

Mokolo and Crocodile (West) Water Augmentation Project Feasibility Study
Scenario 9, Phase 1 - New Pipeline from Mokolo Dam to Matimba T-off and Steenbokpan
RATES: April 2008
BASE YEAR: 2008

PUMP STATION COST CALCULATIONS

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No	PAY REF	DESCRIPTION	UNIT	RATE 2008 RAND	Quantity	Amount
1.		Mechanical and Electrical	Sum			34 305 066
2.		Civils				
		(a) (% of 1)	%	43%		14 702 171
		(c) Permanent access road	km	3 000 000	5.57	16 707 000
		SUB-TOTAL A				65 714 237
3.	11.0	Landscaping (% of Sub-total A)	%	5		3 285 712
4.	12.0	Miscellaneous (% of Sub-total A)	%	10		6 571 424
		SUB TOTAL B				75 571 373
5.	13.0	Preliminary & General (% of sub-total B)	%	30		22 671 412
6.	14.0	Preliminary works				
		SUB TOTAL C				98 242 785
7.	17.0	Contingencies (% of sub total C)	%	20		19 648 557
		SUB TOTAL D				117 891 342
8.	16.0	Planning design & supervision fees, time cost & transport (% of sub total D)	%	15		17 683 701
		SUB TOTAL E				135 575 043
9.	18.0	VAT (% of sub total E)	%	14		18 980 506
		NET PUMP STATION COST				154 555 549
10.	19.0	Cost of relocations	Sum			0
11.	20.0	Cost of land acquisition	Sum			0
		TOTAL PUMP STATION COST				154 555 549
		TOTAL PUMP STATION COST (EXCL VAT)				135 575 043

PROJECT: **Mokolo and Crocodile (West) Water Augmentation Project Feasibility Study**
 OPTION: Scenario 9, Phase 1 - New Pipeline from Mokolo Dam to Matimba T-off and Steenbokpan
 RATES: April 2008
 BASE YEAR: 2008

UNIT REFERENCE VALUE CALCULATIONS AT DIFFERENT DISCOUNT RATES

Year	Net Demand Mm³	Total annual costs (excl VAT)	Discounted to 2008 at 6%		Discounted to 2008 at 8%		Discounted to 2008 at 10%	
			Use	Costs	Use	Costs	Use	Costs
2008	0.00	0	0.00	0	0.00	0	0.00	0
2009	0.00	0	0.00	0	0.00	0	0.00	0
2010	0.00	809 728 386	0.00	720 655 381	0.00	694 211 579	0.00	669 197 013
2011	0.00	765 593 410	0.00	642 806 990	0.00	607 752 732	0.00	575 201 660
2012	31.70	86 248 268	25.11	68 316 707	23.30	63 395 052	21.65	58 908 728
2013	38.70	105 996 384	28.92	79 206 664	26.34	72 139 358	24.03	65 815 415
2014	38.70	105 996 384	27.28	74 723 268	24.39	66 795 702	21.85	59 832 195
2015	28.70	145 545 047	19.09	96 795 769	16.75	84 924 137	14.73	74 687 622
2016	28.70	81 434 363	18.01	51 092 927	15.51	43 996 452	13.39	37 989 731
2017	28.70	81 434 363	16.99	48 200 874	14.36	40 737 456	12.17	34 536 119
2018	28.70	81 434 363	16.03	45 472 523	13.29	37 719 866	11.07	31 396 472
2019	28.70	81 434 363	15.12	42 898 606	12.31	34 925 802	10.06	28 542 247
2020	28.70	81 434 363	14.26	40 470 383	11.40	32 338 706	9.14	25 947 498
2021	28.70	81 434 363	13.46	38 179 607	10.55	29 943 246	8.31	23 588 634
2022	28.70	81 434 363	12.69	36 018 497	9.77	27 725 228	7.56	21 444 213
2023	28.70	81 434 363	11.98	33 979 714	9.05	25 671 507	6.87	19 494 739
2024	28.70	81 434 363	11.30	32 056 334	8.38	23 769 914	6.25	17 722 490
2025	28.70	81 434 363	10.66	30 241 825	7.76	22 009 180	5.68	16 111 354
2026	28.70	83 639 688	10.05	29 302 645	7.18	20 930 751	5.16	15 043 333
2027	28.70	81 434 363	9.49	26 915 116	6.65	18 869 324	4.69	13 315 169
2028	28.70	81 434 363	8.95	25 391 619	6.16	17 471 597	4.27	12 104 699
2029	28.70	81 434 363	8.44	23 954 358	5.70	16 177 404	3.88	11 004 272
2030	28.70	81 434 363	7.96	22 598 451	5.28	14 979 078	3.53	10 003 884
2031	28.70	81 434 363	7.51	21 319 293	4.89	13 869 517	3.21	9 094 440
2032	28.70	81 434 363	7.09	20 112 541	4.53	12 842 145	2.91	8 267 672
2033	28.70	81 434 363	6.69	18 974 095	4.19	11 890 875	2.65	7 516 066
2034	28.70	81 434 363	6.31	17 900 090	3.88	11 010 069	2.41	6 832 787
2035	28.70	81 434 363	5.95	16 886 877	3.59	10 194 509	2.19	6 211 625
2036	28.70	81 434 363	5.61	15 931 016	3.33	9 439 360	1.99	5 646 931
2037	28.70	81 434 363	5.30	15 029 260	3.08	8 740 148	1.81	5 133 574
2038	28.70	81 434 363	5.00	14 178 548	2.85	8 092 730	1.64	4 666 886
2039	28.70	81 434 363	4.71	13 375 988	2.64	7 493 268	1.50	4 242 623
2040	28.70	81 434 363	4.45	12 618 857	2.45	6 938 211	1.36	3 856 930
2041	28.70	83 639 688	4.20	12 226 970	2.26	6 598 246	1.24	3 601 254
2042	28.70	81 434 363	3.96	11 230 738	2.10	5 948 398	1.12	3 187 546
2043	28.70	81 434 363	3.73	10 595 036	1.94	5 507 776	1.02	2 897 769
2044	28.70	81 434 363	3.52	9 995 317	1.80	5 099 792	0.93	2 634 335
2045	28.70	81 434 363	3.32	9 429 544	1.66	4 722 030	0.84	2 394 850
2046	28.70	81 434 363	3.14	8 895 796	1.54	4 372 250	0.77	2 177 137
2047	28.70	81 434 363	2.96	8 392 260	1.43	4 048 380	0.70	1 979 215
2048	28.70	81 434 363	2.79	7 917 227	1.32	3 748 500	0.63	1 799 286
2049	28.70	81 434 363	2.63	7 469 082	1.22	3 470 833	0.58	1 635 715
2050	28.70	81 434 363	2.48	7 046 304	1.13	3 213 734	0.52	1 487 014
2051	28.70	81 434 363	2.34	6 647 456	1.05	2 975 680	0.48	1 351 830
2052	28.70	81 434 363	2.21	6 271 185	0.97	2 755 259	0.43	1 228 937
2053	28.70	81 434 363	2.09	5 916 212	0.90	2 551 166	0.39	1 117 215
2054	28.70	81 434 363	1.97	5 581 333	0.83	2 362 191	0.36	1 015 650
2055	28.70	81 434 363	1.86	5 265 408	0.77	2 187 214	0.33	923 318
2056	28.70	81 434 363	1.75	4 967 366	0.71	2 025 198	0.30	839 380
TOTAL	1314.50	5 362 327 395	389.34	2 503 452 056	291.18	2 158 581 549	226.57	1 913 627 474
URV				6.430		7.413		8.446

