

## ANNEX C

### FINANCIAL AND ECONOMIC

# FEASIBILITY STUDY FOR KLIPVOOR

## ANNEX C : FINANCIAL AND ECONOMIC

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**Table C.1-1: Construction Costs and Disbursement Schedule for Case A and B**

**Klipvoor**

(Unit: ,000Rand)

Item	Total	1 1998	2 1999	3 2000	4 2001	5 2002
<b>Case A</b>	<b>76,625</b>	-	-	<b>6,364</b>	<b>38,628</b>	<b>31,633</b>
Bulk	54,604	-	-	17,618	27,126	9,860
- Intake and Pump Station	303	-	-	303	-	-
- Raw Water Pipeline	50	-	-	50	-	-
- WTW and Pump Station	4,950	-	-	2,475	2,475	-
- Bulk Supply Pipelines	44,186	-	-	13,256	22,093	8,837
- Regional Reservoirs	4,100	-	-	1,230	2,050	820
- Pump Stations	1,015	-	-	305	508	203
Retail	22,021	-	-	4,404	13,213	4,404
- Service Reservoir	5,435	-	-	1,087	3,261	1,087
- Reticulation Pipelines	15,882	-	-	3,176	9,529	3,176
- Standpipes	704	-	-	141	422	141
Yard Connection	-	-	-	-	-	-
<b>Case B</b>	<b>122,308</b>	-	-	<b>33,206</b>	<b>66,742</b>	<b>22,361</b>
Bulk	63,912	-	-	21,526	31,704	10,682
- Intake and Pump Station	454	-	-	454	-	-
- Raw Water Pipeline	50	-	-	50	-	-
- WTW and Pump Station	10,000	-	-	5,000	5,000	-
- Bulk Supply Pipelines	44,186	-	-	13,256	22,093	8,837
- Regional Reservoirs	7,700	-	-	2,310	3,850	1,540
- Pump Stations	1,522	-	-	457	761	304
Retail	42,438	-	-	8,488	25,463	8,488
- Service Reservoir	12,890	-	-	2,578	7,734	2,578
- Reticulation Pipelines	29,004	-	-	5,801	17,402	5,801
- Standpipes	544	-	-	109	326	109
Yard Connection	15,958	-	-	3,192	9,575	3,192
<b>Case B-A</b>	<b>45,683</b>	-	-	<b>11,183</b>	<b>26,404</b>	<b>8,096</b>
Bulk	9,308	-	-	3,908	4,579	821
- Intake and Pump Station	151	-	-	151	-	-
- Raw Water Pipeline	-	-	-	-	-	-
- WTW and Pump Station	5,050	-	-	2,525	2,525	-
- Bulk Supply Pipelines	-	-	-	-	-	-
- Regional Reservoirs	3,600	-	-	1,080	1,800	720
- Pump Stations	507	-	-	152	254	101
Retail	20,417	-	-	4,083	12,250	4,083
- Service Reservoir	7,455	-	-	1,491	4,473	1,491
- Reticulation Pipelines	13,122	-	-	2,624	7,873	2,624
- Standpipes	-	-	-	-	-	-
Yard Connection	15,958	-	-	3,192	9,575	3,192

Table C.1-2 Disbursement and Project Cost for Case A and B : Klipvoor

(Unit: ,000Rand)

