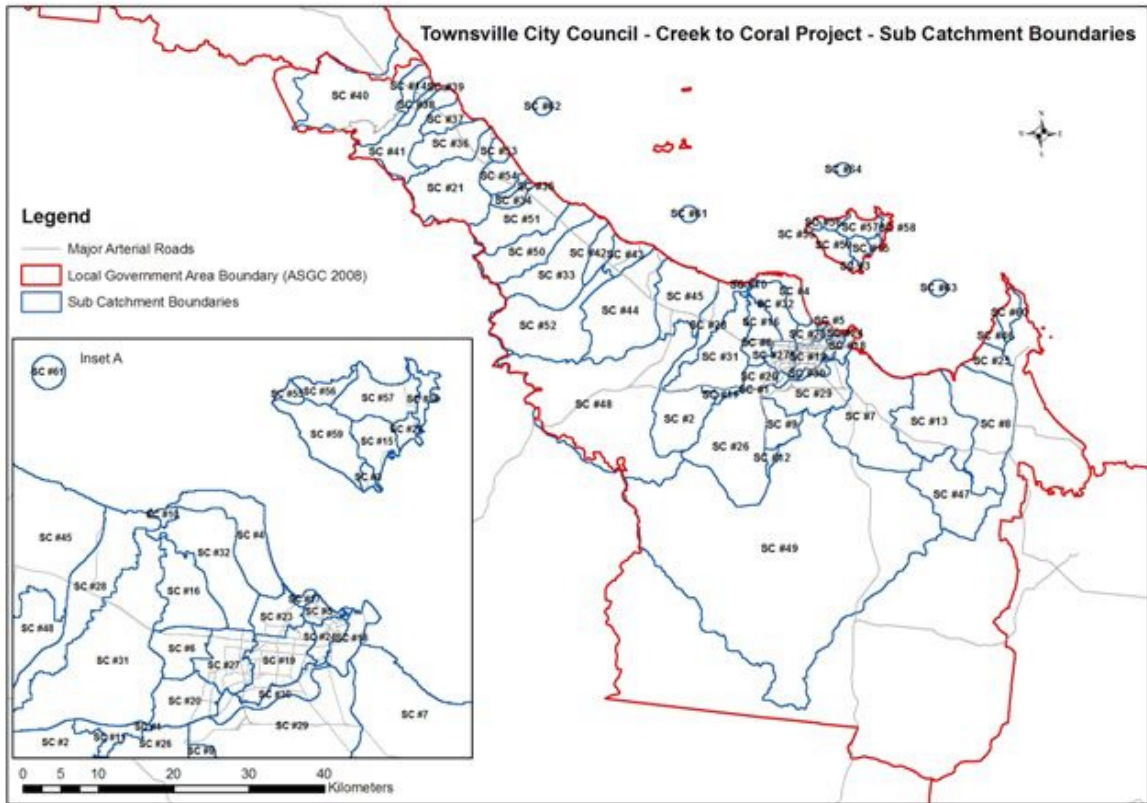
Note: Alligator Creek sub basin has been grouped with the Ross River AWR Basin. It is part of the Haughton River AWR Basin. Loads do not include point source discharges. Areas are from modelled results except for Upper Ross River (in brackets). (Updated using 9/6/09, 10/6/09 and 12/6/09 data)

Table 5-12 Modelled Loads by WQIP Sub Basin With STPs (at 2007)

Sub Basin	No.	Flow	TSS	TN	TP
		ML/year	kg/year	kg/year	kg/year
Crystal Creek	1	239,443	5,513,449	90,122	9,383
Rollingstone Creek	2	144,387	1,603,046	40,448	4,021
Bluewater Creek	3	145,698	2,806,946	92,700	4,641
Black River	4	114,396	7,190,500	70,591	11,063
<b>Black Basin total</b>		643,925	17,113,941	293,861	29,108
Bohle River	5	131,708	9,289,250	191,753	29,795
Lower Ross River	6	53,714	4,205,854	33,120	6,981
Upper Ross River	7	196,870	8,108,550	100,444	12,784
Stuart Creek (pre)	8	47,483	1,649,800	200,020	58,400
Stuart Creek (post)	8	47,483	1,649,800	61,320	20,039
Alligator Creek	9	104,834	2,104,936	42,716	4,811
<b>Ross Basin total</b>		534,608	25,358,390	429,353	74,409
Magnetic Island	10	27,390	342,217	6,286	944
<b>Black Ross Total</b>		1,205,923	42,814,548	729,500	104,461