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

TOTAL	884.00	4 140 811 956	348.59	2 387 831 792	271.80	2 103 593 149	217.18	1 886 958 276
URV				6.850		7.739		8.689

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

TOTAL	597.00	3 324 263 005	293.29	2 230 597 551	239.00	2 010 353 587	197.48	1 830 981 927
URV				7.605		8.411		9.272

Mokolo and Crocodile (West) Water Augmentation Project Feasibility Study
Scenario 9, Phase 1 - New Pipeline from Mokolo Dam to Matimba T-off and Steenbokpan
RATES: April 2008
BASE YEAR: 2008

RISING MAIN - 900mm DIAMETER PIPELINE COST CALCULATIONS

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No	Pay Ref	Description	Unit	Rate	Quantity	Amount	Quantity	Amount Rands
1.		number of pipes in parallel (n)	no		1			
		Route Clearing & grubbing						
		(a) Sparse, bush & trees	Ha	10 300	17	175 100	17	175 100
2.		Road, river and rail crossings	900					
		(a) national & provincial road	no	1 270 000	0	0	0	0
		(b) gravel road	no	220 000	2	440 000	2	440 000
		(c) river	no	670 000	1	670 000	1	670 000
		(d) rail	no	1 270 000	0	0	0	0
3.		Trench Excavation & backfill						
		(a) Excavation						
		All materials	m³	50	32114	1 605 696	32 114	1 605 696
		E/O Hard	m³	100	28903	2 890 253	28 903	2 890 253
		(b) Bedding						
		From trench	m³	135	981	132 438	981	132 438
		From commercial sources	m³	235	2289	537 926	2 289	537 926
		(c) Bedding Cradle & Fill Blanket						
		From trench	m³	210	3111	653 357	3 111	653 357
		From commercial sources	m³	245	7260	1 778 582	7 260	1 778 582
		(d) Main Fill						
		From trench	m³	55	14737	810 509	14 737	810 509
		(e) Spoil	m³	45	13285	597 832	13 285	597 832
4.		Pipelines						
		(a) Supply of steel pipe: D/t ratio as specified. Sintakote external coating and epoxy internal lining						
	P1	Dia (mm) t (mm) Grade D/t						
		900 8.3 API Grade X42 110	m	3 692	5 695	21 025 940	5 695	21 025 940
						0	0	0
						0	0	0
		(b) Laying & jointing (% of a)		20%		4 205 188		4 205 188
		(c) Air valve, Isolating Valve, Scour Valve, Access						
		All valve types, incl chamber - civil & mechanical	m	230	5 695	1 309 850	5 695	1 309 850
		(d) Cathodic Protection	m	3 780 637	1	3 780 637		3 780 637
		SUB-TOTAL A				40 613 308		40 613 308
5.		Landscaping & EIA Remediation (% of Sub-total A)	%	5		2 030 665		2 030 665
6.		Miscellaneous (% of Sub-total A)	%	10		4 061 331		4 061 331
		SUB TOTAL B				46 705 304		46 705 304
7.		Preliminary & General (% of Sub-total B)	%	30		14 011 591		14 011 591
8.		To include below						
		Preliminary works						
		(a) Access road	km	350 000	5.70	1 993 250	6	1 993 250
		SUB TOTAL C				62 710 145		62 710 145
9.		Contingencies						
		(% of Sub-total C)	%	20		12 542 029		12 542 029
		SUB TOTAL D				75 252 174		75 252 174
10.		Planning design & supervision						
		(% of Sub-total D)	%	15		11 287 826		11 287 826
		SUB TOTAL E				86 540 000		86 540 000
11.		VAT (% of sub total E)	%	14		12 115 600		12 115 600
		NET PROJECT COST				98 655 600		98 655 600
12.		Cost of relocations	Sum			0		0
13.		Cost of land acquisition	Sum			190 000		190 000
		TOTAL RISING MAIN COST				98 845 600		98 845 600
		TOTAL RISING MAIN COST (EXCL VAT, RELOC, LAND ACQ)				86 540 000		86 540 000

