

APPENDIX F

COST CALCULATIONS

APPENDIX F1

OPTION V1

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario C4 - 80Mm³/a
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		1 300 Rising main	m	10 847	28 988	314 435 519
		1 700 Gravity Main 1	m	14 501	63 600	922 270 897
		2 200 Gravity Main 2	m	21 705	9 207	199 835 176
		1 500 Gravity Main 3&4	m	11 257	16 996	191 317 126
		1 400 Gravity Main 5	m	9 635	18 244	175 774 629
		1 000 Gravity Main 6&7	m	6 657	14 600	97 185 818
2		Abstraction Weir and Low lift P/S Civil works	No	200 783 521	1	200 783 521
3		Low Lift Pump Station (M&E)	No	55 460 290	1	55 460 290
4		RM to desilting works	No	138 907 383	1	138 907 383
5		Desilting works	No	69 746 366	1	69 746 366
6		High Lift P/S	No	150 948 915	1	150 948 915
7		Balancing dams	No	143 312 460	1	143 312 460
8		Break Pressure and Operational Reservoirs	No	55 480 867	1	55 480 867
SUB-TOTAL A						2 715 458 967
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		135 772 948
4		Miscellaneous (% of Sub-total A)		10%		271 545 897
		(a) Access road	km	423 629	151.64	64 237 182
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						3 187 014 994
5		Preliminary & General (% of Sub-total B)		30%		956 104 498
SUB TOTAL C						4 143 119 493
6		Contingencies (% of Sub-total C)		20%		828 623 899
SUB TOTAL D						4 971 743 391
7		Engineering, Environmental & Administration (% of Sub-total D)		20%		978 917 434
SUB TOTAL E						5 950 660 825
8		Cost of ESKOM Power Supply	Sum	189 500 118	1	189 500 118
9		VAT (% of sub total E)		14%		859 622 532
NET PROJECT COST						6 999 783 475
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						6 999 783 475
TOTAL PROJECT COST (EXCL VAT)						6 140 160 943

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario C4 - 80Mm³/a
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm ³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0	0.00	0	0.00	0	0.00	0
2013	0.00	0	0.00	0	0.00	0	0.00	0
2014	0.00	140 171 241	0.00	129 596 191	0.00	124 751 905	0.00	120 174 246
2015	0.00	854 458 127	0.00	759 610 163	0.00	717 419 520	0.00	678 296 410
2016	0.00	1 680 585 523	0.00	1 436 571 549	0.00	1 331 181 143	0.00	1 235 280 530
2017	0.00	1 700 935 523	0.00	1 398 045 013	0.00	1 271 037 971	0.00	1 157 628 136
2018	1.70	1 164 255 453	1.34	920 127 997	1.20	820 754 154	1.07	733 678 425
2019	4.60	671 053 187	3.50	509 945 270	3.06	446 288 696	2.68	391 553 089
2020	19.10	142 045 910	13.96	103 791 555	11.98	89 121 361	10.32	76 742 985
2021	27.80	89 173 650	19.53	62 652 224	16.45	52 781 747	13.91	44 609 026
2022	29.10	51 190 870	19.66	34 582 718	16.25	28 584 715	13.48	23 711 278
2023	33.80	53 603 127	21.96	34 819 569	17.81	28 237 458	14.50	22 989 462
2024	36.10	54 783 592	22.55	34 217 670	17.94	27 225 767	14.34	21 755 318
2025	45.60	59 659 430	27.39	35 829 908	21.38	27 970 669	16.77	21 936 649
2026	49.10	61 455 791	28.35	35 489 188	21.72	27 181 956	16.72	20 923 303
2027	56.10	65 048 513	31.15	36 119 130	23.41	27 142 472	17.69	20 506 004
2028	63.10	68 641 236	33.69	36 648 117	24.84	27 020 367	18.42	20 035 722
2029	65.80	70 027 000	33.78	35 949 988	24.44	26 005 536	17.78	18 926 124
2030	71.70	73 055 152	35.39	36 062 077	25.12	25 594 419	17.94	18 281 981
2031	71.90	73 157 801	34.13	34 723 796	23.76	24 179 605	16.66	16 951 545
2032	72.00	73 209 126	32.86	33 411 689	22.45	22 826 951	15.45	15 706 887
2033	72.60	81 762 754	31.86	35 880 244	21.36	24 050 956	14.42	16 242 641
2034	73.10	73 773 696	30.84	31 129 209	20.29	20 472 577	13.45	13 569 971
2035	75.20	74 851 513	30.51	30 369 230	19.69	19 595 921	12.81	12 748 357
2036	76.30	75 416 084	29.77	29 421 434	18.84	18 626 155	12.03	11 893 066
2037	80.00	77 315 094	30.01	29 002 191	18.64	18 014 311	11.68	11 289 388
2038	80.00	77 315 094	28.86	27 886 722	17.58	16 994 633	10.82	10 453 137
2039	80.00	77 315 094	27.75	26 814 156	16.59	16 032 673	10.01	9 678 831
2040	80.00	77 315 094	26.68	25 782 842	15.65	15 125 163	9.27	8 961 880
2041	80.00	77 315 094	25.65	24 791 194	14.76	14 269 022	8.59	8 298 037
2042	80.00	77 315 094	24.67	23 837 687	13.93	13 461 341	7.95	7 683 368
2043	80.00	77 315 094	23.72	22 920 853	13.14	12 699 378	7.36	7 114 229
2044	80.00	77 315 094	22.80	22 039 281	12.40	11 980 546	6.82	6 587 249
2045	80.00	77 315 094	21.93	21 191 617	11.69	11 302 402	6.31	6 099 305
2046	80.00	77 315 094	21.08	20 376 555	11.03	10 662 643	5.84	5 647 505
2047	80.00	77 315 094	20.27	19 592 841	10.41	10 059 097	5.41	5 229 171
2048	80.00	85 560 775	19.49	20 848 485	9.82	10 501 796	5.01	5 358 207
2049	80.00	77 315 094	18.74	18 114 683	9.26	8 952 561	4.64	4 483 171
2050	80.00	77 315 094	18.02	17 417 964	8.74	8 445 812	4.30	4 151 085
2051	80.00	77 315 094	17.33	16 748 043	8.24	7 967 747	3.98	3 843 597
2052	80.00	77 315 094	16.66	16 103 887	7.78	7 516 743	3.68	3 558 886
2053	80.00	77 315 094	16.02	15 484 507	7.34	7 091 267	3.41	3 295 265
2054	80.00	77 315 094	15.41	14 888 949	6.92	6 689 874	3.16	3 051 171
2055	80.00	77 315 094	14.81	14 316 297	6.53	6 311 202	2.92	2 825 158
2056	80.00	77 315 094	14.24	13 765 670	6.16	5 953 964	2.71	2 615 887
2057	80.00	77 315 094	13.70	13 236 221	5.81	5 616 947	2.51	2 422 118
TOTAL	2624.70	9 084 176 953	920.06	6 260 154 572	584.42	5 453 701 141	386.79	4 836 787 801
URV				6.804		9.332		12.505

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	1664.70	8 148 150 144	714.27	6 059 260 471	486.37	5 357 931 488	339.23	4 790 306 580
URV				8.483		11.016		14.121

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	868.40	7 376 898 215	452.44	5 805 572 495	333.13	5 209 425 865	248.39	4 702 248 089
URV				12.832		15.638		18.931

APPENDIX F2

OPTION V2

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario D1 - 75Mm³/a
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		1 300 Rising main	m	9 493	28 988	275 196 699
		1 700 Gravity Main 1	m	14 501	63 600	922 270 897
		2 200 Gravity Main 2	m	21 705	9 207	199 835 176
		1 500 Gravity Main 3&4	m	11 257	16 996	191 317 126
		1 400 Gravity Main 5	m	9 635	18 244	175 774 629
		1 000 Gravity Main 6&7	m	6 657	14 600	97 185 818
2		Abstraction Weir and Low lift P/S Civil works	No	200 783 521	1	200 783 521
3		Low Lift Pump Station (M&E)	No	55 460 290	1	55 460 290
4		RM to desilting works	No	138 907 383	1	138 907 383
5		Desilting works	No	69 746 366	1	69 746 366
6		High Lift P/S	No	140 078 973	1	140 078 973
7		Balancing dams	No	143 312 460	1	143 312 460
8		Break Pressure and Operational Reservoirs	No	55 480 867	1	55 480 867
SUB-TOTAL A						2 665 350 205
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		133 267 510
4		Miscellaneous (% of Sub-total A)		10%		266 535 021
		(a) Access road	km	423 629	151.64	64 237 182
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						3 129 389 918
5		Preliminary & General (% of Sub-total B)		30%		938 816 975
SUB TOTAL C						4 068 206 893
6		Contingencies (% of Sub-total C)		20%		813 641 379
SUB TOTAL D						4 881 848 272
7		Engineering, Environmental & Administration (% of Sub-total D)		20%		978 018 483
SUB TOTAL E						5 859 866 754
8		Cost of ESKOM Power Supply	Sum	189 500 118	1	189 500 118
9		VAT (% of sub total E)		14%		846 911 362
NET PROJECT COST						6 896 278 235
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						6 896 278 235
TOTAL PROJECT COST (EXCL VAT)						6 049 366 873

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario D1 - 75Mm³/a
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm ³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0	0.00	0	0.00	0	0.00	0
2013	0.00	0	0.00	0	0.00	0	0.00	0
2014	0.00	0	0.00	0	0.00	0	0.00	0
2015	0.00	0	0.00	0	0.00	0	0.00	0
2016	0.00	139 721 765	0.00	119 434 750	0.00	110 672 725	0.00	102 699 668
2017	0.00	845 019 139	0.00	694 544 136	0.00	631 447 458	0.00	575 105 827
2018	0.00	1 653 616 987	0.00	1 306 877 525	0.00	1 165 734 725	0.00	1 042 059 200
2019	0.00	1 673 966 987	0.00	1 272 077 332	0.00	1 113 283 653	0.00	976 743 659
2020	0.00	1 139 957 160	0.00	832 955 531	0.00	715 223 225	0.00	615 883 383
2021	0.00	623 447 333	0.00	438 025 827	0.00	369 017 519	0.00	311 878 884
2022	10.39	135 797 606	7.02	91 739 997	5.80	75 828 674	4.81	62 900 567
2023	17.23	81 795 696	11.19	53 132 925	9.08	43 088 952	7.39	35 080 772
2024	23.84	46 365 036	14.89	28 959 465	11.85	23 042 002	9.47	18 412 194
2025	37.59	53 068 184	22.57	31 871 376	17.62	24 880 435	13.82	19 513 061
2026	43.88	56 135 667	25.34	32 416 949	19.41	24 828 860	14.94	19 112 008
2027	52.73	60 448 090	29.28	33 564 678	22.00	25 222 876	16.62	19 055 759
2028	59.16	63 581 861	31.59	33 946 875	23.29	25 028 763	17.27	18 558 939
2029	61.50	64 723 495	31.57	33 227 311	22.84	24 036 003	16.62	17 492 751
2030	67.80	67 791 802	33.47	33 463 940	23.75	23 750 437	16.97	16 964 833
2031	68.58	68 172 224	32.55	32 357 429	22.67	22 531 807	15.89	15 796 327
2032	68.60	68 185 577	31.31	31 119 007	21.39	21 260 585	14.72	14 629 093
2033	68.61	68 188 502	30.11	29 923 406	20.18	20 058 016	13.63	13 546 038
2034	68.81	68 285 981	29.04	28 813 638	19.10	18 949 708	12.66	12 560 558
2035	70.77	69 238 845	28.71	28 092 023	18.53	18 126 540	12.05	11 792 433
2036	73.47	78 398 319	28.66	30 584 868	18.15	19 362 703	11.59	12 363 363
2037	75.00	71 302 651	28.13	26 746 822	17.47	16 613 420	10.95	10 411 464
2038	75.00	71 302 651	27.05	25 718 098	16.49	15 673 038	10.14	9 640 244
2039	75.00	71 302 651	26.01	24 728 941	15.55	14 785 885	9.39	8 926 152
2040	75.00	71 302 651	25.01	23 777 828	14.67	13 948 948	8.69	8 264 956
2041	75.00	71 302 651	24.05	22 863 296	13.84	13 159 385	8.05	7 652 737
2042	75.00	71 302 651	23.12	21 983 938	13.06	12 414 514	7.45	7 085 867
2043	75.00	71 302 651	22.23	21 138 402	12.32	11 711 806	6.90	6 560 988
2044	75.00	71 302 651	21.38	20 325 387	11.62	11 048 873	6.39	6 074 989
2045	75.00	71 302 651	20.56	19 543 641	10.96	10 423 465	5.92	5 624 990
2046	75.00	71 302 651	19.77	18 791 963	10.34	9 833 458	5.48	5 208 324
2047	75.00	71 302 651	19.01	18 069 195	9.76	9 276 847	5.07	4 822 522
2048	75.00	71 302 651	18.28	17 374 226	9.21	8 751 742	4.70	4 465 298
2049	75.00	71 302 651	17.57	16 705 986	8.68	8 256 361	4.35	4 134 535
2050	75.00	71 302 651	16.90	16 063 448	8.19	7 789 020	4.03	3 828 274
2051	75.00	79 144 201	16.25	17 144 265	7.73	8 156 247	3.73	3 934 528
2052	75.00	71 302 651	15.62	14 851 561	7.29	6 932 200	3.45	3 282 128
2053	75.00	71 302 651	15.02	14 280 347	6.88	6 539 811	3.20	3 039 007
2054	75.00	71 302 651	14.44	13 731 103	6.49	6 169 633	2.96	2 813 895
2055	75.00	71 302 651	13.89	13 202 984	6.12	5 820 409	2.74	2 605 459
2056	75.00	71 302 651	13.35	12 695 177	5.78	5 490 951	2.54	2 412 462
2057	75.00	71 302 651	12.84	12 206 901	5.45	5 180 143	2.35	2 233 761
TOTAL	2367.95	8 631 103 477	797.77	5 609 072 497	493.55	4 723 351 820	316.91	4 045 171 897
URV			7.031		9.570		12.764	