Item				Total	1	2	3	4	5
					1995	1999	2000	2001	2002
Case A	Total			186,925	553	4,400	49,032	93,453	39,489
	Bulk	(1)Direct Construction Cost		54,604	-	-	17,618	27,126	9,860
		(2)P&G	(1)x 15%	8,191	-	-	2,643	4,069	1,479
		(3)Base Cost	(1)+(2)	62,795	-	-	20,261	31,194	11,339
		(4)Engineering Fee	(3)x 10%	6,279	-	1,570	1,570	1,570	1,570
		(5)Miscellaneous	(1)x 2%	1,092	-	546	546	-	-
		(6)Institutional Support	(3)x 2.5%	1,570	314	314	314	314	314
		(7)Sub-Total	(3)+(4)+(5)+(6)	71,736	314	2,430	22,691	33,078	13,223
		(8)Physical Contingency	(3)x 15%	9,419	-	-	3,039	4,679	1,701
		(9)Price Escalation(10%/a)	(7)+(8)x	35,693	31	510	8,517	17,523	9,111
		(10)Sub-Total	(8)+(9)	45,112	31	510	11,556	22,202	10,812
		Total	(7)+(10)	116,848	345	2,940	34,247	55,280	24,035
		VAT	14%	16,359	48	412	4,795	7,739	3,365
		Grand Total		133,207	394	3,352	39,041	63,020	27,400
	Retail	(1)Direct Construction Cost		22,021	-	-	4,404	13,213	4,404
		(2)P&G	(1)x 15%	3,303	-	-	661	1,982	661
		(3)Base Cost	(1)+(2)	25,324	-	-	5,065	15,194	5,065
		(4)Engineering Fee	(3)x 10%	2,532	-	633	633	633	633
		(5)Miscellaneous	(1)x 2%	-	-	-	-	-	-
		(6)Institutional Development	(3)x 2.5%	633	127	127	127	127	127
		(7)Sub-Total	(3)+(4)+(5)+(6)	28,490	127	760	5,825	15,954	5,825
		(8)Physical Contingency	(3)x 15%	3,799	-	-	760	2,279	760
		(9)Price Escalation(10%/a)	(7)+(8)x	14,833	13	160	2,179	8,462	4,020
		(10)Sub-Total	(8)+(9)	18,632	13	160	2,939	10,741	4,779
		Total	(7)+(10)	47,122	139	919	8,764	26,696	10,604
		VAT	14%	6,597	19	129	1,227	3,737	1,485
		Grand Total		53,719	159	1,048	9,991	30,433	12,089
Case B	Total			285,751	767	5,943	71,608	148,292	59,141
	Bulk	(1)Direct Construction Cost		63,912	-	-	21,526	31,704	10,682
		(2)P&G	(1)x 15%	9,587	-	-	3,229	4,756	1,602
		(3)Base Cost	(1)+(2)	73,499	-	-	24,755	36,460	12,284
		(4)Engineering Fee	(3)x 10%	7,350	-	1,837	1,837	1,837	1,837
		(5)Miscellaneous	(1)x 2%	1,278	-	639	639	-	-
		(6)Institutional Support	(3)x 2.5%	1,837	367	367	367	367	367
		(7)Sub-Total	(3)+(4)+(5)+(6)	83,964	367	2,844	27,599	38,665	14,489
		(8)Physical Contingency	(3)x 15%	11,025	-	-	3,713	5,469	1,843
		(9)Price Escalation(10%/a)	(7)+(8)x	41,451	37	597	10,365	20,482	9,970
		(10)Sub-Total	(8)+(9)	52,476	37	597	14,078	25,951	11,813
		Total	(7)+(10)	136,441	404	3,441	41,677	64,616	26,302
		VAT	14%	19,102	57	482	5,835	9,046	3,682
		Grand Total		155,542	461	3,923	47,512	73,662	29,984
	Retail	(1)Direct Construction Cost		42,438	-	-	8,488	25,463	8,488
		(2)P&G	(1)x 15%	6,366	-	-	1,273	3,819	1,273
		(3)Base Cost	(1)+(2)	48,804	-	-	9,761	29,282	9,761
		(4)Engineering Fee	(3)x 10%	4,880	-	1,220	1,220	1,220	1,220
		(5)Miscellaneous	(1)x 2%	-	-	-	-	-	-
		(6)Institutional Development	(3)x 2.5%	1,220	244	244	244	244	244
		(7)Sub-Total	(3)+(4)+(5)+(6)	54,904	244	1,464	11,225	30,746	11,225
		(8)Physical Contingency	(3)x 15%	7,321	-	-	1,464	4,392	1,464
		(9)Price Escalation(10%/a)	(7)+(8)x	28,587	24	307	4,200	16,308	7,747
		(10)Sub-Total	(8)+(9)	35,907	24	307	5,664	20,700	9,211
		Total	(7)+(10)	90,811	268	1,772	16,889	51,447	20,436
		VAT	14%	12,714	38	248	2,364	7,203	2,861
		Grand Total		103,525	306	2,020	19,253	58,649	23,297
	Yard Connection	(1)Direct Construction Cost		15,958	-	-	3,192	9,575	3,192
		(2)Price Escalation(10%/a)	(1)x	7,449	-	-	1,056	4,444	1,949
		Total	(1)+(2)	23,407	-	-	4,248	14,018	5,140
		VAT	14%	3,277	-	-	595	1,963	720
		Grand Total		26,684	-	-	4,843	15,981	5,860
Case B-A	Bulk			22,336	67	571	8,471	10,642	2,584
	Retail			49,806	147	972	9,263	28,216	11,208
	Yard Connection			26,684	-	-	4,843	15,981	5,860
	Total			98,825	214	1,543	22,576	54,840	19,652

Table C.1-3 : Annual Operation and Maintenance Cost for Case A and B : Klipvoor

(Case A) Annual Water Production : 1,257,257 kl (Unit: 000Rand)