GRAVITY MAIN - 1900mm DIAMETER PIPELINE COST CALCULATIONS

					P1	P1		
No	Pay Ref	Description	Unit	Rate	Quantity	Amount	Quantity	Amount Rands
1.		Route Clearing & grubbing (a) Sparse, bush & trees	Ha	10 300	4	41 200	4	41 200
2.		Road, river and rail crossings (a) national & provincial road (b) gravel road (c) river (d) rail	1 900 no no no no	2 020 000 640 000 1 350 000 2 020 000	0 1 0 0	0 640 000 0 0	0 1 0 0	0 640 000 0 0
3.		Trench Excavation & backfill (a) Excavation All materials E/O Hard (b) Bedding From trench From commercial sources (c) Bedding Cradle & Fill Blanket From trench From commercial sources (d) Main Fill From trench (e) Spoil	m³ m³ m³ m³ m³ m³ m³ m³	50 100 135 235 210 245 55 45	19399 3880 369 861 1696 3956 8421 8914	969 950 387 980 49 839 202 434 356 077 969 320 463 136 401 111	19 399 3 880 369 861 1 696 3 956 8 421 8 914	969 950 387 980 49 839 202 434 356 077 969 320 463 136 401 111
4.	P1	Pipelines (a) Supply of steel pipe: D/t ratio as specified. Sintakote external coating and epoxy internal lining Dia (mm) t (mm) Grade D/t 1900 12.1 API Grade X42 160 (b) Laying & jointing (% of a) (c) Air valve, Isolating Valve, Scour Valve, Access All valve types, incl chamber - civil & mechanical components (d) Cathodic Protection	m m m	10 922 700 700 259	1 400 1 400 1	15 290 800 980 000 700 259	1 400 0 0 1 400	15 290 800 0 0 980 000 700 259
		SUB-TOTAL A				24 510 265		24 510 265
5.		Landscaping & EIA Remediation (% of Sub-total A)	%	5		1 225 513		1 225 513
6.		Miscellaneous (% of Sub-total A)	%	10		2 451 026		2 451 026
		SUB TOTAL B				28 186 804		28 186 804
7.		Preliminary & General (% of Sub-total B) To include below	%	30		8 456 041		8 456 041
8.		Preliminary works (a) Access road	km	350 000	1.40	490 000	1	490 000
		SUB TOTAL C				37 132 846		37 132 846
9.		Contingencies (% of Sub-total C)	%	20		7 426 569		7 426 569
		SUB TOTAL D				44 559 415		44 559 415
10.		Planning design & supervision (% of Sub-total D)	%	15		6 683 912		6 683 912
		SUB TOTAL E				51 243 327		51 243 327
11.		VAT (% of sub total E)	%	14		7 174 066		7 174 066
		NET PROJECT COST				58 417 393		58 417 393
12.		Cost of relocations	Sum			0		0
13.		Cost of land acquisition	Sum			0		0
		TOTAL GRAVITY MAIN COST				58 417 393		58 417 393
		TOTAL GRAVITY MAIN COST (EXCL VAT, RELOC, LAND ACQ)				51 243 327		51 243 327