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	1467.95	7 767 630 115	604.84	5 423 955 342	401.63	4 635 154 999	272.33	4 002 391 704
URV			8.968		11.541		14.697	

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	719.48	7 047 507 938	358.63	5 186 544 120	257.50	4 496 012 963	186.85	3 919 785 955
URV			14.462		17.461		20.978	

APPENDIX F3

OPTION W1

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario C4 - 95Mm³/a
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		1 500 Rising main	m	12 011	28 988	348 193 149
		1 800 Gravity Main 1	m	15 985	63 600	1 016 615 606
		2 300 Gravity Main 2	m	23 021	9 207	211 957 181
		1 600 Gravity Main 3&4	m	12 424	16 996	211 161 656
		1 500 Gravity Main 5	m	10 612	18 244	193 601 043
		1 100 Gravity Main 6&7	m	7 517	14 600	109 746 790
2		Abstraction Weir and Low lift P/S Civil works	No	200 783 521	1	200 783 521
3		Low Lift Pump Station (M&E)	No	55 460 290	1	55 460 290
4		RM to desilting works	No	138 907 383	1	138 907 383
5		Desilting works	No	69 746 366	1	69 746 366
6		High Lift P/S	No	156 892 087	1	156 892 087
7		Balancing dams	No	143 312 460	1	143 312 460
8		Break Pressure and Operational Reservoirs	No	55 480 867	1	55 480 867
SUB-TOTAL A						2 911 858 398
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		145 592 920
4		Miscellaneous (% of Sub-total A)		10%		291 185 840
		(a) Access road	km	423 629	151.64	64 237 182
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						3 412 874 340
5		Preliminary & General (% of Sub-total B)		30%		1 023 862 302
SUB TOTAL C						4 436 736 642
6		Contingencies (% of Sub-total C)		20%		887 347 328
SUB TOTAL D						5 324 083 970
7		Engineering, Environmental & Administration (% of Sub-total D)		18.453%		982 440 840
SUB TOTAL E						6 306 524 810
8		Cost of ESKOM Power Supply	Sum	189 500 118	1	189 500 118
9		VAT (% of sub total E)		14%		909 443 490
NET PROJECT COST						7 405 468 418
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						7 405 468 418
TOTAL PROJECT COST (EXCL VAT)						6 496 024 928

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario C4 - 95Mm³/a
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm ³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0	0.00	0	0.00	0	0.00	0
2013	0.00	0	0.00	0	0.00	0	0.00	0
2014	0.00	141 932 943	0.00	131 224 985	0.00	126 319 814	0.00	121 684 622
2015	0.00	891 453 888	0.00	792 499 260	0.00	748 481 874	0.00	707 664 837
2016	0.00	1 786 287 697	0.00	1 526 926 210	0.00	1 414 907 165	0.00	1 312 974 783
2017	0.00	1 806 637 697	0.00	1 484 924 495	0.00	1 350 024 784	0.00	1 229 567 260
2018	1.70	1 235 023 677	1.34	976 057 152	1.20	870 642 959	1.07	778 274 410
2019	4.60	708 461 628	3.50	538 372 611	3.06	471 167 446	2.68	413 380 555
2020	19.10	143 499 347	13.96	104 853 568	11.98	90 033 266	10.32	77 528 232
2021	27.80	90 194 521	19.53	63 369 474	16.45	53 385 998	13.91	45 119 716
2022	29.10	52 147 104	19.66	35 228 715	16.25	29 118 670	13.48	24 154 199
2023	33.80	54 325 675	21.96	35 288 922	17.81	28 618 088	14.50	23 299 351
2024	36.10	55 391 784	22.55	34 597 545	17.94	27 528 019	14.34	21 996 839
2025	45.60	59 795 277	27.39	35 911 494	21.38	28 034 359	16.77	21 986 599
2026	49.10	61 417 617	28.35	35 467 144	21.72	27 165 071	16.72	20 910 306
2027	56.10	64 662 297	31.15	35 904 678	23.41	26 981 317	17.69	20 384 253
2028	63.10	67 906 976	33.69	36 256 090	24.84	26 731 329	18.42	19 821 399
2029	65.80	69 158 496	33.78	35 504 121	24.44	25 683 005	17.78	18 691 394
2030	71.70	71 893 297	35.39	35 488 553	25.12	25 187 370	17.94	17 991 228
2031	71.90	71 986 002	34.13	34 167 611	23.76	23 792 310	16.66	16 680 025
2032	72.00	72 032 355	32.86	32 874 626	22.45	22 460 029	15.45	15 454 413
2033	72.60	80 777 111	31.86	35 447 711	21.36	23 761 024	14.42	16 046 837
2034	73.10	72 542 233	30.84	30 609 586	20.29	20 130 839	13.45	13 343 455
2035	75.20	73 515 637	30.51	29 827 230	19.69	19 246 192	12.81	12 520 837
2036	76.30	74 025 515	29.77	28 878 943	18.84	18 282 714	12.03	11 673 775
2037	84.50	77 826 426	31.70	29 194 000	19.69	18 133 451	12.34	11 364 052
2038	88.60	79 726 881	31.96	28 756 627	19.48	17 524 768	11.98	10 779 215
2039	95.00	82 693 445	32.95	28 679 457	19.70	17 147 970	11.89	10 352 129
2040	95.00	82 693 445	31.68	27 576 401	18.58	16 177 330	11.01	9 585 305
2041	95.00	82 693 445	30.46	26 515 770	17.53	15 261 633	10.20	8 875 282
2042	95.00	82 693 445	29.29	25 495 933	16.54	14 397 767	9.44	8 217 854
2043	95.00	82 693 445	28.16	24 515 320	15.60	13 582 799	8.74	7 609 124
2044	95.00	82 693 445	27.08	23 572 423	14.72	12 813 961	8.09	7 045 485
2045	95.00	82 693 445	26.04	22 665 791	13.89	12 088 642	7.49	6 523 597
2046	95.00	82 693 445	25.04	21 794 030	13.10	11 404 380	6.94	6 040 368
2047	95.00	82 693 445	24.07	20 955 798	12.36	10 758 849	6.43	5 592 933
2048	95.00	91 160 086	23.15	22 212 862	11.66	11 189 059	5.95	5 708 862
2049	95.00	82 693 445	22.26	19 374 814	11.00	9 575 337	5.51	4 795 039
2050	95.00	82 693 445	21.40	18 629 628	10.38	9 033 337	5.10	4 439 851
2051	95.00	82 693 445	20.58	17 913 104	9.79	8 522 016	4.72	4 110 973
2052	95.00	82 693 445	19.79	17 224 139	9.24	8 039 638	4.37	3 806 456
2053	95.00	82 693 445	19.03	16 561 672	8.71	7 584 564	4.05	3 524 497
2054	95.00	82 693 445	18.29	15 924 684	8.22	7 155 249	3.75	3 263 423
2055	95.00	82 693 445	17.59	15 312 197	7.75	6 750 235	3.47	3 021 688
2056	95.00	82 693 445	16.91	14 723 266	7.32	6 368 146	3.21	2 797 859
2057	95.00	82 693 445	16.26	14 156 986	6.90	6 007 685	2.98	2 590 610
TOTAL	2922.80	9 542 264 176	995.91	6 581 435 625	624.14	5 737 200 459	408.09	5 091 193 928
URV				6.608		9.192		12.476

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	1782.80	8 541 476 196	751.53	6 366 652 445	507.71	5 634 811 965	351.61	5 041 501 369
URV				8.472		11.098		14.338

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	868.40	7 731 043 259	452.44	6 100 801 780	333.13	5 479 400 931	248.39	4 949 475 551
URV				13.484		16.448		19.926

APPENDIX F4

OPTION X1

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario C4 - 110Mm³/a
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		1 600 Rising main	m	12 697	28 988	368 068 085
		1 900 Gravity Main 1	m	17 300	63 600	1 100 288 703
		2 400 Gravity Main 2	m	24 683	9 207	227 251 985
		1 600 Gravity Main 3&4	m	12 424	16 996	211 161 656
		1 600 Gravity Main 5	m	11 828	18 244	215 786 016
		1 100 Gravity Main 6&7	m	7 517	14 600	109 746 790
2		Abstraction Weir and Low lift P/S Civil works	No	200 783 521	1	200 783 521
3		Low Lift Pump Station (M&E)	No	55 460 290	1	55 460 290
4		RM to desilting works	No	138 907 383	1	138 907 383
5		Desilting works	No	69 746 366	1	69 746 366
6		High Lift P/S	No	172 213 255	1	172 213 255
7		Balancing dams	No	143 312 460	1	143 312 460
8		Break Pressure and Operational Reservoirs	No	55 480 867	1	55 480 867
SUB-TOTAL A						3 068 207 376
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		153 410 369
4		Miscellaneous (% of Sub-total A)		10%		306 820 738
		(a) Access road	km	423 629	151.64	64 237 182
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						3 592 675 664
5		Preliminary & General (% of Sub-total B)		30%		1 077 802 699
SUB TOTAL C						4 670 478 363
6		Contingencies (% of Sub-total C)		20%		934 095 673
SUB TOTAL D						5 604 574 036
7		Engineering, Environmental & Administration (% of Sub-total D)		17.579%		985 245 740
SUB TOTAL E						6 589 819 776
8		Cost of ESKOM Power Supply	Sum	189 500 118	1	189 500 118
9		VAT (% of sub total E)		14%		949 104 785
NET PROJECT COST						7 728 424 679
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						7 728 424 679
TOTAL PROJECT COST (EXCL VAT)						6 779 319 894