Note: Yellow shaded rows are different to load values in Table 5-11 due to input to sub basins from STPs. Tan shaded row is load value prior to the Cleveland Bay STP upgrade. (Updated using 9/6/09, 10/6/09 and 12/6/09 data)

Figure 5-1 Modelled Sub Catchments



Based on the modelled loads, with and without nutrient contributions from STPs, the relative contributions from STPs by sub basin, basin and WQIP area have been calculated (see Table 5-13).

Table 5-13 STP Load Contributions

Sub Basin	Total N (kg/yr)		Difference		Total P (kg/yr)		Difference	
	With	Without	kg/yr	%	With	Without	kg/yr	%
Black River	70,591	69,178	1,413	2.0	11,063	10,022	1,041	9.4
<b>Black Basin total</b>	<b>293,861</b>	<b>292,448</b>	<b>1,413</b>	<b>0.5</b>	<b>29,108</b>	<b>28,067</b>	<b>1,041</b>	<b>3.6</b>
Bohle River	191,753	78,328	113,425	59.2	29,795	14,146	15,649	52.5
Stuart Creek	61,320	18,956	42,364	69.1	20,039	2,959	17,080	85.2
<b>Ross Basin total</b>	<b>429,353</b>	<b>273,565</b>	<b>155,788</b>	<b>36.3</b>	<b>74,409</b>	<b>41,680</b>	<b>32,729</b>	<b>44.0</b>
<b>Black Ross Total</b>	<b>729,500</b>	<b>572,299</b>	<b>157,201</b>	<b>21.5</b>	<b>104,461</b>	<b>70,690</b>	<b>33,771</b>	<b>32.3</b>

Note: Load contribution totals for basins and the Black Ross WQIP area are from all sources (point source and diffuse) and all sub basins. Only the sub basins with contributions from STPs have been included in the table. With is the total for sub basins with STP discharge figures included and Without is diffuse sources loads only. For a list of all load contributions see Table 5-11 and Table 5-12. (Updated using 9/6/09, 10/6/09 and 12/6/09 diffuse data)

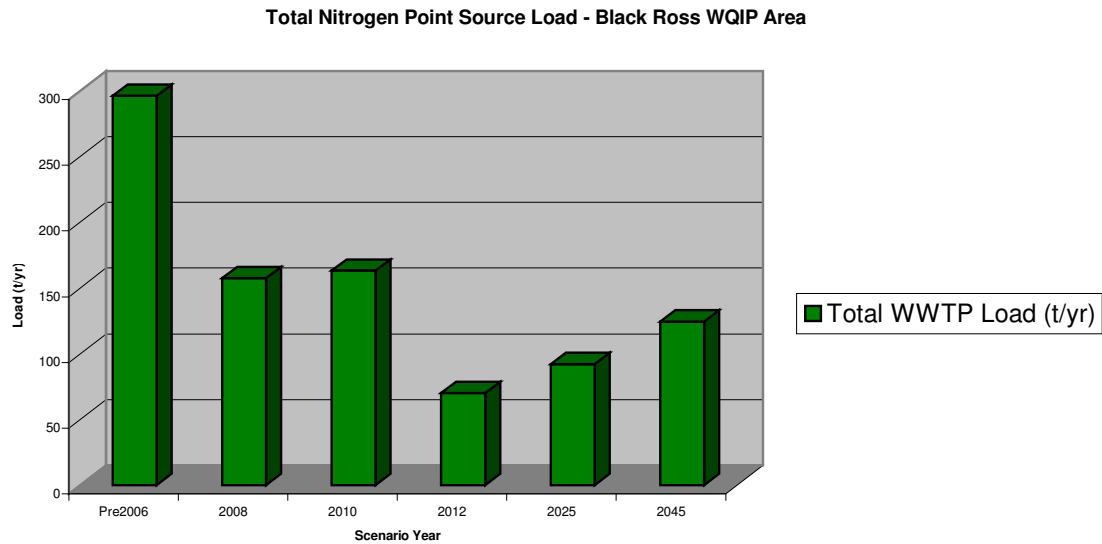
Point source loads will be reduced over the next three years as a result of upgrades to existing STPs. Expected load reductions from STPs along with post upgrade increases associated with population growth are listed in Table 5-14 with the trend for nitrogen illustrated in Figure 5-2.