GRAVITY MAIN - 1100mm DIAMETER PIPELINE COST CALCULATIONS

No	Pay Ref	Description	Unit	Rate	P1		P1	
					Quantity	Amount	Quantity	Amount Rands
1.		Route Clearing & grubbing (a) Sparse, bush & trees	Ha	10 300	129	1 328 700	129	1 328 700
2.		Road, river and rail crossings (a) national & provincial road (b) gravel road (c) river (d) rail	1 100 no no no no	 1 390 000 290 000 770 000 1 390 000	 2 11 9 1	 2 780 000 3 190 000 6 930 000 1 390 000	 2 11 9 1	 2 780 000 3 190 000 6 930 000 1 390 000
3.		Trench Excavation & backfill (a) Excavation All materials E/O Hard (b) Bedding From trench From commercial sources (c) Bedding Cradle & Fill Blanket From trench From commercial sources (d) Main Fill From trench (e) Spoil	 m³ m³ m³ m³ m³ m³ m³ m³	 50 100 135 235 210 245 55 45	 287003 57401 8187 19102 28594 66720 122239 127983	 14 350 149 5 740 059 1 105 185 4 488 962 6 004 810 16 346 428 6 723 169 5 759 219	 287 003 57 401 8 187 19 102 28 594 66 720 122 239 127 983	 14 350 149 5 740 059 1 105 185 4 488 962 6 004 810 16 346 428 6 723 169 5 759 219
4.	P1	Pipelines (a) Supply of steel pipe: D/t ratio as specified. Sintakote external coating and epoxy internal lining Dia (mm) t (mm) Grade D/t 1100 7.0 API Grade X42 160 (b) Laying & jointing (% of a) (c) Air valve, Isolating Valve, Scour Valve, Access All valve types, incl chamber - civil & mechanical components (d) Cathodic Protection	 m m m	 4 094 20% 400 21 481 433	 42 947 42 947 1	 175 825 018 35 165 004 17 178 800 21 481 433	 42 947 0 0 42 947	 175 825 018 0 0 17 178 800 21 481 433
		SUB-TOTAL A				325 786 937		325 786 937
5.		Landscaping & EIA Remediation (% of Sub-total A)	%	5		16 289 347		16 289 347
6.		Miscellaneous (% of Sub-total A)	%	10		32 578 694		32 578 694
		SUB TOTAL B				374 654 977		374 654 977
7.		Preliminary & General (% of Sub-total B) To include below	%	30		112 396 493		112 396 493
8.		Preliminary works (a) Access road	km	350 000	42.95	15 031 450	43	15 031 450
		SUB TOTAL C				502 082 920		502 082 920
9.		Contingencies (% of Sub-total C)	%	20		100 416 584		100 416 584
		SUB TOTAL D				602 499 504		602 499 504
10.		Planning design & supervision (% of Sub-total D)	%	15		90 374 926		90 374 926
		SUB TOTAL E				692 874 430		692 874 430
11.		VAT (% of sub total E)	%	14		97 002 420		97 002 420
		NET PROJECT COST				789 876 850		789 876 850
12.		Cost of relocations	Sum			0		0
13.		Cost of land acquisition	Sum			1 128 608		1 128 608
		TOTAL GRAVITY MAIN COST				791 005 458		791 005 458
		TOTAL GRAVITY MAIN COST (EXCL VAT, RELOC, LAND ACQ)				692 874 430		692 874 430

Mokolo and Crocodile (West) Water Augmentation Project Feasibility Study
Scenario 9, Phase 1 - New Pipeline from Mokolo Dam to Matimba T-off and Steenbokpan
RATES: April 2008
BASE YEAR: 2008

GRAVITY MAIN - 1000mm DIAMETER PIPELINE COST CALCULATIONS

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No	Pay Ref	Description	Unit	Rate	Quantity	Amount	Quantity	Amount Rands
1.		Route Clearing & grubbing (a) Sparse, bush & trees	Ha	10 300	60	618 000	60	618 000
2.		Road, river and rail crossings (a) national & provincial road (b) gravel road (c) river (d) rail	1 000 no no no no	 1 330 000 260 000 720 000 1 330 000	 0 7 3 0	 0 1 820 000 2 160 000 0	 0 7 3 0	 0 1 820 000 2 160 000 0
3.		Trench Excavation & backfill (a) Excavation All materials E/O Hard (b) Bedding From trench From commercial sources (c) Bedding Cradle & Fill Blanket From trench From commercial sources (d) Main Fill From trench (e) Spoil	 m³ m³ m³ m³ m³ m³ m³ m³	 50 100 135 235 210 245 55 45	 122817 24563 3624 8455 12086 28201 54260 52847	 6 140 828 2 456 331 489 178 1 986 907 2 538 060 6 909 164 2 984 317 2 378 102	 122 817 24 563 3 624 8 455 12 086 28 201 54 260 52 847	 6 140 828 2 456 331 489 178 1 986 907 2 538 060 6 909 164 2 984 317 2 378 102
4.	P1	Pipelines (a) Supply of steel pipe: D/t ratio as specified. Sintakote external coating and epoxy internal lining Dia (mm) t (mm) Grade D/t 1000 7.8 API Grade X42 130 (b) Laying & jointing (% of a) (c) Air valve, Isolating Valve, Scour Valve, Access All valve types, incl chamber - civil & mechanical components (d) Cathodic Protection	 m m m	 3 969 20% 290 13 257 786	 19 971 19 971 1	 79 264 899 15 852 980 5 791 590 13 257 786	 19 971 0 0 19 971 	 79 264 899 0 0 15 852 980 5 791 590 13 257 786
		SUB-TOTAL A				144 648 142		144 648 142
5.		Landscaping & EIA Remediation (% of Sub-total A)	%	5		7 232 407		7 232 407
6.		Miscellaneous (% of Sub-total A)	%	10		14 464 814		14 464 814
		SUB TOTAL B				166 345 364		166 345 364
7.		Preliminary & General (% of Sub-total B) To include below Preliminary works (a) Access road	% km	30 350 000	 19.97	 6 989 850	 20	 6 989 850
		SUB TOTAL C				223 238 823		223 238 823
9.		Contingencies (% of Sub-total C)	%	20		44 647 765		44 647 765
		SUB TOTAL D				267 886 587		267 886 587
10.		Planning design & supervision (% of Sub-total D)	%	15		40 182 988		40 182 988
		SUB TOTAL E				308 069 576		308 069 576
11.		VAT (% of sub total E)	%	14		43 129 741		43 129 741
		NET PROJECT COST				351 199 316		351 199 316
12.		Cost of relocations	Sum			0		0
13.		Cost of land acquisition	Sum			475 728		475 728
		TOTAL GRAVITY MAIN COST				351 675 044		351 675 044
		TOTAL GRAVITY MAIN COST (EXCL VAT, RELOC, LAND ACQ)				308 069 576		308 069 576