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario C4 - 110Mm³/a
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm ³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0	0.00	0	0.00	0	0.00	0
2013	0.00	0	0.00	0	0.00	0	0.00	0
2014	0.00	143 335 394	0.00	132 521 629	0.00	127 567 990	0.00	122 886 997
2015	0.00	920 905 345	0.00	818 681 498	0.00	773 209 885	0.00	731 044 353
2016	0.00	1 870 434 716	0.00	1 598 855 435	0.00	1 481 559 486	0.00	1 374 825 354
2017	0.00	1 890 784 716	0.00	1 554 087 211	0.00	1 412 904 332	0.00	1 286 836 307
2018	1.70	1 291 965 325	1.34	1 021 058 963	1.20	910 784 574	1.07	814 157 307
2019	4.60	739 406 595	3.50	561 888 243	3.06	491 747 616	2.68	431 436 647
2020	19.10	146 340 736	13.96	106 929 742	11.98	91 815 988	10.32	79 063 346
2021	27.80	93 003 165	19.53	65 342 790	16.45	55 048 431	13.91	46 524 737
2022	29.10	54 950 856	19.66	37 122 829	16.25	30 684 271	13.48	25 452 879
2023	33.80	57 111 738	21.96	37 098 696	17.81	30 085 751	14.50	24 494 245
2024	36.10	58 169 190	22.55	36 332 305	17.94	28 908 305	14.34	23 099 786
2025	45.60	62 536 930	27.39	37 558 059	21.38	29 319 753	16.77	22 994 699
2026	49.10	64 146 097	28.35	37 042 773	21.72	28 371 880	16.72	21 839 247
2027	56.10	67 364 431	31.15	37 405 077	23.41	28 108 823	17.69	21 236 078
2028	63.10	70 582 765	33.69	37 684 716	24.84	27 784 643	18.42	20 602 436
2029	65.80	71 824 123	33.78	36 872 583	24.44	26 672 924	17.78	19 411 830
2030	71.70	74 536 719	35.39	36 793 421	25.12	26 113 477	17.94	18 652 742
2031	71.90	74 628 671	34.13	35 421 934	23.76	24 665 747	16.66	17 292 363
2032	72.00	74 674 648	32.86	34 080 534	22.45	23 283 908	15.45	16 021 312
2033	72.60	83 986 768	31.86	36 856 216	21.36	24 705 161	14.42	16 684 454
2034	73.10	75 180 386	30.84	31 722 769	20.29	20 862 940	13.45	13 828 718
2035	75.20	76 145 886	30.51	30 894 391	19.69	19 934 784	12.81	12 968 808
2036	76.30	76 651 624	29.77	29 903 445	18.84	18 931 307	12.03	12 087 910
2037	84.50	80 421 673	31.70	30 167 521	19.69	18 738 140	12.34	11 743 004
2038	88.60	82 306 698	31.96	29 687 140	19.48	18 091 838	11.98	11 128 011
2039	96.20	85 800 889	33.36	29 757 170	19.95	17 792 355	12.04	10 741 140
2040	95.70	85 571 008	31.91	28 536 003	18.72	16 740 269	11.09	9 918 854
2041	94.80	85 157 222	30.40	27 305 784	17.50	15 716 339	10.17	9 139 713
2042	97.80	86 536 508	30.15	26 680 821	17.03	15 066 883	9.72	8 599 767
2043	106.50	90 536 438	31.57	26 840 456	17.49	14 871 048	9.80	8 330 805
2044	110.00	92 145 605	31.36	26 266 836	17.05	14 278 643	9.37	7 850 810
2045	110.00	92 145 605	30.15	25 256 573	16.08	13 470 418	8.68	7 269 268
2046	110.00	92 145 605	28.99	24 285 167	15.17	12 707 942	8.03	6 730 804
2047	110.00	92 145 605	27.88	23 351 122	14.31	11 988 624	7.44	6 232 226
2048	110.00	101 181 868	26.80	24 654 856	13.50	12 419 141	6.89	6 336 472
2049	110.00	92 145 605	25.77	21 589 425	12.74	10 669 833	6.38	5 343 129
2050	110.00	92 145 605	24.78	20 759 062	12.02	10 065 880	5.91	4 947 342
2051	110.00	92 145 605	23.83	19 960 637	11.34	9 496 113	5.47	4 580 872
2052	110.00	92 145 605	22.91	19 192 920	10.69	8 958 597	5.06	4 241 548
2053	110.00	92 145 605	22.03	18 454 731	10.09	8 451 507	4.69	3 927 359
2054	110.00	92 145 605	21.18	17 744 934	9.52	7 973 120	4.34	3 636 444
2055	110.00	92 145 605	20.37	17 062 436	8.98	7 521 811	4.02	3 367 078
2056	110.00	92 145 605	19.59	16 406 189	8.47	7 096 048	3.72	3 117 665
2057	110.00	92 145 605	18.83	15 775 181	7.99	6 694 385	3.45	2 886 726
TOTAL	3148.80	10 034 071 999	1 047.74	6 881 890 223	649.77	5 991 880 911	421.02	5 313 511 596
URV				6.568		9.222		12.621

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	1828.80	8 919 288 472	764.77	6 642 653 563	514.95	5 877 837 911	355.62	5 258 163 931
URV				8.686		11.414		14.786

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	868.40	8 062 015 200	452.44	6 362 251 814	333.13	5 714 140 672	248.39	5 161 354 648
URV				14.062		17.153		20.779

APPENDIX F5

OPTION X2

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario D1 - 100Mm³/a
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		1 500 Rising main	m	11 012	28 988	319 216 255
		1 900 Gravity Main 1	m	17 300	63 600	1 100 288 703
		2 400 Gravity Main 2	m	24 683	9 207	227 251 985
		1 500 Gravity Main 3&4	m	32 980	1 600	52 768 023
		1 500 Gravity Main 5	m	10 612	18 244	193 601 043
		1 100 Gravity Main 6&7	m	7 517	14 600	109 746 790
2		Abstraction Weir and Low lift P/S Civil works	No	200 783 521	1	200 783 521
3		Low Lift Pump Station (M&E)	No	55 460 290	1	55 460 290
4		RM to desilting works	No	138 907 383	1	138 907 383
5		Desilting works	No	69 746 366	1	69 746 366
6		High Lift P/S	No	165 169 106	1	165 169 106
7		Balancing dams	No	143 312 460	1	143 312 460
8		Break Pressure and Operational Reservoirs	No	55 480 867	1	55 480 867
SUB-TOTAL A						2 831 732 791
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		141 586 640
4		Miscellaneous (% of Sub-total A)		10%		283 173 279
		(a) Access road	km	423 629	136.24	57 714 991
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						3 314 207 700
5		Preliminary & General (% of Sub-total B)		30%		994 262 310
SUB TOTAL C						4 308 470 011
6		Contingencies (% of Sub-total C)		20%		861 694 002
SUB TOTAL D						5 170 164 013
7		Engineering, Environmental & Administration (% of Sub-total D)		19%		980 901 640
SUB TOTAL E						6 151 065 653
8		Cost of ESKOM Power Supply	Sum	189 500 118	1	189 500 118
9		VAT (% of sub total E)		14%		887 679 208
NET PROJECT COST						7 228 244 979
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						7 228 244 979
TOTAL PROJECT COST (EXCL VAT)						6 340 565 771

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario D1 - 100Mm³/a
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm ³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0	0.00	0	0.00	0	0.00	0
2013	0.00	0	0.00	0	0.00	0	0.00	0
2014	0.41	3 946 749	0.38	3 648 991	0.36	3 512 592	0.35	3 383 701
2015	0.52	4 083 693	0.46	3 630 388	0.44	3 428 747	0.41	3 241 767
2016	0.75	145 368 804	0.64	124 261 863	0.60	115 145 709	0.55	106 850 411
2017	0.81	882 140 606	0.67	725 055 276	0.61	659 186 777	0.55	600 370 074
2018	1.22	1 747 620 426	0.96	1 381 169 808	0.86	1 232 003 440	0.77	1 101 297 312
2019	2.15	1 768 412 340	1.64	1 343 848 038	1.43	1 176 095 206	1.26	1 031 851 615
2020	6.24	1 207 262 091	4.56	882 134 585	3.92	757 451 172	3.37	652 246 143
2021	9.62	663 276 922	6.76	466 009 567	5.69	392 592 591	4.81	331 803 595
2022	10.39	139 538 638	7.02	94 267 304	5.80	77 917 646	4.81	64 633 388
2023	17.23	85 425 348	11.19	55 490 677	9.08	45 001 008	7.39	36 637 468
2024	23.84	49 887 190	14.89	31 159 392	11.85	24 792 405	9.47	19 810 890
2025	37.59	56 366 511	22.57	33 852 266	17.62	26 426 820	13.82	20 725 849
2026	43.88	59 331 568	25.34	34 262 502	19.41	26 242 410	14.94	20 200 087
2027	52.73	63 499 993	29.28	35 259 292	22.00	26 496 329	16.62	20 017 846
2028	59.16	66 529 124	31.59	35 520 443	23.29	26 188 942	17.27	19 419 217
2029	61.50	67 632 638	31.57	34 720 787	22.84	25 116 355	16.62	18 279 002
2030	67.80	70 598 491	33.47	34 849 400	23.75	24 733 743	16.97	17 667 204
2031	68.58	70 966 209	32.55	33 683 573	22.67	23 455 255	15.89	16 443 727
2032	68.60	70 979 117	31.31	32 393 942	21.39	22 131 624	14.72	15 228 442
2033	68.61	70 981 944	30.11	31 149 262	20.18	20 879 722	13.63	14 100 971
2034	68.81	71 076 168	29.04	29 990 972	19.10	19 723 999	12.66	13 073 786
2035	70.77	71 997 214	28.71	29 211 166	18.53	18 848 674	12.05	12 262 226
2036	73.47	82 045 502	28.66	32 007 712	18.15	20 263 479	11.59	12 938 521
2037	82.66	77 601 697	31.01	29 109 700	19.26	18 081 089	12.07	11 331 237
2038	86.40	79 363 226	31.16	28 625 461	18.99	17 444 833	11.68	10 730 048
2039	93.35	82 637 533	32.38	28 660 066	19.36	17 136 376	11.69	10 345 130
2040	91.85	81 930 848	30.63	27 322 092	17.97	16 028 144	10.65	9 496 909
2041	91.85	81 930 848	29.45	26 271 242	16.95	15 120 890	9.86	8 793 435
2042	92.45	82 213 522	28.50	25 347 964	16.10	14 314 207	9.19	8 170 161
2043	98.35	84 993 149	29.16	25 197 091	16.15	13 960 536	9.05	7 820 734
2044	97.95	84 804 700	27.92	24 174 253	15.18	13 141 116	8.35	7 225 364
2045	97.50	84 592 695	26.72	23 186 365	14.25	12 366 287	7.69	6 673 427
2046	99.00	85 299 380	26.09	22 480 830	13.65	11 763 768	7.23	6 230 719
2047	100.00	85 770 189	25.34	21 735 493	13.01	11 159 149	6.76	5 801 028
2048	100.00	85 770 189	24.37	20 899 512	12.27	10 527 499	6.26	5 371 322
2049	100.00	85 770 189	23.43	20 095 685	11.58	9 931 603	5.80	4 973 446
2050	100.00	85 770 189	22.53	19 322 774	10.92	9 369 437	5.37	4 605 043
2051	100.00	94 544 559	21.66	20 480 300	10.31	9 743 339	4.97	4 700 132
2052	100.00	85 770 189	20.83	17 864 991	9.72	8 338 765	4.60	3 948 082
2053	100.00	85 770 189	20.03	17 177 876	9.17	7 866 760	4.26	3 655 631
2054	100.00	85 770 189	19.26	16 517 188	8.65	7 421 472	3.95	3 384 844
2055	100.00	85 770 189	18.52	15 881 912	8.16	7 001 388	3.65	3 134 115
2056	100.00	85 770 189	17.80	15 271 069	7.70	6 605 083	3.38	2 901 958
2057	100.00	85 770 189	17.12	14 683 720	7.27	6 231 211	3.13	2 686 998
TOTAL	2846.04	9 296 581 337	927.28	5 967 882 792	566.18	5 011 187 597	360.11	4 284 463 006
URV				6.436		8.851		11.898

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	1647.04	8 259 035 505	670.30	5 745 471 442	443.76	4 905 228 123	300.74	4 233 069 688
URV				8.571		11.054		14.076

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	741.20	7 436 921 784	374.70	5 475 569 496	271.40	4 747 371 167	198.93	4 139 544 722
URV				14.613		17.492		20.809