Item	Bulk Water Supply						Retail Supply	Total
	Raw Water	Electricity	Chemicals	Salaries	Maintenance	Sub-Total	Administration	
Unit Cost	0.17 R/kl	0.15 R/kl	0.05 R/kl	0.17 R/kl	0.05 R/kl		342,300 R/year	
Escalation	0%	3%	0%	0%	0%		0%	
Year								
5	213.73	218.63	62.86	213.73	62.86	771.82	342.30	1,114.12
6	213.73	225.18	62.86	213.73	62.86	778.38	342.30	1,120.68
7	213.73	231.94	62.86	213.73	62.86	785.13	342.30	1,127.43
8	213.73	238.90	62.86	213.73	62.86	792.09	342.30	1,134.39
9	213.73	246.07	62.86	213.73	62.86	799.26	342.30	1,141.56
10	213.73	253.45	62.86	213.73	62.86	806.64	342.30	1,148.94
11	213.73	261.05	62.86	213.73	62.86	814.24	342.30	1,156.54
12	213.73	268.88	62.86	213.73	62.86	822.08	342.30	1,164.38
13	213.73	276.95	62.86	213.73	62.86	830.14	342.30	1,172.44
14	213.73	285.26	62.86	213.73	62.86	838.45	342.30	1,180.75
15	213.73	293.81	62.86	213.73	62.86	847.01	342.30	1,189.31
16	213.73	302.63	62.86	213.73	62.86	855.82	342.30	1,198.12
17	213.73	311.71	62.86	213.73	62.86	864.90	342.30	1,207.20
18	213.73	321.06	62.86	213.73	62.86	874.25	342.30	1,216.55
19	213.73	330.69	62.86	213.73	62.86	883.88	342.30	1,226.18
20	213.73	340.61	62.86	213.73	62.86	893.80	342.30	1,236.10
21	213.73	350.83	62.86	213.73	62.86	904.02	342.30	1,246.32
22	213.73	361.36	62.86	213.73	62.86	914.55	342.30	1,256.85
23	213.73	372.20	62.86	213.73	62.86	925.39	342.30	1,267.69
24	213.73	383.36	62.86	213.73	62.86	936.55	342.30	1,278.85
25	213.73	394.86	62.86	213.73	62.86	948.06	342.30	1,290.36
26	213.73	406.71	62.86	213.73	62.86	959.90	342.30	1,302.20
27	213.73	418.91	62.86	213.73	62.86	972.10	342.30	1,314.40
28	213.73	431.48	62.86	213.73	62.86	984.67	342.30	1,326.97
29	213.73	444.42	62.86	213.73	62.86	997.61	342.30	1,339.91
30	213.73	457.75	62.86	213.73	62.86	1,010.95	342.30	1,353.25

(Case B)

Annual Water Production : 3,352,686 kl (Unit: 000Rand)

Item	Bulk Water Supply						Retail Supply	Total
	Raw Water	Electricity	Chemicals	Salaries	Maintenance	Sub-Total	Administration	
Unit Cost	0.17 R/kl	0.15 R/kl	0.05 R/kl	0.17 R/kl	0.05 R/kl		695,100 R/year	
Escalation	0%	3%	0%	0%	0%		0%	
Year								
5	569.96	583.00	167.63	569.96	167.63	2,058.18	695.10	2,753.28
6	569.96	600.49	167.63	569.96	167.63	2,075.67	695.10	2,770.77
7	569.96	618.51	167.63	569.96	167.63	2,093.69	695.10	2,788.79
8	569.96	637.06	167.63	569.96	167.63	2,112.24	695.10	2,807.34
9	569.96	656.17	167.63	569.96	167.63	2,131.36	695.10	2,826.46
10	569.96	675.86	167.63	569.96	167.63	2,151.04	695.10	2,846.14
11	569.96	696.14	167.63	569.96	167.63	2,171.32	695.10	2,866.42
12	569.96	717.02	167.63	569.96	167.63	2,192.20	695.10	2,887.30
13	569.96	738.53	167.63	569.96	167.63	2,213.71	695.10	2,908.81
14	569.96	760.69	167.63	569.96	167.63	2,235.87	695.10	2,930.97
15	569.96	783.51	167.63	569.96	167.63	2,258.69	695.10	2,953.79
16	569.96	807.01	167.63	569.96	167.63	2,282.19	695.10	2,977.29
17	569.96	831.22	167.63	569.96	167.63	2,306.40	695.10	3,001.50
18	569.96	856.16	167.63	569.96	167.63	2,331.34	695.10	3,026.44
19	569.96	881.84	167.63	569.96	167.63	2,357.03	695.10	3,052.13
20	569.96	908.30	167.63	569.96	167.63	2,383.48	695.10	3,078.58
21	569.96	935.55	167.63	569.96	167.63	2,410.73	695.10	3,105.83
22	569.96	963.61	167.63	569.96	167.63	2,438.80	695.10	3,133.90
23	569.96	992.52	167.63	569.96	167.63	2,467.70	695.10	3,162.80
24	569.96	1,022.30	167.63	569.96	167.63	2,497.48	695.10	3,192.58
25	569.96	1,052.97	167.63	569.96	167.63	2,528.15	695.10	3,223.25
26	569.96	1,084.56	167.63	569.96	167.63	2,559.74	695.10	3,254.84
27	569.96	1,117.09	167.63	569.96	167.63	2,592.27	695.10	3,287.37
28	569.96	1,150.61	167.63	569.96	167.63	2,625.79	695.10	3,320.89
29	569.96	1,185.12	167.63	569.96	167.63	2,660.31	695.10	3,355.41
30	569.96	1,220.68	167.63	569.96	167.63	2,695.86	695.10	3,390.96