Mokolo and Crocodile (West) Water Augmentation Project Feasibility Study
Scenario 9, Phase 1 - New Pipeline from Mokolo Dam to Matimba T-off and Steenbokpan
RATES: April 2008
BASE YEAR: 2008

GRAVITY MAIN - 900mm DIAMETER PIPELINE COST CALCULATIONS

No	Pay Ref	Description	Unit	Rate	P1		P1	
					Quantity	Amount	Quantity	Amount Rands
1.		Route Clearing & grubbing (a) Sparse, bush & trees	Ha	10 300	35	360 500	35	360 500
2.		Road, river and rail crossings (a) national & provincial road (b) gravel road (c) river (d) rail	900 no no no no	1 270 000 220 000 670 000 1 270 000	1 4 0 0	1 270 000 880 000 0 0	1 4 0 0	1 270 000 880 000 0 0
3.		Trench Excavation & backfill (a) Excavation All materials E/O Hard (b) Bedding From trench From commercial sources (c) Bedding Cradle & Fill Blanket From trench From commercial sources (d) Main Fill From trench (e) Spoil	m³ m³ m³ m³ m³ m³ m³ m³	50 100 135 235 210 245 55 45	66348 13270 2027 4729 6428 14998 30446 27447	3 317 405 1 326 962 273 620 1 111 368 1 349 850 3 674 591 1 674 529 1 235 135	66 348 13 270 2 027 4 729 6 428 14 998 30 446 27 447	3 317 405 1 326 962 273 620 1 111 368 1 349 850 3 674 591 1 674 529 1 235 135
4.	P1	Pipelines (a) Supply of steel pipe: D/t ratio as specified. Sintakote external coating and epoxy internal lining Dia (mm) t (mm) Grade D/t 900 7.0 API Grade X42 130 (b) Laying & jointing (% of a) (c) Air valve, Isolating Valve, Scour Valve, Access All valve types, incl chamber - civil & mechanical components (d) Cathodic Protection	m m Sum	3 279 230 5 885 173	11 766 11 766 1	38 580 714 2 706 180 5 885 173	11 766 0 0 11 766 	38 580 714 0 0 2 706 180 5 885 173
		SUB-TOTAL A				71 362 170		71 362 170
5.		Landscaping & EIA Remediation (% of Sub-total A)	%	5		3 568 109		3 568 109
6.		Miscellaneous (% of Sub-total A)	%	10		7 136 217		7 136 217
		SUB TOTAL B				82 066 496		82 066 496
7.		Preliminary & General (% of Sub-total B) To include below	%	30		24 619 949		24 619 949
8.		Preliminary works (a) Access road	km	350 000	11.77	4 118 100	12	4 118 100
		SUB TOTAL C				110 804 544		110 804 544
9.		Contingencies (% of Sub-total C)	%	20		22 160 909		22 160 909
		SUB TOTAL D				132 965 453		132 965 453
10.		Planning design & supervision (% of Sub-total D)	%	15		19 944 818		19 944 818
		SUB TOTAL E				152 910 271		152 910 271
11.		VAT (% of sub total E)	%	14		21 407 438		21 407 438
		NET PROJECT COST				174 317 709		174 317 709
12.		Cost of relocations	Sum			0		0
13.		Cost of land acquisition	Sum			325 664		325 664
		TOTAL GRAVITY MAIN COST				174 643 373		174 643 373
		TOTAL GRAVITY MAIN COST (EXCL VAT, RELOC, LAND ACQ)				152 910 271		152 910 271