APPENDIX F6

OPTION Y1

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario C4 - +30Mm³/a
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		800 Rising main	m	6 200	28 988	179 742 560
		1 200 Gravity Main 1	m	9 574	63 600	608 891 571
		1 600 Gravity Main 2	m	13 401	9 207	123 381 344
		1 000 Gravity Main 3&4	m	7 244	16 996	123 115 577
		800 Gravity Main 5	m	4 809	18 244	87 739 369
		600 Gravity Main 6&7	m	4 199	14 600	61 306 642
2		Abstraction Weir and Low lift P/S Civil works	No	0	1	0
3		Low Lift Pump Station (M&E)	No	0	1	0
4		RM to desilting works	No	0	1	0
5		Desilting works	No	0	1	0
6		High Lift P/S	No	57 383 673	1	57 383 673
7		Balancing dams	No	0	1	0
8		Break Pressure and Operational Reservoirs	No	0	1	0
SUB-TOTAL A						1 241 560 736
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		62 078 037
4		Miscellaneous (% of Sub-total A)		10%		124 156 074
		(a) Access road	km	423 629	0.00	0
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						1 427 794 847
5		Preliminary & General (% of Sub-total B)		30%		428 338 454
SUB TOTAL C						1 856 133 301
6		Contingencies (% of Sub-total C)		20%		371 226 660
SUB TOTAL D						2 227 359 961
7		Engineering, Environmental & Administration (% of Sub-total D)		21%		463 573 600
SUB TOTAL E						2 690 933 561
8		Cost of ESKOM Power Supply	Sum	100 000 000	1	100 000 000
9		VAT (% of sub total E)		14%		390 730 698
NET PROJECT COST						3 181 664 259
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						3 181 664 259
TOTAL PROJECT COST (EXCL VAT)						2 790 933 561

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario C4 - 80+30Mm³/a
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm ³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	140171240.59	0.00	129596191.37	0.00	124751905.12	0.00	120174246.05
2015	0.00	854458126.92	0.00	759610163.47	0.00	717419519.91	0.00	678296409.75
2016	0.00	1680585523.09	0.00	1436571548.52	0.00	1331181143.37	0.00	1235280529.65
2017	0.00	1700935523.09	0.00	1398045013.27	0.00	1271037971.14	0.00	1157628136.25
2018	1.70	1164255453.47	1.34	920127996.53	1.20	820754153.69	1.07	733678424.71
2019	4.60	671053186.98	3.50	509945270.39	3.06	446288695.62	2.68	391553089.31
2020	19.10	142045909.70	13.96	103791554.88	11.98	89121361.04	10.32	76742985.18
2021	27.80	89173650.30	19.53	62652223.87	16.45	52781746.60	13.91	44609026.46
2022	29.10	51190870.16	19.66	34582717.65	16.25	28584714.53	13.48	23711277.71
2023	33.80	53603126.59	21.96	34819568.90	17.81	28237458.41	14.50	22989462.20
2024	36.10	54783592.49	22.55	34217670.24	17.94	27225767.10	14.34	21755318.33
2025	45.60	59659429.94	27.39	35829907.61	21.38	27970668.80	16.77	21936648.58
2026	49.10	61455791.10	28.35	35489188.06	21.72	27181955.67	16.72	20923302.64
2027	56.10	65048513.43	31.15	36119130.46	23.41	27142471.91	17.69	20506004.28
2028	63.10	68641235.76	33.69	36648116.96	24.84	27020367.37	18.42	20035722.40
2029	65.80	70027000.09	33.78	35949988.33	24.44	26005536.17	17.78	18926123.89
2030	71.70	157654451.57	35.39	77822670.70	25.12	55233258.25	17.94	39452873.44
2031	71.90	434768096.88	34.13	206359383.40	23.76	143696512.57	16.66	100741013.09
2032	72.00	810042113.88	32.86	369692646.65	22.45	252574960.08	15.45	173793083.45
2033	72.60	823670742.43	31.86	361454398.86	21.36	242287198.95	14.42	163626927.11
2034	73.10	592120688.43	30.84	249848514.03	20.29	164316509.02	13.45	108914979.65
2035	75.20	358725009.03	30.51	145544182.58	19.69	93913224.90	12.81	61096351.89
2036	76.30	134268504.24	29.77	52381026.83	18.84	33161440.26	12.03	21174054.14
2037	84.50	116932451.45	31.70	43863327.27	19.69	27245101.05	12.34	17074231.58
2038	88.60	99780701.42	31.96	35989824.66	19.48	21932798.85	11.98	13490526.83
2039	96.20	104411603.82	33.36	36211674.32	19.95	21651620.41	12.04	13070956.48
2040	95.70	104106939.19	31.91	34717318.82	18.72	20366455.41	11.09	12067422.67
2041	94.80	103558542.85	30.40	33206193.27	17.50	19112426.94	10.17	11114681.49
2042	97.80	105386530.64	30.15	32492634.75	17.03	18348862.65	9.72	10473032.30
2043	106.50	110687695.22	31.57	32814502.65	17.49	18180989.72	9.80	10185044.35
2044	110.00	112820347.64	31.36	32160335.89	17.05	17482347.36	9.37	9612298.70
2045	110.00	112820347.64	30.15	30923399.90	16.08	16492780.53	8.68	8900276.58
2046	110.00	112820347.64	28.99	29734038.36	15.17	15559226.92	8.03	8240996.83
2047	110.00	112820347.64	27.88	28590421.50	14.31	14678515.96	7.44	7630552.62
2048	110.00	121066028.57	26.80	29500004.44	13.50	14859737.81	6.89	7581708.78
2049	110.00	112820347.64	25.77	26433451.83	12.74	13063826.95	6.38	6541968.98
2050	110.00	115868139.07	24.78	26103403.61	12.02	12657302.28	5.91	6221016.07
2051	110.00	112820347.64	23.83	24439212.13	11.34	11626759.48	5.47	5608683.97
2052	110.00	112820347.64	22.91	23499242.43	10.69	10968641.02	5.06	5193225.90
2053	110.00	112820347.64	22.03	22595425.41	10.09	10347774.54	4.69	4808542.50
2054	110.00	112820347.64	21.18	21726370.59	9.52	9762051.46	4.34	4452354.16
2055	110.00	112820347.64	20.37	20890740.95	8.98	9209482.51	4.02	4122550.15
2056	110.00	112820347.64	19.59	20087250.91	8.47	8688191.04	3.72	3817176.07
2057	110.00	112820347.64	18.83	19314664.34	7.99	8196406.64	3.45	3534422.28
TOTAL	3148.80	12 573 980 584	1 047.74	7 672 392 512	649.77	6 378 319 840	421.02	5 451 287 659
URV				7.323		9.816		12.948

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	1828.80	11 208 842 940	764.77	7 379 478 285	514.95	6 238 701 923	355.62	5 383 534 461
URV				9.649		12.115		15.139

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	868.40	10 104 069 276	452.44	7 014 718 047	333.13	6 024 727 100	248.39	5 256 371 936
URV				15.504		18.085		21.162

APPENDIX F7

OPTION Y1 EARLY

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario C5 - +30Mm³/a early
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		800 Rising main	m	6 200	28 988	179 742 560
		1 200 Gravity Main 1	m	9 574	63 600	608 891 571
		1 600 Gravity Main 2	m	13 401	9 207	123 381 344
		1 000 Gravity Main 3&4	m	7 244	16 996	123 115 577
		800 Gravity Main 5	m	4 809	18 244	87 739 369
		600 Gravity Main 6&7	m	4 199	14 600	61 306 642
2		Abstraction Weir and Low lift P/S Civil works	No	0	1	0
3		Low Lift Pump Station (M&E)	No	0	1	0
4		RM to desilting works	No	0	1	0
5		Desilting works	No	0	1	0
6		High Lift P/S	No	57 383 673	1	57 383 673
7		Balancing dams	No	0	1	0
8		Break Pressure and Operational Reservoirs	No	0	1	0
SUB-TOTAL A						1 241 560 736
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		62 078 037
4		Miscellaneous (% of Sub-total A)		10%		124 156 074
		(a) Access road	km	423 629	0.00	0
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						1 427 794 847
5		Preliminary & General (% of Sub-total B)		30%		428 338 454
SUB TOTAL C						1 856 133 301
6		Contingencies (% of Sub-total C)		20%		371 226 660
SUB TOTAL D						2 227 359 961
7		Engineering, Environmental & Administration (% of Sub-total D)		21%		463 573 600
SUB TOTAL E						2 690 933 561
8		Cost of ESKOM Power Supply	Sum	100 000 000	1	100 000 000
9		VAT (% of sub total E)		14%		390 730 698
NET PROJECT COST						3 181 664 259
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						3 181 664 259
TOTAL PROJECT COST (EXCL VAT)						2 790 933 561

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario C5 - 80+30Mm³/a
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm ³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	140171240.59	0.00	129596191.37	0.00	124751905.12	0.00	120174246.05
2015	0.00	854458126.92	0.00	759610163.47	0.00	717419519.91	0.00	678296409.75
2016	0.00	1680585523.09	0.00	1436571548.52	0.00	1331181143.37	0.00	1235280529.65
2017	0.00	1700935523.09	0.00	1398045013.27	0.00	1271037971.14	0.00	1157628136.25
2018	1.70	1164255453.47	1.34	920127996.53	1.20	820754153.69	1.07	733678424.71
2019	4.60	671053186.98	3.50	509945270.39	3.06	446288695.62	2.68	391553089.31
2020	19.10	226645209.50	13.96	165607434.59	11.98	142200008.35	10.32	122449354.51
2021	27.80	450783946.21	19.53	316714821.22	16.45	266818325.14	13.91	225504203.49
2022	29.10	788023858.46	19.66	532360682.96	16.25	440028406.65	13.48	365007519.70
2023	33.80	795511114.88	21.96	516748851.07	17.81	419065331.63	14.50	341181081.59
2024	36.10	573130584.69	22.55	357975672.22	17.94	284828341.92	14.34	227598040.68
2025	45.60	343532926.04	27.39	206316973.11	21.38	161061641.15	16.77	126316343.96
2026	49.10	120308211.76	28.35	69474994.55	21.72	53212438.09	16.72	40960259.06
2027	60.60	104665870.93	33.65	58117242.77	25.29	43673410.99	19.10	32995047.61
2028	71.70	91106843.23	38.28	48642688.46	28.22	35863870.26	20.93	26593219.07
2029	82.00	97123509.95	42.10	49860611.55	30.45	36068215.81	22.16	26249469.20
2030	87.40	99846997.00	43.14	49287285.52	30.62	34980775.46	21.87	24986614.06
2031	86.70	99401249.87	41.15	47180050.19	28.66	32853406.34	20.09	23032468.77
2032	89.80	101280562.26	40.98	46223126.52	28.00	31579758.06	19.27	21729563.08
2033	99.10	115135355.40	43.49	50525262.74	29.15	33867686.84	19.69	22872300.10
2034	103.10	109278949.91	43.50	46110841.56	28.61	30325465.59	18.96	20100825.46
2035	105.20	110356766.61	42.68	44774646.27	27.54	28891099.26	17.92	18795444.08
2036	106.30	110921337.26	41.47	43272795.63	26.25	27395190.86	16.76	17492221.38
2037	110.00	112820347.64	41.26	42320808.04	25.63	26286986.49	16.06	16473790.79
2038	110.00	112820347.64	39.68	40693084.65	24.18	24799043.86	14.87	15253509.99
2039	110.00	112820347.64	38.15	39127966.01	22.81	23395324.40	13.77	14123620.36
2040	110.00	115868139.07	36.68	38639414.02	21.52	22667300.63	12.75	13430707.11
2041	110.00	112820347.64	35.27	36176004.08	20.30	20821755.43	11.81	12108728.02
2042	110.00	112820347.64	33.92	34784619.30	19.15	19643165.50	10.93	11211785.21
2043	110.00	112820347.64	32.61	33446749.33	18.07	18531288.20	10.12	10381282.60
2044	110.00	112820347.64	31.36	32160335.89	17.05	17482347.36	9.37	9612298.70
2045	110.00	112820347.64	30.15	30923399.90	16.08	16492780.53	8.68	8900276.58
2046	110.00	112820347.64	28.99	29734038.36	15.17	15559226.92	8.03	8240996.83
2047	110.00	112820347.64	27.88	28590421.50	14.31	14678515.96	7.44	7630552.62
2048	110.00	121066028.57	26.80	29500004.44	13.50	14859737.81	6.89	7581708.78
2049	110.00	112820347.64	25.77	26433451.83	12.74	13063826.95	6.38	6541968.98
2050	110.00	112820347.64	24.78	25416780.61	12.02	12324365.04	5.91	6057378.69
2051	110.00	112820347.64	23.83	24439212.13	11.34	11626759.48	5.47	5608683.97
2052	110.00	112820347.64	22.91	23499242.43	10.69	10968641.02	5.06	5193225.90
2053	110.00	112820347.64	22.03	22595425.41	10.09	10347774.54	4.69	4808542.50
2054	110.00	112820347.64	21.18	21726370.59	9.52	9762051.46	4.34	4452354.16
2055	110.00	115868139.07	20.37	21455095.01	8.98	9458272.57	4.02	4233919.01
2056	110.00	112820347.64	19.59	20087250.91	8.47	8688191.04	3.72	3817176.07
2057	110.00	112820347.64	18.83	19314664.34	7.99	8196406.64	3.45	3534422.28
TOTAL	3448.80	12 932 080 912	1 170.72	8 424 154 503	730.18	7 143 800 523	474.29	6 179 671 741
URV				7.196		9.784		13.029