**Table C.1-4: Different Local Structure Models (Retail Supply)**

Service Level A		
	Structure Model 1	Structure Model 2
Size	<u>Small Community</u> : e.g. 350 Households 2100 People	<u>Medium</u> : e.g. 800 Households 4800 People
Mngt.	Water Committee: - Chair person - Vice Chair - Secretary - Treasurer	Water Committee: - Chair person - Vice Chair - Secretary - Vice Secretary - Treasurer
Staff	Water Bailiff (x 2)  • Part-time employee/s. • Functions may be combined.	Bookkeeper / Administrator Water Bailiff (x 2)  • Part-time employee/s.
Service Level B		
	Structure Model 3	Structure Model 4
Size	<u>Small Community</u> : e.g. 350 Households 2100 People	<u>Medium</u> : e.g. 800 Households 4800 People
Mngt.	Water Committee: - Chair person - Vice Chair - Secretary - Treasurer	Water Committee: - Chair person - Vice Chair - Secretary - Vice Secretary - Treasurer
Staff	Pipe / Meter Maintenance (x1) Meter Readers / Collection Officers (x 2)  • Some permanent positions. • Functions may be combined.	Bookkeeper / Administrator (x1) Pipe / Meter Maintenance (x2) Meter Readers / Collect. Officers (x 2)  • Some permanent positions.

**Table C.1-5: Costing of Alternative Structure Models / Options**

<b>Stipend / Employment Cost per Position</b>		
<b>Role / Position</b>	<b>Cost ( R )</b>	
	<b>Monthly</b>	<b>Annually</b>
<b>Water Committee:</b>		
Chairperson	75	900
Vice Chairperson	75	900
Secretary	75	900
Vice Secretary	75	900
Treasurer	75	900
Bookkeeper / Cashier (Part-time)	500	6000
Bookkeeper / Cashier (Full-time)	2000	24000
Operator (Valves, pumps, plant)(Part-time)	450	5400
Maintenance Worker (Part-time)	450	5400
Collections / Water Bailiff (Part-time)	200	2400

<b>Application of Costs per Position to Structure Models</b>		
<b>Organisational Model</b>	<b>Cost ( R )</b>	
	<b>Monthly</b>	<b>Annually</b>
<b>Model 1:</b> Service Level A Small Community	700	8,400
<b>Model 2:</b> Service Level A Medium Community	1,275	15,300
<b>Model 3:</b> Service Level B Small Community	1,150	13,800
<b>Model 4:</b> Service Level B Medium Community	3,675	44,100

**Table C.1-6 : Administration Cost For Retail Supply : Klipvoor**

Settlement/ Community	Calculated Population	Service Level A		Service Level B	
		Cost (R)		Cost (R)	
		Monthly	Annual	Monthly	Annual
1 Dipelloana	1,700	700	8,400	1,150	13,800
2 Makekeng	6,528	1,275	15,300	3,675	44,100
3 Makgapha	1,088	700	8,400	1,150	13,800
4 Mogohlwaneng incl. Olverton	6,147	1,275	15,300	3,675	44,100
5 Renostervlei	1,020	700	8,400	1,150	13,800
6 Selepe	653	700	8,400	1,150	13,800
7 Ngobi	8,541	1,275	15,300	3,675	44,100
8 Swaartboom	3,638	700	8,400	1,150	13,800
9 Transaksie	2,067	700	8,400	1,150	13,800
<b>Sub-Total of Moretele North</b>	<b>31,382</b>	<b>8,025</b>	<b>96,300</b>	<b>17,925</b>	<b>215,100</b>
10 Ga-Tsogwe	1,088	700	8,400	1,150	13,800
11 Fafung	4,488	700	8,400	1,150	13,800
12 Ga-Rasai	1,088	700	8,400	1,150	13,800
13 Ga-Tsefoge	1,734	700	8,400	1,150	13,800
14 Kgomo-Kgomo	1,047	700	8,400	1,150	13,800
15 Legonyane	4,352	700	8,400	1,150	13,800
16 Sephai	1,292	700	8,400	1,150	13,800
<b>Sub-Total of Klipvoor West</b>	<b>15,089</b>	<b>4,900</b>	<b>58,800</b>	<b>8,050</b>	<b>96,600</b>
17 Bollantlokwe	1,768	700	8,400	1,150	13,800
18 Dikebu incl. Ranteberg	13,600	1,275	15,300	3,675	44,100
19 Lebotlwane North	19,040	1,275	15,300	3,675	44,100
20 Little	2,720	700	8,400	1,150	13,800
21 Mokobyane	1,768	700	8,400	1,150	13,800
22 Rabosula	653	700	8,400	1,150	13,800
23 Sutelong Agricultural	6,392	1,275	15,300	3,675	44,100
24 Tlholwe	1,700	700	8,400	1,150	13,800
25 Dikgophaneng	510	700	8,400	1,150	13,800
26 Makgabellwane	4,420	700	8,400	1,150	13,800
27 Moiletswane/Buffelsdoorn	5,250	1,275	15,300	3,675	44,100
28 Slagboom	2,380	700	8,400	1,150	13,800
29 Shakung	3,060	700	8,400	1,150	13,800
30 Ga-Hadebi	2,380	700	8,400	1,150	13,800
31 Modiane	272	700	8,400	1,150	13,800
32 Ga-Moti	54	700	8,400	1,150	13,800
33 Garantlapane	136	700	8,400	1,150	13,800
34 Botshabelo	884	700	8,400	1,150	13,800
35 Diponpong	1,360	700	8,400	1,150	13,800
<b>Sub-Total of Klipvoor East</b>	<b>68,347</b>	<b>15,600</b>	<b>187,200</b>	<b>31,950</b>	<b>383,400</b>
<b>TOTAL</b>	<b>114,818</b>	<b>28,525</b>	<b>342,300</b>	<b>57,925</b>	<b>695,100</b>