Table 5-14 Point Source Load Reduction Figures

Upgrade status	Years	Total Flows (ML/day)	Total TSS loads (t/yr)	Total TN loads (t/yr)	Total TP loads (t/yr)
STP upgrade scenario data	Pre 2006	41.54	91.03	296.32	72.08
	2008	41.54	91.03	157.41	33.83
	2010	43.24	94.77	163.29	36.68
	2012	48.43	106.14	70.02	23.92
	2021	55.65	121.97	92.10	28.67
	2045	74.43	163.12	124.64	37.06

Note: Loads are in tonnes per year. Flows are daily discharge flows based on expected population growth

Figure 5-2 Nitrogen Loads from Point Sources



Projected increases in diffuse source pollutant loads have been calculated from modelling results and are presented in Table 5-15. Land use changes associated with the modelled load increases are discussed in the Options report (Gunn, Manning and McHarg 2009).

Anticipated load reductions from diffuse sources as a result of improved management practices have also been modelled. The initial management practice improvement scenarios modelled are:

- Water sensitive urban design (WSUD) applied to all new urban (Greenfield) development;
- WSUD applied to all urban areas (new and established); and
- Best management practice principles applied to rural areas i.e. grazing and intensive agriculture.

Potential diffuse source load reductions from the modelling are listed in Table 5-16 for total suspended solids (TSS), Table 5-17 for total nitrogen (TN) and Table 5-18 for total phosphorus (TP). These results have been used to establish indicative load reduction targets for diffuse sources at 2021 and 2045 (see Table 5-19 and Table 5-20).

Table 5-15 Modelled End of Catchment Loads

Sub Basin	Area	Flow	2005 TSS	2005 TN	2005 TP	2021 TSS	2021 TN	2021 TP	2045 Flow	2045 TSS	2045 TN	2045 TP
	Hectare	ML/year	kg/year	kg/year	kg/year	kg/year	kg/year	kg/year	ML/year	kg/year	kg/year	kg/year
Crystal Creek	22,629	239,443	5,513,449	90,122	9,383	6,515,695	97,966	10,352	239,042	8,019,064	109,732	11,806
Rollingstone Creek	21,822	144,387	1,603,046	40,448	4,021	2,168,745	45,643	4,572	14,5008	3,017,294	53,436	5,400
Bluewater Creek	28,872	145,698	2,806,946	92,700	4,641	2,807,092	95,213	4,515	144,566	2,807,312	98,983	4,327
Black River	29,539	114,396	7,195,425	69,178	10,022	7,408,731	70,669	10,246	114,433	7,728,690	72,904	10,581
<b>Black Basin total</b>	105,291	643,925	17,118,866	292,448	28,067	18,900,263	309,491	29,686	643,048	21,572,359	335,055	32,115
Bohle River	33,194	131,708	9,295,613	78,328	14,146	9,494,820	78,326	14,225	133,397	9,793,631	78,322	14,343
Lower Ross River	13,244	53,714	4,205,854	33,120	6,981	5,081,431	36,718	7,766	54,795	6,394,797	42,114	8,943
Upper Ross River	74,929	196,870	8,108,550	100,444	12,784	10,153,950	110,232	14,741	196,139	13,222,050	124,916	17,678
Stuart Creek	11,024	47,483	1,650,930	18,956	2,959	2,429,643	23,559	3,777	47,483	3,597,713	30,462	5,004
Alligator Creek	27,490	104,834	2,104,936	42,716	4,811	3,792,099	53,248	6,586	103,775	6,322,843	69,047	9,248
<b>Ross Basin total</b>	159,882	534,608	25,365,882	273,565	41,680	30,951,942	302,083	47,094	535,589	39,331,033	344,860	55,216
Magnetic Island	4,815	27,390	342,217	6,286	944	399,459	6,383	1,000	27,489	485,322	6,527	1,084
<b>Black Ross Total</b>	267,559	1,205,923	42,826,965	572,299	70,690	50,251,665	617,957	77,780	1,206,126	61,388,714	686,442	88,416
<b>Change from 2005</b>	0	0	0	0	0	7,424,700	45,657	7,090	202	18,561,749	114,143	17,726
<b>% change from 2005</b>						17	8	10	0	43	20	25
<b>Change from 1850</b>		21,485	30,718,792	227,354	34,388	38,143,492	273,011	41,478	21,688	49,280,542	341,497	52,114
<b>% increase from 1850</b>		1.8	254	66	95	315	79	114	1.8	407	99	144