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	2128.80	11 566 943 268	887.75	8 131 362 546	595.37	7 004 266 754	408.89	6 111 970 811
URV				9.159		11.765		14.948

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	1032.50	10 437 591 011	527.21	7 759 817 369	384.33	6 786 751 570	283.77	5 982 982 590
URV				14.719		17.659		21.084

APPENDIX F8

OPTION Y1 LATE

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario C6 - +30Mm³/a late
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		800 Rising main	m	6 200	28 988	179 742 560
		1 200 Gravity Main 1	m	9 574	63 600	608 891 571
		1 600 Gravity Main 2	m	13 401	9 207	123 381 344
		1 000 Gravity Main 3&4	m	7 244	16 996	123 115 577
		800 Gravity Main 5	m	4 809	18 244	87 739 369
		600 Gravity Main 6&7	m	4 199	14 600	61 306 642
2		Abstraction Weir and Low lift P/S Civil works	No	0	1	0
3		Low Lift Pump Station (M&E)	No	0	1	0
4		RM to desilting works	No	0	1	0
5		Desilting works	No	0	1	0
6		High Lift P/S	No	57 383 673	1	57 383 673
7		Balancing dams	No	0	1	0
8		Break Pressure and Operational Reservoirs	No	0	1	0
SUB-TOTAL A						1 241 560 736
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		62 078 037
4		Miscellaneous (% of Sub-total A)		10%		124 156 074
		(a) Access road	km	423 629	0.00	0
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						1 427 794 847
5		Preliminary & General (% of Sub-total B)		30%		428 338 454
SUB TOTAL C						1 856 133 301
6		Contingencies (% of Sub-total C)		20%		371 226 660
SUB TOTAL D						2 227 359 961
7		Engineering, Environmental & Administration (% of Sub-total D)		21%		463 573 600
SUB TOTAL E						2 690 933 561
8		Cost of ESKOM Power Supply	Sum	100 000 000	1	100 000 000
9		VAT (% of sub total E)		14%		390 730 698
NET PROJECT COST						3 181 664 259
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						3 181 664 259
TOTAL PROJECT COST (EXCL VAT)						2 790 933 561

Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)

OPTION: Phase 2: Demand Scenario C6 - +30Mm³/a late

RATES: April 2012

BASE YEAR: 2012

INPUT CELLS

ECONOMIC COST MODEL

YEAR	TOTAL ANNUAL COST MCWAP-2		PRESENT VALUE OF COST (2012) AT 4%		PRESENT VALUE OF COST (2012) AT 6%		PRESENT VALUE OF COST (2012) AT 8%	
	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION
				4.00%		6.00%		8.00%
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0
2023	0	0	0	0	0	0	0	0
2024	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0
2026	0	0	0	0	0	0	0	0
2027	0	0	0	0	0	0	0	0
2028	0	0	0	0	0	0	0	0
2029	0	0	0	0	0	0	0	0
2030	0	0	0	0	0	0	0	0
2031	0	0	0	0	0	0	0	0
2032	0	0	0	0	0	0	0	0
2033	0	0	0	0	0	0	0	0
2034	0	0	0	0	0	0	0	0
2035	0	0	0	0	0	0	0	0
2036	0	0	0	0	0	0	0	0
2037	0	0	0	0	0	0	0	0
2038	0	0	0	0	0	0	0	0
2039	0	0	0	0	0	0	0	0
2040	84 599 300	0	28 211 961	0	16 550 173	0	9 806 220	0
2041	361 610 296	0	115 950 853	0	66 737 617	0	38 810 736	0
2042	736 832 988	0	227 179 365	0	128 290 088	0	73 224 497	0
2043	741 907 988	0	219 946 233	0	121 861 978	0	68 267 442	0
2044	518 346 992	0	147 758 926	0	80 321 700	0	44 163 187	0
2045	283 873 496	0	77 808 071	0	41 498 394	0	22 394 477	0
2046	44 112 500	14 739 921	11 625 942	3 884 737	6 083 622	2 032 805	3 222 211	1 076 682
2047	19 650 000	19 967 357	4 979 614	5 060 037	2 556 568	2 597 857	1 329 019	1 350 483
2048	0	22 465 607	0	5 474 166	0	2 757 446	0	1 406 899
2049	0	27 096 510	0	6 348 627	0	3 137 591	0	1 571 211
2050	0	26 791 845	0	6 035 812	0	2 926 710	0	1 438 467
2051	0	26 243 449	0	5 684 872	0	2 704 532	0	1 304 651
2052	0	28 071 437	0	5 846 973	0	2 729 166	0	1 292 154
2053	0	33 372 601	0	6 683 795	0	3 060 903	0	1 422 381
2054	0	35 505 254	0	6 837 422	0	3 072 177	0	1 401 183
2055	0	35 505 254	0	6 574 444	0	2 898 280	0	1 297 392
2056	0	35 505 254	0	6 321 581	0	2 734 227	0	1 201 289
2057	0	35 505 254	0	6 078 443	0	2 579 459	0	1 112 304
TOTAL	2 790 933 561	340 769 742	833 460 965	70 830 909	463 900 141	33 231 156	261 217 787	15 875 097

NET PRESENT COST

Discounted to 2012 at 4% 904 291 874

Discounted to 2012 at 6% 497 131 297

Discounted to 2012 at 8% 277 092 884

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario C6 - 80+30Mm³/a
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm ³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	140171240.59	0.00	129596191.37	0.00	124751905.12	0.00	120174246.05
2015	0.00	854458126.92	0.00	759610163.47	0.00	717419519.91	0.00	678296409.75
2016	0.00	1680585523.09	0.00	1436571548.52	0.00	1331181143.37	0.00	1235280529.65
2017	0.00	1700935523.09	0.00	1398045013.27	0.00	1271037971.14	0.00	1157628136.25
2018	1.70	1164255453.47	1.34	920127996.53	1.20	820754153.69	1.07	733678424.71
2019	4.60	671053186.98	3.50	509945270.39	3.06	446288695.62	2.68	391553089.31
2020	19.10	142045909.70	13.96	103791554.88	11.98	89121361.04	10.32	76742985.18
2021	27.80	89173650.30	19.53	62652223.87	16.45	52781746.60	13.91	44609026.46
2022	29.10	51190870.16	19.66	34582717.65	16.25	28584714.53	13.48	23711277.71
2023	33.80	53603126.59	21.96	34819568.90	17.81	28237458.41	14.50	22989462.20
2024	36.10	54783592.49	22.55	34217670.24	17.94	27225767.10	14.34	21755318.33
2025	45.60	59659429.94	27.39	35829907.61	21.38	27970668.80	16.77	21936648.58
2026	49.10	61455791.10	28.35	35489188.06	21.72	27181955.67	16.72	20923302.64
2027	56.10	65048513.43	31.15	36119130.46	23.41	27142471.91	17.69	20506004.28
2028	63.10	68641235.76	33.69	36648116.96	24.84	27020367.37	18.42	20035722.40
2029	65.80	70027000.09	33.78	35949988.33	24.44	26005536.17	17.78	18926123.89
2030	71.70	73055151.76	35.39	36062077.30	25.12	25594418.83	17.94	18281980.80
2031	71.90	73157800.97	34.13	34723795.99	23.76	24179605.04	16.66	16951545.06
2032	72.00	73209125.58	32.86	33411689.26	22.45	22826951.41	15.45	15706886.66
2033	72.60	81762754.14	31.86	35880243.92	21.36	24050955.87	14.42	16242641.05
2034	73.10	73773696.23	30.84	31129208.52	20.29	20472576.72	13.45	13569971.09
2035	75.20	74851512.93	30.51	30369229.88	19.69	19595921.08	12.81	12748356.70
2036	76.30	75416083.58	29.77	29421433.72	18.84	18626154.84	12.03	11893066.40
2037	80.00	77315093.95	30.01	29002190.81	18.64	18014311.01	11.68	11289388.04
2038	80.00	77315093.95	28.86	27886721.93	17.58	16994633.03	10.82	10453137.07
2039	80.00	77315093.95	27.75	26814155.70	16.59	16032672.67	10.01	9678830.62
2040	80.00	161914393.76	26.68	53994802.59	15.65	31675336.02	9.27	18768099.81
2041	80.00	438925389.86	25.65	140742047.20	14.76	81006638.51	8.59	47108773.19
2042	80.00	814148082.25	24.67	251017052.25	13.93	141751429.18	7.95	80907864.71
2043	80.00	819223082.25	23.72	242867086.05	13.14	134561356.69	7.36	75381671.00
2044	80.00	595662086.15	22.80	169798207.25	12.40	92302246.17	6.82	50750436.58
2045	80.00	361188590.05	21.93	98999687.94	11.69	52800795.87	6.31	28493781.62
2046	80.00	136167514.61	21.08	35887233.01	11.03	18779070.47	5.84	9946397.79
2047	84.50	116932451.45	21.41	29632492.23	10.99	15213522.12	5.72	7908672.88
2048	88.60	108026382.35	21.59	26322650.51	10.87	13259241.56	5.55	6765106.45
2049	96.20	104411603.82	22.54	24463309.66	11.14	12090151.75	5.58	6054381.92
2050	95.70	104106939.19	21.56	23453776.63	10.45	11372522.33	5.14	5589551.60
2051	94.80	103558542.85	20.54	22432914.36	9.77	10672279.38	4.71	5148248.09
2052	97.80	105386530.64	20.37	21950859.79	9.51	10245909.06	4.50	4851040.36
2053	106.50	110687695.22	21.33	22168302.21	9.77	10152169.70	4.54	4717646.22
2054	110.00	112820347.64	21.18	21726370.59	9.52	9762051.46	4.34	4452354.16
2055	110.00	112820347.64	20.37	20890740.95	8.98	9209482.51	4.02	4122550.15
2056	110.00	112820347.64	19.59	20087250.91	8.47	8688191.04	3.72	3817176.07
2057	110.00	112820347.64	18.83	19314664.34	7.99	8196406.64	3.45	3534422.28
TOTAL	2848.80	12 215 880 256	964.66	7 164 446 446	604.87	5 950 832 437	396.34	5 113 880 686
URV				7.427		9.838		12.903

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	1664.70	10 875 321 205	714.27	6 876 115 881	486.37	5 813 191 439	339.23	5 046 973 138
URV				9.627		11.952		14.878

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	868.40	7 376 898 215	452.44	5 805 572 495	333.13	5 209 425 865	248.39	4 702 248 089
URV				12.832		15.638		18.931

APPENDIX F9

OPTION Y2

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario D1 - +25Mm³/a
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		800 Rising main	m	5 440	28 988	157 688 117
		1 100 Gravity Main 1	m	8 743	63 600	556 081 914
		1 500 Gravity Main 2	m	12 185	9 207	112 185 496
		900 Gravity Main 3&4	m	6 512	16 996	110 674 505
		800 Gravity Main 5	m	4 809	18 244	87 739 369
		600 Gravity Main 6&7	m	4 199	14 600	61 306 642
2		Abstraction Weir and Low lift P/S Civil works	No	0	1	0
3		Low Lift Pump Station (M&E)	No	0	1	0
4		RM to desilting works	No	0	1	0
5		Desilting works	No	0	1	0
6		High Lift P/S	No	44 598 261	1	44 598 261
7		Balancing dams	No	0	1	0
8		Break Pressure and Operational Reservoirs	No	0	1	0
SUB-TOTAL A						1 130 274 303
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		56 513 715
4		Miscellaneous (% of Sub-total A)		10%		113 027 430
		(a) Access road	km	423 629	0.00	0
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						1 299 815 449
5		Preliminary & General (% of Sub-total B)		30%		389 944 635
SUB TOTAL C						1 689 760 084
6		Contingencies (% of Sub-total C)		20%		337 952 017
SUB TOTAL D						2 027 712 100
7		Engineering, Environmental & Administration (% of Sub-total D)		23%		461 577 121
SUB TOTAL E						2 489 289 221
8		Cost of ESKOM Power Supply	Sum	100 000 000	1	100 000 000
9		VAT (% of sub total E)		14%		362 500 491
NET PROJECT COST						2 951 789 712
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						2 951 789 712
TOTAL PROJECT COST (EXCL VAT)						2 589 289 221