**Table C.1-7 : Preliminary Tariff Setting for Case A and B  
Klipvoor**

**Bulk Water Tariff**

	Annual Production (KL)	O&M Cost ('000R)	Reserve for Replacement ('000R)	Loan Repayment ('000R)	Total ('000R)	Bulk Tariff (Unit Cost) (R/KL)
	(1)	(2)	(3)	(4)	(5)= (2)+(3)+(4)	(6)=(5)/(1)
Case A	1,257,257	778.38	146.25	0	924.63	0.74
Case B	3,352,686	2075.67	279.44	1931.06	4286.17	1.28

**Retail Water Tariff**

	Annual Water Sales (KL)	Bulk Water Purchase ('000R)	O&M Cost ('000R)	Loan Repayment ('000R)	Total ('000R)	Retail Tariff (Unit Cost) (R/KL)
	(7)	(8)=(1)x(6)	(9)	(10)	(11)= (8)+(9)+(10)	(12)=(11)/(12)
Case A	1,068,669	924.63	342.30	0	1266.93	1.19
Case B	2,849,783	4286.17	695.10	6242.87	11224.14	3.94

	Consumption		Monthly Tariff		Share of Income	
	Average	Low-Income	Average	Low-Income	Average	Low-Income
	(kl/m/hh)	(kl/m/hh)	(R/m/hh)	(R/m/hh)	1,167R/m	332R/m
	(13)	(14)	(15)=(12)x(13)	(16)=(12)x(14)	(15)/1,167	(16)/332
Case A	5.10	5.10	6.05	6.05	0.5%	1.8%
Case B	13.87	5.10	54.64	20.09	4.7%	6.1%

Reserve for Replacement : Replacement Cost for Pumps, Interest Rate (Deposit)5%, 15years  
Loan Repayment : Interest rate 8%, 20years equal repayment

Table C.1-8 : Disbursement Schedule and Project Cost for Case C : Klipvoor

Table C.1.6 : Disbursement Schedule and Project Cost for Case C

(Unit: 000Ranc)