BASE YEAR: 2008

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No	Pay Ref	Description	Unit	Rate	Quantity	Amount	Quantity	Amount Rands
1.		Route Clearing & grubbing (a) Sparse, bush & trees	Ha	10 300	6	61 800	6	61 800
2.		Road, river and rail crossings (a) national & provincial road (b) gravel road (c) river (d) rail	800 no no no no	 1 230 000 200 000 620 000 1 230 000	 2 3 0 0	 2 460 000 600 000 0 0	 2 3 0 0	 2 460 000 600 000 0 0
3.		Trench Excvation & backfill (a) Excavation All materials E/O Hard (b) Bedding From trench From commercial sources (c) Bedding Cradle & Fill Blanket From trench From commercial sources (d) Main Fill From trench (e) Spoil	 m³ m³ m³ m³ m³ m³ m³	 50 100 135 235 210 245 55 45	 10001 2000 317 739 950 2217 4772 3963	 500 042 200 017 42 734 173 575 199 523 543 146 262 435 178 319	 10 001 2 000 317 739 950 2 217 4 772 3 963	 500 042 200 017 42 734 173 575 199 523 543 146 262 435 178 319
4.	P1	Pipelines (a) Supply of steel pipe: D/t ratio as specified. Sintakote external coating and epoxy internal lining Dia (mm) t (mm) Grade D/t 800 6.3 API Grade X42 130 (b) Laying & jointing (% of a) (c) Air valve, Isolating Valve, Scour Valve, Access All valve types, incl chamber - civil & mechanical components (d) Cathodic Protection	 m m Sum	 2 730 20% 180 970 358	 1 940 1 940 1	 5 296 200 1 059 240 349 200 970 358	 1 940 0 0 1 940	 5 296 200 0 0 349 200 970 358
		SUB-TOTAL A				12 896 589		12 896 589
5.		Landscaping & EIA Remediation (% of Sub-total A)	%	5		644 829		644 829
6.		Miscellaneous (% of Sub-total A)	%	10		1 289 659		1 289 659
		SUB TOTAL B				14 831 078		14 831 078
7.		Preliminary & General (% of Sub-total B) To include below	%	30		4 449 323		4 449 323
8.		Preliminary works (a) Access road	km	350 000	1.94	679 000	2	679 000
		SUB TOTAL C				19 959 401		19 959 401
9.		Contingencies (% of Sub-total C)	%	20		3 991 880		3 991 880
		SUB TOTAL D				23 951 281		23 951 281
10.		Planning design & supervision (% of Sub-total D)	%	15		3 592 692		3 592 692
		SUB TOTAL E				27 543 973		27 543 973
11.		VAT (% of sub total E)	%	14		3 856 156		3 856 156
		NET PROJECT COST				31 400 129		31 400 129
12.		Cost of relocations	Sum			0		0
13.		Cost of land acquisition	Sum			50 000		50 000
		TOTAL GRAVITY MAIN COST				31 450 129		31 450 129
		TOTAL GRAVITY MAIN COST (EXCL VAT, RELOC. LAND ACQ)				27 543 973		27 543 973

Mokolo and Crocodile (West) Water Augmentation Project Feasibility Study

Scenario 9, Phase 1 - New Pipeline from Mokolo Dam to Matimba T-off and Steenbokpan

RATES: April 2008

BASE YEAR: 2008

SUMMARY OF TOTAL PROJECT COST CALCULATIONS

					P1	P1
No	Pay Ref	Description	Unit	Rate	Quantity	Amount
1		Construction Costs				
		Diameter pipeline : 1900 mm	m	1	1 400	24 510 265
		1100 mm	m	1	42 947	325 786 937
		1000 mm	m	1	19 971	144 648 142
		900 mm	m	1	17 461	111 975 478
		800 mm	m	1	1 940	12 896 589
2		Pump Station	No	1	1	65 714 237
SUB-TOTAL A						685 531 648
3		Landscaping & EIA Remediation (% of Sub-total A)	%	5		34 276 582
5		Preliminary & General (% of Sub-total B)	%	30		236 508 418
6		To include below				
		Preliminary works				
		(a) Access road	km	350 000	83.72	29 301 650
		(b) Electricity to site	Sum			
		(c) Water to site - construction (not potable)	Sum			
		(d) Railhead & materials handling	Sum			
9.		Accommodation	Sum			
SUB TOTAL C						1 054 171 463
7		Contingencies (% of Sub-total C)	%	20		210 834 293
SUB TOTAL D						1 265 005 756
8		Planning design & supervision (% of Sub-total D)	%	15		189 750 863
SUB TOTAL E						1 454 756 619
9		Cost of ESKOM transmission lines to site	Sum	1	1	76 430 200
10		VAT (% of sub total E)	%	14		214 366 155
NET PROJECT COST						1 745 552 974
11		Cost of relocations	Sum			0
12		Cost of land acquisition	Sum			2 170 000
13		Cost Environmental and Socio-economic Studies	Sum			1 000 000
TOTAL PROJECT COST						1 748 722 974
TOTAL PROJECT COST (EXCL VAT)						1 534 356 819

Mokolo and Crocodile (West) Water Augmentation Project Feasibility Study

Scenario 9, Phase 1 - New Pipeline from Mokolo Dam to Matimba T-off and Steenbokpan