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario D1 - +25Mm³/a
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0	0.00	0	0.00	0	0.00	0
2013	0.00	0	0.00	0	0.00	0	0.00	0
2014	0.00	0	0.00	0	0.00	0	0.00	0
2015	0.00	0	0.00	0	0.00	0	0.00	0
2016	0.00	0	0.00	0	0.00	0	0.00	0
2017	0.00	0	0.00	0	0.00	0	0.00	0
2018	0.00	0	0.00	0	0.00	0	0.00	0
2019	0.00	0	0.00	0	0.00	0	0.00	0
2020	0.00	0	0.00	0	0.00	0	0.00	0
2021	0.00	0	0.00	0	0.00	0	0.00	0
2022	0.00	0	0.00	0	0.00	0	0.00	0
2023	0.00	0	0.00	0	0.00	0	0.00	0
2024	0.00	0	0.00	0	0.00	0	0.00	0
2025	0.00	0	0.00	0	0.00	0	0.00	0
2026	0.00	0	0.00	0	0.00	0	0.00	0
2027	0.00	0	0.00	0	0.00	0	0.00	0
2028	0.00	0	0.00	0	0.00	0	0.00	0
2029	0.00	0	0.00	0	0.00	0	0.00	0
2030	0.00	83 601 061	0.00	41 267 834	0.00	29 289 112	0.00	20 921 084
2031	0.00	340 647 271	0.00	161 685 646	0.00	112 588 355	0.00	78 932 082
2032	0.00	676 938 630	0.00	308 945 954	0.00	211 072 665	0.00	145 235 970
2033	0.00	682 013 630	0.00	299 290 498	0.00	200 617 994	0.00	135 485 928
2034	0.00	478 417 420	0.00	201 870 807	0.00	132 763 273	0.00	88 000 343
2035	0.00	263 908 710	0.00	107 074 713	0.00	69 090 578	0.00	44 947 687
2036	0.00	57 051 385	0.00	22 256 971	0.00	14 090 468	0.00	8 996 966
2037	7.66	38 584 502	2.87	14 473 695	1.79	8 990 136	1.12	5 634 028
2038	11.40	20 951 585	4.11	7 557 011	2.51	4 605 369	1.54	2 832 691
2039	18.35	24 700 910	6.36	8 566 685	3.81	5 122 177	2.30	3 092 228
2040	16.85	23 891 703	5.62	7 967 345	3.30	4 673 937	1.95	2 769 376
2041	16.85	23 891 703	5.40	7 660 908	3.11	4 409 375	1.81	2 564 237
2042	17.45	24 215 386	5.38	7 466 056	3.04	4 216 144	1.73	2 406 460
2043	23.35	27 398 266	6.92	8 122 497	3.84	4 500 298	2.15	2 521 080
2044	22.95	27 182 478	6.54	7 748 581	3.56	4 212 126	1.96	2 315 948
2045	22.50	26 939 716	6.17	7 384 019	3.29	3 938 215	1.78	2 125 245
2046	24.00	27 748 922	6.33	7 313 286	3.31	3 826 896	1.75	2 026 929
2047	25.00	28 288 034	6.34	7 168 626	3.25	3 680 421	1.69	1 913 248
2048	25.00	28 288 034	6.09	6 892 909	3.07	3 472 095	1.57	1 771 526
2049	25.00	28 288 034	5.86	6 627 797	2.89	3 275 561	1.45	1 640 302
2050	25.00	30 656 760	5.63	6 906 521	2.73	3 348 909	1.34	1 645 976
2051	25.00	28 288 034	5.42	6 127 771	2.58	2 915 238	1.24	1 406 295
2052	25.00	28 288 034	5.21	5 892 088	2.43	2 750 225	1.15	1 302 125
2053	25.00	28 288 034	5.01	5 665 469	2.29	2 594 552	1.07	1 205 671
2054	25.00	28 288 034	4.81	5 447 566	2.16	2 447 690	0.99	1 116 362
2055	25.00	28 288 034	4.63	5 238 044	2.04	2 309 142	0.91	1 033 669
2056	25.00	28 288 034	4.45	5 036 581	1.93	2 178 435	0.85	957 100
2057	25.00	28 288 034	4.28	4 842 867	1.82	2 055 128	0.78	886 204
TOTAL	456.37	3 161 620 383	113.43	1 292 498 747	58.72	849 034 514	31.12	565 686 761
URV				11.394		14.458		18.176

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	157.37	2 820 334 356	49.39	1 219 339 221	28.22	814 180 221	16.33	548 781 355
URV				24.690		28.849		33.601

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	0.00	2 525 526 721	0.00	1 120 135 454	0.00	755 421 976	0.00	513 523 093
URV				#DIV/0!		#DIV/0!		#DIV/0!

APPENDIX F10

OPTION Z1

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario C4 - +80Mm³/a
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		1 300 Rising main	m	9 189	28 988	266 361 007
		1 700 Gravity Main 1	m	14 501	63 600	922 270 897
		2 200 Gravity Main 2	m	21 705	9 207	199 835 176
		1 400 Gravity Main 3&4	m	10 316	16 996	175 327 289
		1 200 Gravity Main 5	m	7 939	18 244	144 832 536
		900 Gravity Main 6&7	m	5 852	14 600	85 438 336
2		Abstraction Weir and Low lift P/S Civil works	No	0	1	0
3		Low Lift Pump Station (M&E)	No	0	1	0
4		RM to desilting works	No	0	1	0
5		Desilting works	No	0	1	0
6		High Lift P/S	No	98 830 942	1	98 830 942
7		Balancing dams	No	0	1	0
8		Break Pressure and Operational Reservoirs	No	0	1	0
SUB-TOTAL A						1 892 896 184
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		94 644 809
4		Miscellaneous (% of Sub-total A)		10%		189 289 618
		(a) Access road	km	423 629	0.00	0
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						2 176 830 611
5		Preliminary & General (% of Sub-total B)		30%		653 049 183
SUB TOTAL C						2 829 879 794
6		Contingencies (% of Sub-total C)		20%		565 975 959
SUB TOTAL D						3 395 855 753
7		Engineering, Environmental & Administration (% of Sub-total D)		24%		809 958 558
SUB TOTAL E						4 205 814 311
8		Cost of ESKOM Power Supply	Sum	100 000 000	1	100 000 000
9		VAT (% of sub total E)		14%		602 814 004
NET PROJECT COST						4 908 628 314
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						4 908 628 314
TOTAL PROJECT COST (EXCL VAT)						4 305 814 311

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario C4 - +80Mm³/a
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm ³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	140171240.59	0.00	129596191.37	0.00	124751905.12	0.00	120174246.05
2015	0.00	854458126.92	0.00	759610163.47	0.00	717419519.91	0.00	678296409.75
2016	0.00	1680585523.09	0.00	1436571548.52	0.00	13311811143.37	0.00	1235280529.65
2017	0.00	1700935523.09	0.00	1398045013.27	0.00	1271037971.14	0.00	1157628136.25
2018	1.70	1164255453.47	1.34	920127996.53	1.20	820754153.69	1.07	733678424.71
2019	4.60	671053186.98	3.50	509945270.39	3.06	446288695.62	2.68	391553089.31
2020	19.10	142045909.70	13.96	103791554.88	11.98	89121361.04	10.32	76742985.18
2021	27.80	89173650.30	19.53	62652223.87	16.45	52781746.60	13.91	44609026.46
2022	29.10	51190870.16	19.66	34582717.65	16.25	28584714.53	13.48	23711277.71
2023	33.80	53603126.59	21.96	34819568.90	17.81	28237458.41	14.50	22989462.20
2024	36.10	54783592.49	22.55	34217670.24	17.94	27225767.10	14.34	21755318.33
2025	45.60	59659429.94	27.39	35829907.61	21.38	27970668.80	16.77	21936648.58
2026	49.10	61455791.10	28.35	35489188.06	21.72	27181955.67	16.72	20923302.64
2027	56.10	65048513.43	31.15	36119130.46	23.41	27142471.91	17.69	20506004.28
2028	63.10	68641235.76	33.69	36648116.96	24.84	27020367.37	18.42	20035722.40
2029	65.80	70027000.09	33.78	35949988.33	24.44	26005536.17	17.78	18926123.89
2030	71.70	178696930.53	35.39	88209830.05	25.12	62605360.11	17.94	44718733.37
2031	71.90	580260155.06	34.13	275416086.58	23.76	191783530.72	16.66	134453278.18
2032	72.00	1216090851.55	32.86	555007990.04	22.45	379182875.84	15.45	260910112.24
2033	72.60	1238356980.11	31.86	543432654.29	21.36	364269396.20	14.42	246006731.67
2034	73.10	889957346.88	30.84	375522296.40	20.29	246967699.79	13.45	163699205.62
2035	75.20	527974588.25	30.51	214213193.78	19.69	138222301.21	12.81	89922142.10
2036	76.30	184238457.17	29.77	71875378.54	18.84	45502946.70	12.03	29054282.60
2037	84.50	146870000.32	31.70	55093404.87	19.69	34220508.94	12.34	21445649.74
2038	88.60	110314313.29	31.96	39789185.04	19.48	24248192.38	11.98	14914689.73
2039	96.20	114196454.41	33.36	39605222.64	19.95	23680684.84	12.04	14295890.79
2040	95.70	113941050.39	31.91	37996773.36	18.72	22290303.99	11.09	13207331.09
2041	94.80	113481323.16	30.40	36387946.81	17.50	20943742.91	10.17	12179668.88
2042	97.80	115013747.28	30.15	35460885.36	17.03	20025058.60	9.72	11429759.41
2043	106.50	119457777.25	31.57	35414483.42	17.49	19621518.15	9.80	10992032.64
2044	110.00	121245605.40	31.36	34562022.52	17.05	18787903.37	9.37	10330131.04
2045	110.00	121245605.40	30.15	33232713.96	16.08	17724437.14	8.68	9564936.15
2046	110.00	121245605.40	28.99	31954532.65	15.17	16721167.12	8.03	8856422.36
2047	110.00	121245605.40	27.88	30725512.17	14.31	15774685.96	7.44	8200391.08
2048	110.00	129491286.33	26.80	31552976.23	13.50	15893860.45	6.89	8109336.98
2049	110.00	121245605.40	25.77	28407463.17	12.74	14039414.35	6.38	7030513.61
2050	110.00	126494765.64	24.78	28497427.76	12.02	13818142.74	5.91	6791564.76
2051	110.00	121245605.40	23.83	26264296.57	11.34	12495028.79	5.47	6027532.24
2052	110.00	121245605.40	22.91	25254131.32	10.69	11787763.01	5.06	5581048.37
2053	110.00	121245605.40	22.03	24282818.57	10.09	11120531.14	4.69	5167637.38
2054	110.00	121245605.40	21.18	23348864.01	9.52	10491067.11	4.34	4784849.43
2055	110.00	121245605.40	20.37	22450830.78	8.98	9897233.12	4.02	4430416.14
2056	110.00	121245605.40	19.59	21587337.29	8.47	9337012.38	3.72	4102237.17
2057	110.00	121245605.40	18.83	20757055.09	7.99	8808502.25	3.45	3798367.75
TOTAL	3148.80	14 286 871 466	1 047.74	8 390 299 564	649.77	6 852 966 306	421.02	5 768 751 600
URV				8.008		10.547		13.702

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	1828.80	12 818 429 360	764.77	8 075 216 318	514.95	6 702 781 897	355.62	5 695 871 283
URV				10.559		13.016		16.017

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	868.40	11 558 425 026	452.44	7 655 798 302	333.13	6 455 736 600	248.39	5 548 456 911
URV				16.921		19.379		22.338