Item	Stage Year	STAGE 1 (Service Level A)					STAGE 2 (Upgrade)							Sub-Total	Total
		1	2	3	4	5	6	7	8	9	10				
		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007				
<b>Case C Total</b>		<b>553</b>	<b>4,400</b>	<b>49,032</b>	<b>93,453</b>	<b>39,489</b>	<b>186,925</b>	<b>345</b>	<b>2,485</b>	<b>36,360</b>	<b>88,320</b>	<b>31,649</b>	<b>159,159</b>	<b>346,084</b>	
Bulk															
(1) Direct Construction Cost															
(2) P&G	(1) x 15%	-	-	17,618	27,126	9,860	54,604	-	3,908	4,579	-	821	9,308	63,912	
(3) Base Cost	(1)+(2)	-	-	2,643	4,069	1,479	8,191	-	586	687	-	123	1,396	9,587	
(4) Engineering Fee	(3) x 10%	-	-	20,261	31,194	11,339	62,795	-	4,494	5,265	-	945	10,704	73,499	
(5) Miscellaneous	(4) x 2%	-	1,570	1,570	1,570	1,570	6,279	-	268	268	-	268	1,070	7,350	
(6) Institutional Support	(5) x 2.5%	314	314	314	314	314	1,570	-	93	93	-	54	186	1,278	
(7) Sub-Total	(3)+(4)+(5)+(6)	314	2,430	22,691	33,078	13,223	71,736	54	414	5,586	-	1,266	12,228	83,964	
(8) Physical Contingency	(7) x 15%	-	-	3,039	4,679	1,701	9,419	-	674	790	-	142	1,606	11,025	
(9) Price Escalation(10%/a)	(7)+(8) x	31	510	8,517	17,523	9,111	35,693	41	393	8,659	2,243	17,720	53,413	64,438	
(10) Sub-Total	(8)+(9)	31	510	11,556	22,202	10,812	45,112	41	393	9,448	2,385	19,326	51,554	64,438	
Total	(7)+(10)	345	2,940	34,247	55,280	24,035	116,848	95	807	11,967	15,035	3,651	31,554	148,402	
VAT	14%	48	412	4,795	7,739	3,365	16,359	13	113	1,675	2,105	511	4,418	20,776	
<b>Grand Total</b>		<b>394</b>	<b>3,352</b>	<b>39,041</b>	<b>63,020</b>	<b>27,400</b>	<b>133,207</b>	<b>108</b>	<b>920</b>	<b>13,642</b>	<b>17,140</b>	<b>4,162</b>	<b>35,972</b>	<b>169,178</b>	
Retail															
(1) Direct Construction Cost															
(2) P&G	(1) x 15%	-	-	4,404	13,213	4,404	22,021	-	4,083	12,250	-	4,083	20,417	42,438	
(3) Base Cost	(1)+(2)	-	-	661	1,982	661	3,303	-	613	1,838	-	613	3,063	6,366	
(4) Engineering Fee	(3) x 10%	-	-	5,065	15,194	5,065	25,324	-	4,696	14,088	-	4,696	23,480	48,804	
(5) Miscellaneous	(4) x 2%	-	633	633	633	633	2,532	-	587	587	-	587	2,348	4,880	
(6) Institutional Development	(5) x 2.5%	-	-	-	-	-	-	-	-	-	-	-	-	-	
(7) Sub-Total	(3)+(4)+(5)+(6)	127	127	127	127	127	633	117	117	117	-	117	587	1,220	
(8) Physical Contingency	(7) x 15%	-	-	5,825	15,954	5,825	28,490	-	5,400	14,792	-	5,400	26,414	54,904	
(9) Price Escalation(10%/a)	(7)+(8) x	13	160	2,179	8,462	4,020	14,833	91	704	2,113	704	704	3,522	7,321	
(10) Sub-Total	(8)+(9)	13	160	2,939	10,741	4,779	18,632	91	668	6,981	9,729	9,729	40,426	55,259	
Total	(7)+(10)	139	919	8,764	26,696	10,604	47,122	208	1,373	13,086	15,834	10,434	43,948	62,580	
VAT	14%	19	129	1,227	3,737	1,485	6,597	29	192	1,832	5,581	2,217	9,851	16,448	
<b>Grand Total</b>		<b>159</b>	<b>1,048</b>	<b>9,991</b>	<b>30,433</b>	<b>12,089</b>	<b>53,719</b>	<b>237</b>	<b>1,565</b>	<b>14,918</b>	<b>45,442</b>	<b>18,051</b>	<b>80,213</b>	<b>133,932</b>	
Yard															
(1) Direct Construction Cost															
(2) Price Escalation(10%/a)	(1) x	-	-	-	-	-	-	-	3,192	9,575	-	3,192	15,958	15,958	
Total	(1)+(2)	-	-	-	-	-	-	-	3,650	13,002	-	5,087	21,739	21,739	
VAT	14%	-	-	-	-	-	-	-	6,841	22,577	-	8,278	37,697	37,697	
<b>Grand Total</b>		<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>958</b>	<b>3,161</b>	<b>1,159</b>	<b>5,278</b>	<b>5,278</b>	<b>5,278</b>	

Table C.1-9: Project Cost and Allocation for Case C : Klipvoor

(Unit: ,000Rand)