Note: Figures represent average annual outputs. 1850 is considered to be the pre-settlement modelled scenario with 'natural' background outputs from a forested catchment. 2005 is the base case for current loads using the most recent land use data. 2021 is the medium term scenario where differences could be seen at the 'paddock' scale from the introduction of management practice scenarios and 2045 is the long term scenario where wide spread adoption of water quality improvement measures may be measured at the end of catchment through water quality monitoring. Figures have been rounded to the nearest whole number. (Updated using 9/6/09, 10/6/09 and 12/6/09 data)

Table 5-16 Potential TSS Load Reductions at 2045

Sub Basin	BAU	GF WSUD	Change	% SB	% BR	All WSUD	Change	% SB	% BR	Rural BMP	Change	% SB	% BR
	t/year	t/year	t/year			t/year	t/year			t/year	t/year	t/year	
Crystal Creek	8,019	7,847	-172	2.1	11.8	7,847	-172	2.1	2.8	3,349	-4,670	58.2	17.8
Rollingstone Creek	3,017	2,841	-176	5.8	12.2	2,736	-281	9.3	4.5	1,656	-1,361	45.1	5.2
Bluewater Creek	2,807	2,803	-4	0.1	0.3	2,778	-29	1.0	0.5	1,735	-1,072	38.2	4.1
Black River	7,729	7,729	0	0	0	7,433	-296	3.8	4.7	4,489	-3,240	41.9	12.4
Bohle River	9,794	8,972	-822	8.4	56.7	7,268	-2526	25.8	40.5	6,931	-2,863	29.2	10.9
Lower Ross River	6,395	6,221	-174	2.7	12.0	3,760	-2635	41.2	42.2	4,716	-1,679	26.2	6.4
Upper Ross River	13,222	13,222	0	0	0	13,222	0	0	0	6,940	-6,282	47.5	24.0
Stuart Creek	3,598	3,598	0	0	0	3,568	-30	0.8	0.5	1,855	-1,743	48.4	6.6
Alligator Creek	6,323	6,323	0	0	0	6,323	0	0	0	3,009	-3,314	52.4	12.6
Magnetic Island	485	384	-101	20.8	7.0	214	-271	55.9	4.3	485	0	0	0
<b>Black Basin total</b>	21,572	21,220	-352	1.6	24.3	20,795	-777	3.6	12.5	11,229	-10,343	47.9	39.4
<b>Ross Basin total</b>	39,331	38,335	-996	2.5	68.7	34,141	-5190	13.2	83.2	23,452	-15,879	40.4	60.6
<b>Black Ross Total</b>	61,389	59,939	-1,450	2.4	100.0	55,150	-6239	10.2	100.0	35,166	-26,223	42.7	100.0

Notes: BAU is 'business as usual' with no management practice intervention. GF is Greenfield. WSUD is water sensitive urban design. GF WSUD denotes potential load reduction from new urban development (Greenfield) with 100% adoption of WSUD. All WSUD denotes adoption of WSUD measures across all urban areas. Greenfield WSUD is a sub component of All (urban) WSUD. BMP is best management practice. Rural BMP denotes 100% uptake of farming best management practice in rural areas for both intensive agriculture and grazing. % SB is the percentage change (reduction) from the business as usual scenario for the sub basin. % BR is the percentage change for the sub basin relative to the total change (reduction) for the entire Black Ross (BR) WQIP area.