APPENDIX F11

OPTION Z1 EARLY

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario C5 - +80Mm³/a
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		1 300 Rising main	m	9 189	28 988	266 361 007
		1 700 Gravity Main 1	m	14 501	63 600	922 270 897
		2 200 Gravity Main 2	m	21 705	9 207	199 835 176
		1 400 Gravity Main 3&4	m	10 316	16 996	175 327 289
		1 200 Gravity Main 5	m	7 939	18 244	144 832 536
		900 Gravity Main 6&7	m	5 852	14 600	85 438 336
2		Abstraction Weir and Low lift P/S Civil works	No	0	1	0
3		Low Lift Pump Station (M&E)	No	0	1	0
4		RM to desilting works	No	0	1	0
5		Desilting works	No	0	1	0
6		High Lift P/S	No	98 830 942	1	98 830 942
7		Balancing dams	No	0	1	0
8		Break Pressure and Operational Reservoirs	No	0	1	0
SUB-TOTAL A						1 892 896 184
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		94 644 809
4		Miscellaneous (% of Sub-total A)		10%		189 289 618
		(a) Access road	km	423 629	0.00	0
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						2 176 830 611
5		Preliminary & General (% of Sub-total B)		30%		653 049 183
SUB TOTAL C						2 829 879 794
6		Contingencies (% of Sub-total C)		20%		565 975 959
SUB TOTAL D						3 395 855 753
7		Engineering, Environmental & Administration (% of Sub-total D)		24%		809 958 558
SUB TOTAL E						4 205 814 311
8		Cost of ESKOM Power Supply	Sum	100 000 000	1	100 000 000
9		VAT (% of sub total E)		14%		602 814 004
NET PROJECT COST						4 908 628 314
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						4 908 628 314
TOTAL PROJECT COST (EXCL VAT)						4 305 814 311

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario C5 - 80+80Mm³/a early
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm ³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	140171240.59	0.00	129596191.37	0.00	124751905.12	0.00	120174246.05
2015	0.00	854458126.92	0.00	759610163.47	0.00	717419519.91	0.00	678296409.75
2016	0.00	1680585523.09	0.00	1436571548.52	0.00	1331181143.37	0.00	1235280529.65
2017	0.00	1700935523.09	0.00	1398045013.27	0.00	1271037971.14	0.00	1157628136.25
2018	1.70	1164255453.47	1.34	920127996.53	1.20	820754153.69	1.07	733678424.71
2019	4.60	671053186.98	3.50	509945270.39	3.06	446288695.62	2.68	391553089.31
2020	19.10	247687688.46	13.96	180982967.86	11.98	155402319.97	10.32	133817951.15
2021	27.80	596276004.39	19.53	418935611.43	16.45	352934850.84	13.91	298286455.32
2022	29.10	1194072596.13	19.66	806672660.93	16.25	666763900.94	13.48	553086650.83
2023	33.80	1210197352.55	21.96	786121123.65	17.81	637516868.59	14.50	519032900.93
2024	36.10	870967243.14	22.55	544003570.35	17.94	432844036.52	14.34	345873075.58
2025	45.60	512782505.26	27.39	307963884.48	21.38	240412448.39	16.77	188549062.99
2026	49.10	170278164.70	28.35	98331397.26	21.72	75314196.46	16.72	57973081.27
2027	60.60	134603419.80	33.65	74740500.96	25.29	56165304.14	19.10	42432611.55
2028	71.70	101640455.10	38.28	54266669.96	28.22	40010387.43	20.93	29667879.96
2029	82.00	106908360.55	42.10	54883892.06	30.45	39701961.16	22.16	28894010.51
2030	87.40	109681108.20	43.14	54141679.35	30.62	38426095.26	21.87	27447590.84
2031	86.70	109324030.18	41.15	51889822.69	28.66	36133014.33	20.09	25331696.68
2032	89.80	110907778.91	40.98	50616862.53	28.00	34581569.71	19.27	23795065.15
2033	99.10	123905437.43	43.49	54373869.43	29.15	36447453.85	19.69	24614527.30
2034	103.10	117704207.67	43.50	49665924.46	28.61	32663517.56	18.96	21650571.64
2035	105.20	118782024.37	42.68	48192995.21	27.54	31096808.66	17.92	20230394.25
2036	106.30	119346595.02	41.47	46559669.61	26.25	29476048.79	16.76	18820878.94
2037	110.00	121245605.40	41.26	45481263.78	25.63	28250060.01	16.06	17704029.28
2038	110.00	121245605.40	39.68	43731984.41	24.18	26651000.01	14.87	16392619.70
2039	110.00	121245605.40	38.15	42049985.01	22.81	25142452.84	13.77	15178351.58
2040	110.00	126494765.64	36.68	42183154.57	21.52	24746189.10	12.75	14662478.93
2041	110.00	121245605.40	35.27	38877574.90	20.30	22376693.52	11.81	13012990.04
2042	110.00	121245605.40	33.92	37382283.55	19.15	21110088.23	10.93	12049064.85
2043	110.00	121245605.40	32.61	35944503.42	18.07	19915177.57	10.12	11156541.53
2044	110.00	121245605.40	31.36	34562022.52	17.05	18787903.37	9.37	10330131.04
2045	110.00	121245605.40	30.15	33232713.96	16.08	17724437.14	8.68	9564936.15
2046	110.00	121245605.40	28.99	31954532.65	15.17	16721167.12	8.03	8856422.36
2047	110.00	121245605.40	27.88	30725512.17	14.31	15774685.96	7.44	8200391.08
2048	110.00	129491286.33	26.80	31552976.23	13.50	15893860.45	6.89	8109336.98
2049	110.00	121245605.40	25.77	28407463.17	12.74	14039414.35	6.38	7030513.61
2050	110.00	121245605.40	24.78	27314868.43	12.02	13244730.51	5.91	6509734.82
2051	110.00	121245605.40	23.83	26264296.57	11.34	12495028.79	5.47	6027532.24
2052	110.00	121245605.40	22.91	25254131.32	10.69	11787763.01	5.06	5581048.37
2053	110.00	121245605.40	22.03	24282818.57	10.09	11120531.14	4.69	5167637.38
2054	110.00	121245605.40	21.18	23348864.01	9.52	10491067.11	4.34	4784849.43
2055	110.00	126494765.64	20.37	23422808.35	8.98	10325720.10	4.02	4622224.86
2056	110.00	121245605.40	19.59	21587337.29	8.47	9337012.38	3.72	4102237.17
2057	110.00	121245605.40	18.83	20757055.09	7.99	8808502.25	3.45	3798367.75
TOTAL	3448.80	14 731 425 741	1 170.72	9 504 557 436	730.18	8 002 067 656	474.29	6 868 956 680
URV				8.119		10.959		14.483

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	2128.80	13 262 983 635	887.75	9 189 684 772	595.37	7 852 028 173	408.89	6 796 166 384
URV				10.352		13.189		16.621

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	1032.50	12 047 177 431	527.21	8 789 679 616	384.33	7 617 848 123	283.77	6 657 294 362
URV				16.672		19.821		23.460

APPENDIX F12

OPTION Z1 LATE

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario C6 - +80Mm³/a
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		1 300 Rising main	m	9 189	28 988	266 361 007
		1 700 Gravity Main 1	m	14 501	63 600	922 270 897
		2 200 Gravity Main 2	m	21 705	9 207	199 835 176
		1 400 Gravity Main 3&4	m	10 316	16 996	175 327 289
		1 200 Gravity Main 5	m	7 939	18 244	144 832 536
		900 Gravity Main 6&7	m	5 852	14 600	85 438 336
2		Abstraction Weir and Low lift P/S Civil works	No	0	1	0
3		Low Lift Pump Station (M&E)	No	0	1	0
4		RM to desilting works	No	0	1	0
5		Desilting works	No	0	1	0
6		High Lift P/S	No	98 830 942	1	98 830 942
7		Balancing dams	No	0	1	0
8		Break Pressure and Operational Reservoirs	No	0	1	0
SUB-TOTAL A						1 892 896 184
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		94 644 809
4		Miscellaneous (% of Sub-total A)		10%		189 289 618
		(a) Access road	km	423 629	0.00	0
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						2 176 830 611
5		Preliminary & General (% of Sub-total B)		30%		653 049 183
SUB TOTAL C						2 829 879 794
6		Contingencies (% of Sub-total C)		20%		565 975 959
SUB TOTAL D						3 395 855 753
7		Engineering, Environmental & Administration (% of Sub-total D)		24%		809 958 558
SUB TOTAL E						4 205 814 311
8		Cost of ESKOM Power Supply	Sum	100 000 000	1	100 000 000
9		VAT (% of sub total E)		14%		602 814 004
NET PROJECT COST						4 908 628 314
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						4 908 628 314
TOTAL PROJECT COST (EXCL VAT)						4 305 814 311

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario C6 - 80+80Mm³/a late
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm ³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2014	0.00	140171240.59	0.00	129596191.37	0.00	124751905.12	0.00	120174246.05
2015	0.00	854458126.92	0.00	759610163.47	0.00	717419519.91	0.00	678296409.75
2016	0.00	1680585523.09	0.00	1436571548.52	0.00	1331181143.37	0.00	1235280529.65
2017	0.00	1700935523.09	0.00	1398045013.27	0.00	1271037971.14	0.00	1157628136.25
2018	1.70	1164255453.47	1.34	920127996.53	1.20	820754153.69	1.07	733678424.71
2019	4.60	671053186.98	3.50	509945270.39	3.06	446288695.62	2.68	391553089.31
2020	19.10	142045909.70	13.96	103791554.88	11.98	89121361.04	10.32	76742985.18
2021	27.80	89173650.30	19.53	62652223.87	16.45	52781746.60	13.91	44609026.46
2022	29.10	51190870.16	19.66	34582717.65	16.25	28584714.53	13.48	23711277.71
2023	33.80	53603126.59	21.96	34819568.90	17.81	28237458.41	14.50	22989462.20
2024	36.10	54783592.49	22.55	34217670.24	17.94	27225767.10	14.34	21755318.33
2025	45.60	59659429.94	27.39	35829907.61	21.38	27970668.80	16.77	21936648.58
2026	49.10	61455791.10	28.35	35489188.06	21.72	27181955.67	16.72	20923302.64
2027	56.10	65048513.43	31.15	36119130.46	23.41	27142471.91	17.69	20506004.28
2028	63.10	68641235.76	33.69	36648116.96	24.84	27020367.37	18.42	20035722.40
2029	65.80	70027000.09	33.78	35949988.33	24.44	26005536.17	17.78	18926123.89
2030	71.70	73055151.76	35.39	36062077.30	25.12	25594418.83	17.94	18281980.80
2031	71.90	73157800.97	34.13	34723795.99	23.76	24179605.04	16.66	16951545.06
2032	72.00	73209125.58	32.86	33411689.26	22.45	22826951.41	15.45	15706886.66
2033	72.60	81762754.14	31.86	35880243.92	21.36	24050955.87	14.42	16242641.05
2034	73.10	73773696.23	30.84	31129208.52	20.29	20472576.72	13.45	13569971.09
2035	75.20	74851512.93	30.51	30369229.88	19.69	19595921.08	12.81	12748356.70
2036	76.30	75416083.58	29.77	29421433.72	18.84	18626154.84	12.03	11893066.40
2037	80.00	77315093.95	30.01	29002190.81	18.64	18014311.01	11.68	11289388.04
2038	80.00	77315093.95	28.86	27886721.93	17.58	16994633.03	10.82	10453137.07
2039	80.00	77315093.95	27.75	26814155.70	16.59	16032672.67	10.01	9678830.62
2040	80.00	182956872.72	26.68	61011995.27	15.65	35791879.19	9.27	21207211.84
2041	80.00	584417448.04	25.65	187394281.49	14.76	107858178.29	8.59	62724074.85
2042	80.00	1220196819.92	24.67	376209458.18	13.93	212448628.05	7.95	121259905.15
2043	80.00	1233909319.92	23.72	365805074.92	13.14	202675578.51	7.36	113539460.02
2044	80.00	893498744.60	22.80	254698911.59	12.40	138454239.40	6.82	76126133.29
2045	80.00	530438169.28	21.93	145390011.41	11.69	77542752.65	6.31	41845699.93
2046	80.00	186137467.55	21.08	49056918.52	11.03	25670503.20	5.84	13596468.30
2047	84.50	146870000.32	21.41	37219130.27	10.99	19108553.45	5.72	9933485.31
2048	88.60	118559994.22	21.59	28889362.26	10.87	14552145.22	5.55	7424769.44
2049	96.20	114196454.41	22.54	26755869.31	11.14	13223170.73	5.58	6621763.52
2050	95.70	113941050.39	21.56	25669258.61	10.45	12446789.33	5.14	6117549.76
2051	94.80	113481323.16	20.54	24582393.04	9.77	11694876.65	4.71	5641543.31
2052	97.80	115013747.28	20.37	23956103.54	9.51	11181888.13	4.50	5294190.13
2053	106.50	119457777.25	21.33	23924756.06	9.77	10956553.25	4.54	5091437.94
2054	110.00	121245605.40	21.18	23348864.01	9.52	10491067.11	4.34	4784849.43
2055	110.00	121245605.40	20.37	22450830.78	8.98	9897233.12	4.02	4430416.14
2056	110.00	121245605.40	19.59	21587337.29	8.47	9337012.38	3.72	4102237.17
2057	110.00	121245605.40	18.83	20757055.09	7.99	8808502.25	3.45	3798367.75
TOTAL	2848.80	13 842 317 191	964.66	7 637 404 609	604.87	6 211 233 188	396.34	5 259 102 074
URV				7.917		10.269		13.269