Item		Project Cost		Stage 1 (RDP Grant)		Stage 2 (Loan/Own Fund)	
<b>Total</b>		<b>346,084</b>	<b>100.0%</b>	<b>186,925</b>	<b>100.0%</b>	<b>159,159</b>	<b>100.0%</b>
<b>Bulk Supply</b>	(1)Direct Construction Cost	63,912	(43.1%)	54,604	(46.7%)	9,308	(29.5%)
	(2)P&G	9,587	(6.5%)	8,191	(7.0%)	1,396	(4.4%)
	(3)Base Cost	73,499	(49.5%)	62,795	(53.7%)	10,704	(33.9%)
	(4)Engineering Fee	7,350	(5.0%)	6,279	(5.4%)	1,070	(3.4%)
	(5)Miscellaneous	1,278	(0.9%)	1,092	(0.9%)	186	(0.6%)
	(6)Institutional Support	1,837	(1.2%)	1,570	(1.3%)	268	(0.8%)
	(7)Sub-Total	83,964	(56.6%)	71,736	(61.4%)	12,228	(38.8%)
	(8)Physical Contingency	11,025	(7.4%)	9,419	(8.1%)	1,606	(5.1%)
	(9)Price Escalation(10%/a)	53,413	(36.0%)	35,693	(30.5%)	17,720	(56.2%)
	(10)Sub-Total	64,438	(43.4%)	45,112	(38.6%)	19,326	(61.2%)
	Total	148,402	(100.0%)	116,848	(100.0%)	31,554	(100.0%)
	VAT	20,776		16,359		4,418	
	<b>Grand Total</b>	<b>169,178</b>	<b>48.9%</b>	<b>133,207</b>	<b>71.3%</b>	<b>35,972</b>	<b>22.6%</b>
<b>Retail Supply</b>	(1)Direct Construction Cost	42,438	(36.1%)	22,021	(46.7%)	20,417	(29.0%)
	(2)P&G	6,366	(5.4%)	3,303	(7.0%)	3,063	(4.4%)
	(3)Base Cost	48,804	(41.5%)	25,324	(53.7%)	23,480	(33.4%)
	(4)Engineering Fee	4,880	(4.2%)	2,532	(5.4%)	2,348	(3.3%)
	(5)Miscellaneous	-	(0.0%)	-	(0.0%)	-	(0.0%)
	(6)Institutional Development	1,220	(1.0%)	633	(1.3%)	587	(0.8%)
	(7)Sub-Total	54,904	(46.7%)	28,490	(60.5%)	26,414	(37.5%)
	(8)Physical Contingency	7,321	(6.2%)	3,799	(8.1%)	3,522	(5.0%)
	(9)Price Escalation(10%/a)	55,259	(47.0%)	14,833	(31.5%)	40,426	(57.5%)
	(10)Sub-Total	62,580	(53.3%)	18,632	(39.5%)	43,948	(62.5%)
	Total	117,484	(100.0%)	47,122	(100.0%)	70,362	(100.0%)
	VAT	16,448		6,597		9,851	
	<b>Grand Total</b>	<b>133,932</b>	<b>38.7%</b>	<b>53,719</b>	<b>28.7%</b>	<b>80,213</b>	<b>50.4%</b>
<b>Yard Connection</b>	(1)Direct Construction Cost	15,958	(42.3%)	-		15,958	(42.3%)
	(2)Price Escalation(10%/a)	21,739	(57.7%)	-		21,739	(57.7%)
	Total	37,697	(100.0%)	-		37,697	(100.0%)
	VAT	5,278		-		5,278	
<b>Grand Total</b>		<b>42,974</b>	<b>12.4%</b>	<b>-</b>	<b>0.0%</b>	<b>42,974</b>	<b>27.0%</b>

	Project Cost		Stage 1 (RDP Grant)		Stage 2 (Loan/Own Fund)	
<b>Bulk Supply</b>	169,178	100.0%	133,207	78.7%	35,972	21.3%
<b>Retail Supply</b>	133,932	100.0%	53,719	40.1%	80,213	59.9%
<b>Yard Connection</b>	42,974	100.0%	-	0.0%	42,974	100.0%
<b>Total</b>	<b>346,084</b>	<b>100.0%</b>	<b>186,925</b>	<b>54.0%</b>	<b>159,159</b>	<b>46.0%</b>

Table C.1-10 : Project Costs for Case A and B at 1997 Price : Klipvoor

(Unit: ,000Rand)