RATES: April 2008

BASE YEAR: 2008

ECONOMIC COST MODEL

CALENDER YEAR	RAW WATER COST (ALL WATER FROM MOKOLO DAM)	RIVER MANAGEMENT COST	Environmental & Social Impacts	EXISTING EXXARO PIPELINES		EXISTING PUMP STATION			NEW RISING MAIN COSTS - 900		NEW GRAVITY MAIN COSTS - 1900	
				CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE CIVIL	MAINTENANCE E&M	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION
	R 2.00				0.50%		0.25%	4.00%		0.50%		0.50%
2008												
2009												
2010			3 170 000						43 270 000		25 621 663	
2011				33 005 645		7 959 332			43 270 000		25 621 663	
2012	64 700 839				165 028		5 969	222 861		376 261		222 797
2013	78 979 592				165 028		5 969	222 861		376 261		222 797
2014	78 979 592				165 028		5 969	222 861		376 261		222 797
2015	58 571 429			64 110 684	165 028		5 969	222 861		376 261		222 797
2016	58 571 429				165 028		5 969	222 861		376 261		222 797
2017	58 571 429				165 028		5 969	222 861		376 261		222 797
2018	58 571 429				165 028		5 969	222 861		376 261		222 797
2019	58 571 429				165 028		5 969	222 861		376 261		222 797
2020	58 571 429				165 028		5 969	222 861		376 261		222 797
2021	58 571 429				165 028		5 969	222 861		376 261		222 797
2022	58 571 429				165 028		5 969	222 861		376 261		222 797
2023	58 571 429				165 028		5 969	222 861		376 261		222 797
2024	58 571 429				165 028		5 969	222 861		376 261		222 797
2025	58 571 429				165 028		5 969	222 861		376 261		222 797
2026	58 571 429				165 028		5 969	222 861		376 261		222 797
2027	58 571 429				165 028		5 969	222 861		376 261		222 797
2028	58 571 429				165 028		5 969	222 861		376 261		222 797
2029	58 571 429				165 028		5 969	222 861		376 261		222 797
2030	58 571 429				165 028		5 969	222 861		376 261		222 797
2031	58 571 429				165 028		5 969	222 861		376 261		222 797
2032	58 571 429				165 028		5 969	222 861		376 261		222 797
2033	58 571 429				165 028		5 969	222 861		376 261		222 797
2034	58 571 429				165 028		5 969	222 861		376 261		222 797
2035	58 571 429				165 028		5 969	222 861		376 261		222 797
2036	58 571 429				165 028		5 969	222 861		376 261		222 797
2037	58 571 429				165 028		5 969	222 861		376 261		222 797
2038	58 571 429				165 028		5 969	222 861		376 261		222 797
2039	58 571 429				165 028		5 969	222 861		376 261		222 797
2040	58 571 429				165 028		5 969	222 861		376 261		222 797
2041	58 571 429				165 028		5 969	222 861		376 261		222 797
2042	58 571 429				165 028		5 969	222 861		376 261		222 797
2043	58 571 429				165 028		5 969	222 861		376 261		222 797
2044	58 571 429				165 028		5 969	222 861		376 261		222 797
2045	58 571 429				165 028		5 969	222 861		376 261		222 797
2046	58 571 429				165 028		5 969	222 861		376 261		222 797
2047	58 571 429				165 028		5 969	222 861		376 261		222 797
2048	58 571 429				165 028		5 969	222 861		376 261		222 797
2049	58 571 429				165 028		5 969	222 861		376 261		222 797
2050	58 571 429				165 028		5 969	222 861		376 261		222 797
2051	58 571 429				165 028		5 969	222 861		376 261		222 797
2052	58 571 429				165 028		5 969	222 861		376 261		222 797
2053	58 571 429				165 028		5 969	222 861		376 261		222 797
2054	58 571 429				165 028		5 969	222 861		376 261		222 797
2055	58 571 429				165 028		5 969	222 861		376 261		222 797
2056	58 571 429				165 028		5 969	222 861		376 261		222 797
TOTAL	2 682 660 023	0	3 170 000	97 116 329	7 426 270	7 959 332	268 627	10 028 758	86 540 000	16 931 739	51 243 327	10 025 868

Scenario 9, Phase 1 - New Pipeline from Mokolo Dam to Matimba T-off and Steenbokpan

BASE YEAR: 2008

[illegible]

* Maintenance requirements for mechanical & electrical components of pump station accepted to be a major overhaul every 15 years with an estimated cost of 15% of initial capital cost of pump and motor which is

R 14 702 171

** Electricity cost based on full flow from Mokolo Dam to Wolvenfontein Reservoir via existing and new rising mains.

Mokolo and Crocodile (West) Water Augmentation Project Feasibility Study

Scenario 9, Phase 1 - New Pipeline from Mokolo Dam to Matimba T-off and Steenbokpan