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	1664.70	12 329 676 955	714.27	7 309 206 730	486.37	6 053 864 893	339.23	5 182 264 996
URV				10.233		12.447		15.276

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	868.40	7 376 898 215	452.44	5 805 572 495	333.13	5 209 425 865	248.39	4 702 248 089
URV				12.832		15.638		18.931

APPENDIX F13

OPTION Z2

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
OPTION: Phase 2: Demand Scenario D1 - +75Mm³/a
RATES: April 2012
BASE YEAR: 2012

SUMMARY OF TOTAL PROJECT COST CALCULATIONS					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
Construction Costs						
1		Diameter pipeline :				
		1 300 Rising main	m	9 493	28 988	275 196 699
		1 700 Gravity Main 1	m	14 501	63 600	922 270 897
		2 200 Gravity Main 2	m	21 705	9 207	199 835 176
		1 400 Gravity Main 3&4	m	10 316	16 996	175 327 289
		1 200 Gravity Main 5	m	7 939	18 244	144 832 536
		900 Gravity Main 6&7	m	5 852	14 600	85 438 336
2		Abstraction Weir and Low lift P/S Civil works	No	0	1	0
3		Low Lift Pump Station (M&E)	No	0	1	0
4		RM to desilting works	No	0	1	0
5		Desilting works	No	0	1	0
6		High Lift P/S	No	91 700 847	1	91 700 847
7		Balancing dams	No	0	1	0
8		Break Pressure and Operational Reservoirs	No	0	1	0
SUB-TOTAL A						1 894 601 780
3		Landscaping & EIA Remediation (% of Sub-total A)		5%		94 730 089
4		Miscellaneous (% of Sub-total A)		10%		189 460 178
		(a) Access road	km	423 629	0.00	0
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
		Accommodation	Sum			
SUB TOTAL B						2 178 792 047
5		Preliminary & General (% of Sub-total B)		30%		653 637 614
SUB TOTAL C						2 832 429 662
6		Contingencies (% of Sub-total C)		20%		566 485 932
SUB TOTAL D						3 398 915 594
7		Engineering, Environmental & Administration (% of Sub-total D)		24%		809 989 156
SUB TOTAL E						4 208 904 750
8		Cost of ESKOM Power Supply	Sum	100 000 000	1	100 000 000
9		VAT (% of sub total E)		14%		603 246 665
NET PROJECT COST						4 912 151 415
10		Cost of relocations	Sum			0
11		Cost of land acquisition	Sum			0
12		Cost Environmental and Socio-economic Studies	Sum			0
TOTAL PROJECT COST						4 912 151 415
TOTAL PROJECT COST (EXCL VAT)						4 308 904 750

Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)

OPTION: Phase 2: Demand Scenario D1 - +75Mm³/a

RATES: April 2012

BASE YEAR: 2012

INPUT CELLS

ECONOMIC COST MODEL

YEAR	TOTAL ANNUAL COST MCWAP-2		PRESENT VALUE OF COST (2012) AT 4%		PRESENT VALUE OF COST (2012) AT 6%		PRESENT VALUE OF COST (2012) AT 8%	
	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION
				4.00%		6.00%		8.00%
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0
2023	0	0	0	0	0	0	0	0
2024	0	0	0	0	0	0	0	0
2025	0	0	0	0	0	0	0	0
2026	0	0	0	0	0	0	0	0
2027	0	0	0	0	0	0	0	0
2028	0	0	0	0	0	0	0	0
2029	0	0	0	0	0	0	0	0
2030	105 657 078	0	52 155 305	0	37 016 301	0	26 440 581	0
2031	507 423 637	0	240 844 785	0	167 710 114	0	117 576 178	0
2032	1 143 799 678	0	522 015 242	0	356 642 146	0	245 400 171	0
2033	1 157 512 178	0	507 955 239	0	340 488 461	0	229 946 447	0
2034	816 795 619	0	344 651 311	0	226 664 947	0	150 241 800	0
2035	453 429 059	0	183 968 110	0	118 706 486	0	77 225 899	0
2036	85 637 500	22 752 474	33 409 028	8 876 229	21 150 625	5 619 373	13 504 977	3 588 050
2037	38 650 000	31 517 620	14 498 264	11 822 789	9 005 397	7 343 562	5 643 592	4 602 137
2038	0	33 376 449	0	12 038 526	0	7 336 478	0	4 512 555
2039	0	36 831 614	0	12 773 814	0	7 637 696	0	4 610 833
2040	0	36 085 895	0	12 033 833	0	7 059 489	0	4 182 850
2041	0	36 085 895	0	11 570 993	0	6 659 895	0	3 873 010
2042	0	36 384 183	0	11 217 923	0	6 334 855	0	3 615 763
2043	0	39 317 344	0	11 656 030	0	6 458 064	0	3 617 827
2044	0	39 118 486	0	11 151 035	0	6 061 699	0	3 332 897
2045	0	38 894 770	0	10 660 830	0	5 685 880	0	3 068 367
2046	0	39 640 489	0	10 447 334	0	5 466 881	0	2 895 552
2047	0	41 803 075	0	10 593 546	0	5 438 798	0	2 827 332
2048	0	41 803 075	0	10 186 102	0	5 130 942	0	2 617 900
2049	0	41 803 075	0	9 794 329	0	4 840 511	0	2 423 981
2050	4 870 463	41 803 075	1 097 244	9 417 624	532 044	4 566 520	261 497	2 244 427
2051	0	41 803 075	0	9 055 407	0	4 308 038	0	2 078 173
2052	0	41 803 075	0	8 707 122	0	4 064 186	0	1 924 235
2053	0	41 803 075	0	8 372 233	0	3 834 138	0	1 781 699
2054	0	41 803 075	0	8 050 224	0	3 617 111	0	1 649 721
2055	0	41 803 075	0	7 740 600	0	3 412 369	0	1 527 519
2056	0	41 803 075	0	7 442 885	0	3 219 216	0	1 414 370
2057	0	41 803 075	0	7 156 620	0	3 036 996	0	1 309 602
TOTAL	4 313 775 213	849 839 041	1 900 594 528	220 766 027	1 277 916 522	117 132 698	866 241 143	63 698 798

NET PRESENT COST

Discounted to 2012 at 4% 2 121 360 556

Discounted to 2012 at 6% 1 395 049 220

Discounted to 2012 at 8% 929 939 941

PROJECT: Mokolo and Crocodile (West) Water Augmentation Project (MCWAP)
 OPTION: Phase 2: Demand Scenario D1 - +75Mm³/a
 RATES: April 2012
 BASE YEAR: 2012

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm³	Total annual costs (excl VAT)	Discounted to 2012 at 4%		Discounted to 2012 at 6%		Discounted to 2012 at 8%	
			Use	Costs	Use	Costs	Use	Costs
2012	0.00	0	0.00	0	0.00	0	0.00	0
2013	0.00	0	0.00	0	0.00	0	0.00	0
2014	0.00	0	0.00	0	0.00	0	0.00	0
2015	0.00	0	0.00	0	0.00	0	0.00	0
2016	0.00	0	0.00	0	0.00	0	0.00	0
2017	0.00	0	0.00	0	0.00	0	0.00	0
2018	0.00	0	0.00	0	0.00	0	0.00	0
2019	0.00	0	0.00	0	0.00	0	0.00	0
2020	0.00	0	0.00	0	0.00	0	0.00	0
2021	0.00	0	0.00	0	0.00	0	0.00	0
2022	0.00	0	0.00	0	0.00	0	0.00	0
2023	0.00	0	0.00	0	0.00	0	0.00	0
2024	0.00	0	0.00	0	0.00	0	0.00	0
2025	0.00	0	0.00	0	0.00	0	0.00	0
2026	0.00	0	0.00	0	0.00	0	0.00	0
2027	0.00	0	0.00	0	0.00	0	0.00	0
2028	0.00	0	0.00	0	0.00	0	0.00	0
2029	0.00	0	0.00	0	0.00	0	0.00	0
2030	0.00	105 657 078	0.00	52 155 305	0.00	37 016 301	0.00	26 440 581
2031	0.00	507 423 637	0.00	240 844 785	0.00	167 710 114	0.00	117 576 178
2032	0.00	1 143 799 678	0.00	522 015 242	0.00	356 642 146	0.00	245 400 171
2033	0.00	1 157 512 178	0.00	507 955 239	0.00	340 488 461	0.00	229 946 447
2034	0.00	816 795 619	0.00	344 651 311	0.00	226 664 947	0.00	150 241 800
2035	0.00	453 429 059	0.00	183 968 110	0.00	118 706 486	0.00	77 225 899
2036	0.00	108 389 974	0.00	42 285 257	0.00	26 769 998	0.00	17 093 027
2037	7.66	70 167 620	2.87	26 321 053	1.79	16 348 959	1.12	10 245 729
2038	11.40	33 376 449	4.11	12 038 526	2.51	7 336 478	1.54	4 512 555
2039	18.35	36 831 614	6.36	12 773 814	3.81	7 637 696	2.30	4 610 833
2040	16.85	36 085 895	5.62	12 033 833	3.30	7 059 489	1.95	4 182 850
2041	16.85	36 085 895	5.40	11 570 993	3.11	6 659 895	1.81	3 873 010
2042	17.45	36 384 183	5.38	11 217 923	3.04	6 334 855	1.73	3 615 763
2043	23.35	39 317 344	6.92	11 656 030	3.84	6 458 064	2.15	3 617 827
2044	22.95	39 118 486	6.54	11 151 035	3.56	6 061 699	1.96	3 332 897
2045	22.50	38 894 770	6.17	10 660 830	3.29	5 685 880	1.78	3 068 367
2046	24.00	39 640 489	6.33	10 447 334	3.31	5 466 881	1.75	2 895 552
2047	28.35	41 803 075	7.18	10 593 546	3.69	5 438 798	1.92	2 827 332
2048	28.35	41 803 075	6.91	10 186 102	3.48	5 130 942	1.78	2 617 900
2049	28.35	41 803 075	6.64	9 794 329	3.28	4 840 511	1.64	2 423 981
2050	28.35	46 673 538	6.39	10 514 868	3.10	5 098 564	1.52	2 505 925
2051	28.35	41 803 075	6.14	9 055 407	2.92	4 308 038	1.41	2 078 173
2052	28.35	41 803 075	5.91	8 707 122	2.76	4 064 186	1.31	1 924 235
2053	28.35	41 803 075	5.68	8 372 233	2.60	3 834 138	1.21	1 781 699
2054	28.35	41 803 075	5.46	8 050 224	2.45	3 617 111	1.12	1 649 721
2055	28.35	41 803 075	5.25	7 740 600	2.31	3 412 369	1.04	1 527 519
2056	28.35	41 803 075	5.05	7 442 885	2.18	3 219 216	0.96	1 414 370
2057	28.35	41 803 075	4.85	7 156 620	2.06	3 036 996	0.89	1 309 602
TOTAL	493.22	5 163 614 253	121.17	2 121 360 556	62.37	1 395 049 220	32.87	929 939 941
URV				17.508		22.368		28.292

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 30 year analysis period (2012-2041)

TOTAL	157.37	4 659 269 481	49.39	2 013 299 286	28.22	1 343 581 469	16.33	904 983 933
URV				40.767		47.607		55.410

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNTED RATES- 20 year analysis period (2012-2031)

TOTAL	0.00	4 184 617 250	0.00	1 851 589 992	0.00	1 247 228 456	0.00	846 831 077
URV				#DIV/0!		#DIV/0!		#DIV/0!