Table 5-17 Potential TN Load Reductions

Sub Basin	BAU	GF WSUD	Change	% SB	% BR	All WSUD	Change	% SB	% BR	Rural BMP	Change	% SB	% BR
	t/year	t/year	t/year			t/year	t/year			t/year	t/year	t/year	
Crystal Creek	109.7	109.5	0.2	0.1	12.5	109.5	0.2	0.1	1.3	97.7	12.0	10.9	19.4
Rollingstone Creek	53.4	53.2	0.2	0.3	12.5	53.0	0.4	0.8	3.6	49.1	4.3	8.1	7.0
Bluewater Creek	99.0	98.9	0.1	0.1	4.5	98.9	0.1	0.1	0.8	87.6	11.4	11.5	18.5
Black River	72.9	72.9	0	0	-0.3	72.1	0.8	1.0	6.6	66.5	6.4	8.8	10.4
Bohle River	78.3	77.4	0.9	1.1	74.6	73.1	5.2	6.7	44.9	73.4	4.9	6.3	8.0
Lower Ross River	42.1	41.9	0.2	0.4	15.2	37.4	4.7	11.2	40.8	39.0	3.1	7.3	5.0
Upper Ross River	125.0	124.9	0.1	0.1	7.0	124.9	0.1	0.1	0.7	114.3	10.7	8.5	17.3
Stuart Creek	30.5	30.5	0	0.1	3.2	30.4	0.1	0.4	1.0	27.3	3.2	10.4	5.2
Alligator Creek	69.0	69.0	0	-0.1	-3.9	69.0	0.0	-0.1	-0.4	62.9	6.1	8.8	9.9
Magnetic Island	6.5	6.4	0.1	1.5	8.4	6.0	0.5	8.2	4.6	6.5	0	-0.4	0.0
<b>Black Basin total</b>	335.1	334.6	0.5	0.1	37.6	333.6	1.5	0.5	13.1	300.9	34.2	10.2	55.4
<b>Ross Basin total</b>	344.9	343.7	1.2	0.3	96.1	334.8	10.1	2.9	87.0	316.9	28.0	8.1	45.4
<b>Black Ross Total</b>	686.0	684.8	1.2	0.2	100	674.4	11.6	1.7	100	624.4	61.6	9.0	100

Notes: BAU is 'business as usual' with no management practice intervention. GF is Greenfield. WSUD is water sensitive urban design. GF WSUD denotes potential load reduction from new urban development (Greenfield) with 100% adoption of WSUD. All WSUD denotes adoption of WSUD measures across all urban areas. Greenfield WSUD is a sub component of All (urban) WSUD. BMP is best management practice. Rural BMP denotes 100% uptake of farming best management practice in rural areas for both intensive agriculture and grazing. % SB is the percentage change (reduction) from the business as usual scenario for the sub basin. % BR is the percentage change for the sub basin relative to the total change (reduction) for the entire Black Ross (BR) WQIP area.

Table 5-18 Potential TP Load Reductions

Sub Basin	BAU	GF WSUD	Change	% SB	% BR	All WSUD	Change	% SB	% BR	Rural BMP	Change	% SB	% BR
	t/year	t/year	t/year			t/year	t/year			t/year	t/year	t/year	
Crystal Creek	11.8	11.7	0.1	0.9	11.3	11.7	0.1	0.9	1.5	11.0	0.8	6.8	12.5
Rollingstone Creek	5.4	5.3	0.1	2.2	13.0	5.1	0.3	4.9	3.9	5.1	0.3	4.8	4.0
Bluewater Creek	4.3	4.3	0	-0.6	-2.7	4.3	0	0.2	0.1	3.9	0.4	8.9	6.0
Black River	10.6	10.6	0	0.2	2.1	10.2	0.4	3.9	6.2	9.6	1.0	9.6	15.8
Bohle River	14.3	13.8	0.5	3.3	51.7	11.4	2.9	20.0	42.3	13.5	0.8	5.6	12.4
Lower Ross River	8.9	8.8	0.1	0.7	7.0	6.3	2.6	29.6	38.9	8.7	0.2	2.5	3.4
Upper Ross River	17.7	17.7	0	0.1	2.4	17.7	0	0.1	0.3	15.7	2.0	11.1	30.5
Stuart Creek	5.0	5.0	0	-0.1	-0.4	4.9	0.1	1.4	1.0	4.6	0.4	7.2	5.6
Alligator Creek	9.2	9.2	0	-0.5	-5.3	9.2	0	-0.5	-0.7	8.7	0.5	5.5	7.9
Magnetic Island	1.1	1.0	0.1	8.0	9.6	0.8	0.3	30.0	4.9	1.1	0.0	1.5	0.2
<b>Black Basin total</b>	32.1	31.9	0.2	0.7	23.6	31.3	0.8	2.5	11.7	29.6	2.5	7.7	38.4
<b>Ross Basin total</b>	55.2	54.6	0.6	1.1	66.4	49.6	5.6	10.2	83.4	51.3	3.9	7.1	61.4
<b>Black Ross Total</b>	88.4	87.5	0.9	1.0	100	81.6	6.8	7.7	100	82.0	6.4	7.3	100