RATES: April 2008
BASE YEAR: 2008

ECONOMIC COST MODEL

YEAR	TOTAL ANNUAL COST MOKOLO TRANSFER SYSTEM						TOTAL ANNUAL COST COMBINED SCHEME		PRESENT VALUE OF COST (2008) AT 6%		PRESENT VALUE OF COST (2008) AT 8%		PRESENT VALUE OF COST (2008) AT 10%	
	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION	CAPITAL	MAINTENANCE & OPERATION
										6.00%		8.00%		10.00%
2008	0	0					0	0	0	0	0	0	0	0
2009	0	0					0	0	0	0	0	0	0	0
2010	809 728 386	0					809 728 386	0	720 655 381	0	694 211 579	0	669 197 013	0
2011	765 593 410	0					765 593 410	0	642 806 990	0	607 752 732	0	575 201 660	0
2012	0	86 248 268					0	86 248 268	0	68 316 707	0	63 395 052	0	58 908 728
2013	0	105 996 384					0	105 996 384	0	79 206 664	0	72 139 358	0	65 815 415
2014	0	105 996 384					0	105 996 384	0	74 723 268	0	66 795 702	0	59 832 195
2015	64 110 684	81 434 363					64 110 684	81 434 363	42 637 266	54 158 502	37 407 968	47 516 168	32 898 918	41 788 704
2016	0	81 434 363					0	81 434 363	0	51 092 927	0	43 996 452	0	37 989 731
2017	0	81 434 363					0	81 434 363	0	48 200 874	0	40 737 456	0	34 536 119
2018	0	81 434 363					0	81 434 363	0	45 472 523	0	37 719 866	0	31 396 472
2019	0	81 434 363					0	81 434 363	0	42 898 606	0	34 925 802	0	28 542 247
2020	0	81 434 363					0	81 434 363	0	40 470 383	0	32 338 706	0	25 947 498
2021	0	81 434 363					0	81 434 363	0	38 179 607	0	29 943 246	0	23 588 634
2022	0	81 434 363					0	81 434 363	0	36 018 497	0	27 725 228	0	21 444 213
2023	0	81 434 363					0	81 434 363	0	33 979 714	0	25 671 507	0	19 494 739
2024	0	81 434 363					0	81 434 363	0	32 056 334	0	23 769 914	0	17 722 490
2025	0	81 434 363					0	81 434 363	0	30 241 825	0	22 009 180	0	16 111 354
2026	2 205 326	81 434 363					2 205 326	81 434 363	772 622	28 530 023	551 881	20 378 870	396 647	14 646 686
2027	0	81 434 363					0	81 434 363	0	26 915 116	0	18 869 324	0	13 315 169
2028	0	81 434 363					0	81 434 363	0	25 391 619	0	17 471 597	0	12 104 699
2029	0	81 434 363					0	81 434 363	0	23 954 358	0	16 177 404	0	11 004 272
2030	0	81 434 363					0	81 434 363	0	22 598 451	0	14 979 078	0	10 003 884
2031	0	81 434 363					0	81 434 363	0	21 319 293	0	13 869 517	0	9 094 440
2032	0	81 434 363					0	81 434 363	0	20 112 541	0	12 842 145	0	8 267 672
2033	0	81 434 363					0	81 434 363	0	18 974 095	0	11 890 875	0	7 516 066
2034	0	81 434 363					0	81 434 363	0	17 900 090	0	11 010 069	0	6 832 787
2035	0	81 434 363					0	81 434 363	0	16 886 877	0	10 194 509	0	6 211 625
2036	0	81 434 363					0	81 434 363	0	15 931 016	0	9 439 360	0	5 646 931
2037	0	81 434 363					0	81 434 363	0	15 029 260	0	8 740 148	0	5 133 574
2038	0	81 434 363					0	81 434 363	0	14 178 548	0	8 092 730	0	4 666 886
2039	0	81 434 363					0	81 434 363	0	13 375 988	0	7 493 268	0	4 242 623
2040	0	81 434 363					0	81 434 363	0	12 618 857	0	6 938 211	0	3 856 930
2041	2 205 326	81 434 363					2 205 326	81 434 363	322 388	11 904 582	173 976	6 424 270	94 954	3 506 300
2042	0	81 434 363					0	81 434 363	0	11 230 738	0	5 948 398	0	3 187 546
2043	0	81 434 363					0	81 434 363	0	10 595 036	0	5 507 776	0	2 897 769
2044	0	81 434 363					0	81 434 363	0	9 995 317	0	5 099 792	0	2 634 335
2045	0	81 434 363					0	81 434 363	0	9 429 544	0	4 722 030	0	2 394 850
2046	0	81 434 363					0	81 434 363	0	8 895 796	0	4 372 250	0	2 177 137
2047	0	81 434 363					0	81 434 363	0	8 392 260	0	4 048 380	0	1 979 215
2048	0	81 434 363					0	81 434 363	0	7 917 227	0	3 748 500	0	1 799 286
2049	0	81 434 363					0	81 434 363	0	7 469 082	0	3 470 833	0	1 635 715
2050	0	81 434 363					0	81 434 363	0	7 046 304	0	3 213 734	0	1 487 014
2051	0	81 434 363					0	81 434 363	0	6 647 456	0	2 975 680	0	1 351 830
2052	0	81 434 363					0	81 434 363	0	6 271 185	0	2 755 259	0	1 228 937
2053	0	81 434 363					0	81 434 363	0	5 916 212	0	2 551 166	0	1 117 215
2054	0	81 434 363					0	81 434 363	0	5 581 333	0	2 362 191	0	1 015 650
2055	0	81 434 363					0	81 434 363	0	5 265 408	0	2 187 214	0	923 318
2056	0	81 434 363					0	81 434 363	0	4 967 366	0	2 025 198	0	839 380
TOTAL	1 643 843 131	3 718 484 264					1 643 843 131	3 718 484 264	1 407 194 647	1 096 257 408	1 340 098 136	818 483 413	1 277 789 193	635 838 281

NET PRESENT COST

Discounted to 2008 at 6% 2 503 452 056
Discounted to 2008 at 8% 2 158 581 549
Discounted to 2008 at 10% 1 913 627 474