Notes: BAU is 'business as usual' with no management practice intervention. GF is Greenfield. WSUD is water sensitive urban design. GF WSUD denotes potential load reduction from new urban development (Greenfield) with 100% adoption of WSUD. All WSUD denotes adoption of WSUD measures across all urban areas. Greenfield WSUD is a sub component of All (urban) WSUD. BMP is best management practice. Rural BMP denotes 100% uptake of farming best management practice in rural areas for both intensive agriculture and grazing. % SB is the percentage change (reduction) from the business as usual scenario for the sub basin. % BR is the percentage change for the sub basin relative to the total change (reduction) for the entire Black Ross (BR) WQIP area.

Table 5-19 Indicative Load Reduction Targets for 2021

Sub Basin	2021 BAU load (t/yr)	Green Field WSUD (t/yr)	Existing Urban WSUD (t/yr)	Rural BMP (t/yr)	Total load reduction target (t/yr)	% of 2021 BAU load	% of 2021 BAU minus 1850 load
<b>Total Suspended Solids</b>							
Crystal	6,516	69	0	560	629	9.7	11.3
Rollingstone	2,169	71	8	163	242	11.2	15.3
Bluewater	2,807	2	2	129	132	4.7	5.9
Black	7,409	0	24	389	412	5.6	7.0
Bohle	9,495	329	136	344	809	8.5	10.7
Lower Ross	5,081	70	197	201	468	9.2	10.8
Upper Ross	10,154	0	0	754	754	7.4	10.7
Stuart	2,430	0	2	209	211	8.7	11.6
Alligator	3,792	0	0	398	398	10.5	21.0
Magnetic Is.	399	40	14	0	54	13.5	18.5
<b>Black Basin</b>	<b>18,900</b>	<b>141</b>	<b>34</b>	<b>1,241</b>	<b>1,416</b>	<b>7.5</b>	<b>9.3</b>
<b>Ross Basin</b>	<b>30,952</b>	<b>398</b>	<b>336</b>	<b>1,906</b>	<b>2,639</b>	<b>8.5</b>	<b>11.7</b>
<b>Black Ross</b>	<b>50,252</b>	<b>580</b>	<b>383</b>	<b>3,147</b>	<b>4,110</b>	<b>8.2</b>	<b>10.8</b>
<b>Total Nitrogen</b>							
Crystal	98	0.07	0.00	1.4	1.5	1.5	2.9
Rollingstone	46	0.07	0.02	0.5	0.6	1.4	3.4
Bluewater	95	0.01	0.00	1.4	1.4	1.5	2.0
Black	71	0.00	0.06	0.8	0.8	1.2	2.6
Bohle	78	0.37	0.35	0.6	1.3	1.7	4.1
Lower Ross	37	0.08	0.36	0.4	0.8	2.2	4.4
Upper Ross	110	0.00	0.00	1.3	1.3	1.2	3.9
Stuart	24	0.00	0.01	0.4	0.4	1.6	4.4
Alligator	53	0.00	0.00	0.7	0.7	1.4	7.0
Magnetic Is.	6	0.05	0.03	0.0	0.1	1.4	6.7
<b>Black Basin</b>	<b>309</b>	<b>0.16</b>	<b>0.09</b>	<b>4.1</b>	<b>4.3</b>	<b>1.4</b>	<b>2.6</b>
<b>Ross Basin</b>	<b>302</b>	<b>0.45</b>	<b>0.72</b>	<b>3.3</b>	<b>4.5</b>	<b>1.5</b>	<b>4.4</b>
<b>Black Ross</b>	<b>618</b>	<b>0.66</b>	<b>0.84</b>	<b>7.4</b>	<b>8.9</b>	<b>1.4</b>	<b>3.3</b>
<b>Total Phosphorus</b>							
Crystal	10.4	0.04	0.00	0.1	0.14	1.4	2.5
Rollingstone	4.6	0.05	0.01	0.0	0.09	2.0	5.5
Bluewater	4.5	0.00	0.00	0.0	0.05	1.2	3.8
Black	10.2	0.00	0.03	0.1	0.15	1.5	2.5
Bohle	14.2	0.21	0.19	0.1	0.50	3.5	5.3
Lower Ross	7.8	0.04	0.21	0.0	0.28	3.6	4.8
Upper Ross	14.7	0.00	0.00	0.2	0.23	1.6	3.4
Stuart	3.8	0.00	0.01	0.0	0.05	1.3	2.2
Alligator	6.6	0.00	0.00	0.1	0.07	1.0	3.4
Magnetic Is.	1.0	0.03	0.02	0.0	0.05	4.8	10.0
<b>Black Basin</b>	<b>29.7</b>	<b>0.09</b>	<b>0.05</b>	<b>0.3</b>	<b>0.44</b>	<b>1.5</b>	<b>2.9</b>
<b>Ross Basin</b>	<b>47.1</b>	<b>0.25</b>	<b>0.40</b>	<b>0.5</b>	<b>1.13</b>	<b>2.4</b>	<b>4.3</b>
<b>Black Ross</b>	<b>77.8</b>	<b>0.37</b>	<b>0.47</b>	<b>0.8</b>	<b>1.61</b>	<b>2.1</b>	<b>3.9</b>

Notes: Load reductions are based on 100% adoption rate for GF WSUD, a 20% adoption rate for Existing Urban WSUD and a 30% adoption rate for Rural BMP.

Table 5-20 Indicative Load Reduction Targets for 2045

Sub Basin	2045 BAU load (t/yr)	Green Field WSUD (t/yr)	Existing Urban WSUD (t/yr)	Rural BMP (t/yr)	Total load reduction target (t/yr)	% of 2045 BAU load	% of 2045 BAU minus 1850 load
<b>Total Suspended Solids</b>							
Crystal	8,019	172	0	3,736	3,907	48.7%	55.4%
Rollingstone	3,017	176	52	1,089	1,318	43.7%	54.1%
Bluewater	2,807	4	12	857	874	31.1%	39.3%
Black	7,729	0	148	2,592	2,740	35.5%	44.2%
Bohle	9,794	822	852	2,290	3,965	40.5%	50.6%
Lower Ross	6,395	174	1,230	1,343	2,747	43.0%	48.8%
Upper Ross	13,222	0	0	5,026	5,026	38.0%	49.7%
Stuart	3,598	0	15	1,394	1,409	39.2%	47.2%
Alligator	6,323	0	0	2,651	2,651	41.9%	60.0%
Magnetic Is.	485	101	85	0	186	38.4%	49.2%
<b>Black Basin</b>	<b>21,572</b>	<b>352</b>	<b>212</b>	<b>8,274</b>	<b>8,839</b>	<b>41.0%</b>	<b>49.3%</b>
<b>Ross Basin</b>	<b>39,331</b>	<b>996</b>	<b>2,097</b>	<b>12,703</b>	<b>15,796</b>	<b>40.2%</b>	<b>51.0%</b>
<b>Black Ross</b>	<b>61,389</b>	<b>1,450</b>	<b>2,394</b>	<b>20,978</b>	<b>24,823</b>	<b>40.4%</b>	<b>50.4%</b>
<b>Total Nitrogen</b>							
Crystal	109.7	0.2	0.0	9.6	9.7	8.9%	15.3%
Rollingstone	53.4	0.2	0.1	3.4	3.7	7.0%	14.5%
Bluewater	99.0	0.1	0.0	9.1	9.2	9.3%	12.9%
Black	72.9	0.0	0.4	5.1	5.5	7.5%	16.1%
Bohle	78.3	0.9	2.2	3.9	7.0	8.9%	22.0%
Lower Ross	42.1	0.2	2.3	2.5	4.9	11.7%	20.6%
Upper Ross	125.0	0.1	0.0	8.5	8.6	6.9%	18.2%
Stuart	30.5	0.0	0.0	2.5	2.6	8.6%	16.7%
Alligator	69.0	0.0	0.0	4.9	4.8	7.0%	18.4%
Magnetic Is.	6.5	0.1	0.2	0.0	0.3	4.6%	20.8%
<b>Black Basin</b>	<b>335.1</b>	<b>0.5</b>	<b>0.5</b>	<b>27.3</b>	<b>28.3</b>	<b>8.4%</b>	<b>14.5%</b>
<b>Ross Basin</b>	<b>344.9</b>	<b>1.2</b>	<b>4.5</b>	<b>22.4</b>	<b>28.0</b>	<b>8.1%</b>	<b>19.3%</b>
<b>Black Ross</b>	<b>686.0</b>	<b>1.2</b>	<b>5.2</b>	<b>49.3</b>	<b>55.7</b>	<b>8.1%</b>	<b>16.3%</b>
<b>Total Phosphorus</b>							
Crystal	11.80	0.10	0.00	0.64	0.7	6.3%	10.5%
Rollingstone	5.40	0.12	0.07	0.21	0.4	7.4%	16.2%
Bluewater	4.30	+0.02	0.02	0.31	0.3	6.9%	24.4%
Black	10.60	0.02	0.20	0.81	1.0	9.7%	15.9%
Bohle	14.30	0.47	1.20	0.64	2.3	16.1%	24.4%
Lower Ross	8.90	0.06	1.29	0.18	1.5	17.1%	21.7%
Upper Ross	17.70	0.02	0.00	1.57	1.6	9.0%	16.3%
Stuart	5.00	0.00	0.04	0.29	0.3	6.4%	9.3%
Alligator	9.20	+0.05	0.00	0.40	0.4	3.9%	7.7%
Magnetic Is.	1.10	0.09	0.12	0.01	0.2	20.1%	39.1%
<b>Black Basin</b>	<b>32.10</b>	<b>0.22</b>	<b>0.29</b>	<b>1.97</b>	<b>2.5</b>	<b>7.7%</b>	<b>14.3%</b>
<b>Ross Basin</b>	<b>55.20</b>	<b>0.60</b>	<b>2.52</b>	<b>3.15</b>	<b>6.3</b>	<b>11.4%</b>	<b>18.3%</b>
<b>Black Ross</b>	<b>88.40</b>	<b>0.91</b>	<b>2.93</b>	<b>5.13</b>	<b>9.0</b>	<b>10.1%</b>	<b>17.2%</b>

Notes: Load reductions are based on 100% adoption rate for GF WSUD, a 50% adoption rate for Existing Urban WSUD and a 80% adoption rate for Rural BMP.

## 5.6 Load Reduction Targets

The initial load reduction targets for diffuse sources at 2021 and 2045 (see Table 5-21) have been set conservatively based on anticipated improvements that are achievable without the commitment of significant additional external resources for retrofitting existing urban areas (Existing Urban WSUD) and developing a rural best management practice (BMP) extension program. If additional resources can be secured then reduction targets can be increased commensurate with the resources.

The adoption of water sensitive urban design (WSUD) principles for new developments is achievable in the shorter term through policy and regulatory interventions hence the 100% adoption rate used for both the 2021 and 2045 load reduction targets.

Table 5-21 Adoption Rates for Load Reductions

Management Practice	Adoption Rate		
	Current (2005)	2021	2045
Greenfield WSUD	15%*	100%	100%
Existing Urban WSUD	10%*	20%	50%
Rural Best Management Practice	15%*	30%	80%

Note: \* indicates that Current (2005) adoption rates are anecdotal estimates and have not been derived from rigorous investigations.

Further investigations are required to determine current adoption rates of Greenfield WSUD and Rural BMP, and to determine the extent and effectiveness of WSUD measures in established urban areas. In more recent years some urban developments have incorporated WSUD, however there is no quantitative information available to verify the estimated current adoption rate shown in Table 5-21.

In conjunction with determining baseline management practice adoption rates a detailed analysis of implementation costs and available resources is required to add sufficient rigour to establish a more meaningful set of draft load reduction targets for the Black Ross WQIP area. Some preliminary work on costs and benefits has been carried out and the results are included in the Options report (Gunn, Manning and McHarg 2009). Additional investigations will be undertaken with partner organisations and through stakeholder consultation as part of the WQIP implementation process.