Item				Year	1	2	3	4	5
				Total	1998	1999	2000	2001	2002
Case A Total				129,326	502	3,636	36,838	63,829	24,519
Bulk	(1)Direct Construction Cost			54,604	-	-	17,618	27,126	9,860
	(2)P&G	(1)x 15%		8,191	-	-	2,643	4,069	1,479
	(3)Base Cost	(1)+(2)		62,795	-	-	20,261	31,194	11,339
	(4)Engineering Fee	(3)x 10%		6,279	-	1,570	1,570	1,570	1,570
	(5)Miscellaneous	(1)x 2%		1,092	-	546	546	-	-
	(6)Institutional Support	(3)x 2.5%		1,570	314	314	314	314	314
	(7)Sub-Total	(3)+(4)+(5)+(6)		71,736	314	2,430	22,691	33,078	13,223
	(8)Physical Contingency	(3)x 15%		9,419	-	-	3,039	4,679	1,701
	Total	(7)+(8)		81,155	314	2,430	25,730	37,757	14,924
	VAT	14%		11,362	44	340	3,602	5,286	2,089
	Grand Total			92,517	358	2,770	29,332	43,043	17,013
Retail	(1)Direct Construction Cost			22,021	-	-	4,404	13,213	4,404
	(2)P&G	(1)x 15%		3,303	-	-	661	1,982	661
	(3)Base Cost	(1)+(2)		25,324	-	-	5,065	15,194	5,065
	(4)Engineering Fee	(3)x 10%		2,532	-	633	633	633	633
	(5)Miscellaneous			-	-	-	-	-	-
	(6)Institutional Development	(3)x 2.5%		633	127	127	127	127	127
	(7)Sub-Total	(3)+(4)+(5)+(6)		28,490	127	760	5,825	15,954	5,825
	(8)Physical Contingency	(3)x 15%		3,799	-	-	760	2,279	760
	Total	(7)+(8)		32,288	127	760	6,584	18,233	6,584
	VAT	14%		4,520	18	106	922	2,553	922
	Grand Total			36,809	144	866	7,506	20,786	7,506
Case B Total				197,416	697	4,911	53,800	101,286	36,722
Bulk	(1)Direct Construction Cost			63,912	-	-	21,526	31,704	10,682
	(2)P&G	(1)x 15%		9,587	-	-	3,229	4,756	1,602
	(3)Base Cost	(1)+(2)		73,499	-	-	24,755	36,460	12,284
	(4)Engineering Fee	(3)x 10%		7,350	-	1,837	1,837	1,837	1,837
	(5)Miscellaneous	(1)x 2%		1,278	-	639	639	-	-
	(6)Institutional Support	(3)x 2.5%		1,837	367	367	367	367	367
	(7)Sub-Total	(3)+(4)+(5)+(6)		83,964	367	2,844	27,599	38,665	14,489
	(8)Physical Contingency	(3)x 15%		11,025	-	-	3,713	5,469	1,843
	Total	(7)+(8)		94,989	367	2,844	31,313	44,134	16,331
	VAT	14%		13,298	51	398	4,384	6,179	2,286
	Grand Total			108,288	419	3,242	35,697	50,312	18,618
Retail	(1)Direct Construction Cost			42,438	-	-	8,488	25,463	8,488
	(2)P&G	(1)x 15%		6,366	-	-	1,273	3,819	1,273
	(3)Base Cost	(1)+(2)		48,804	-	-	9,761	29,282	9,761
	(4)Engineering Fee	(3)x 10%		4,880	-	1,220	1,220	1,220	1,220
	(5)Miscellaneous			-	-	-	-	-	-
	(6)Institutional Development	(3)x 2.5%		1,220	244	244	244	244	244
	(7)Sub-Total	(3)+(4)+(5)+(6)		54,904	244	1,464	11,225	30,746	11,225
	(8)Physical Contingency	(3)x 15%		7,321	-	-	1,464	4,392	1,464
	Total	(7)+(8)		62,225	244	1,464	12,689	35,139	12,689
	VAT	14%		8,711	34	205	1,776	4,919	1,776
	Grand Total			70,936	278	1,669	14,465	40,058	14,465
Yard Connection	(1)Direct Construction Cost			15,958	-	-	3,192	9,575	3,192
	VAT	14%		2,234	-	-	447	1,340	447
	Grand Total			18,192	-	-	3,638	10,915	3,638
Case C (Cost for Up-Grading)				Year	6	7	8	9	10
					2003	2004	2005	2006	2007
Bulk				15,771	61	472	6,364	7,269	1,604
Retail				34,128	134	803	6,959	19,272	6,959
Yard Connection				18,192	-	-	3,638	10,915	3,638
Total				68,090	195	1,275	16,962	37,456	12,202

Table C.1-11: Project Cost and Allocation for Case C at 1997 Price : Klipvoor

(Unit: ,000Rand)

Item		Project Cost		Stage 1 (RDP Grant)		Stage 2 (Loan/Own Fund)	
<b>Total</b>		197,416	100.0%	129,326	100.0%	68,090	100.0%
<b>Bulk Supply</b>	(1)Direct Construction Cost	63,912	(67.3%)	54,604	(67.3%)	9,308	(67.3%)
	(2)P&G	9,587	(10.1%)	8,191	(10.1%)	1,396	(10.1%)
	(3)Base Cost	73,499	(77.4%)	62,795	(77.4%)	10,704	(77.4%)
	(4)Engineering Fee	7,350	(7.7%)	6,279	(7.7%)	1,070	(7.7%)
	(5)Miscellaneous	1,278	(1.3%)	1,092	(1.3%)	186	(1.3%)
	(6)Institutional Support	1,837	(1.9%)	1,570	(1.9%)	268	(1.9%)
	(7)Sub-Total	83,964	(88.4%)	71,736	(88.4%)	12,228	(88.4%)
	(8)Physical Contingency	11,025	(11.6%)	9,419	(11.6%)	1,606	(11.6%)
	<b>Total</b>	94,989	(100.0%)	81,155	(100.0%)	13,834	(100.0%)
	<b>VAT</b>	13,298		11,362		1,937	
<b>Grand Total</b>		108,288	54.9%	92,517	71.5%	15,771	23.2%
<b>Retail Supply</b>	(1)Direct Construction Cost	42,438	(68.2%)	22,021	(68.2%)	20,417	(68.2%)
	(2)P&G	6,366	(10.2%)	3,303	(10.2%)	3,063	(10.2%)
	(3)Base Cost	48,804	(78.4%)	25,324	(78.4%)	23,480	(78.4%)
	(4)Engineering Fee	4,880	(7.8%)	2,532	(7.8%)	2,348	(7.8%)
	(5)Miscellaneous	-	(0.0%)	-	(0.0%)	-	(0.0%)
	(6)Institutional Development	1,220	(2.0%)	633	(2.0%)	587	(2.0%)
	(7)Sub-Total	54,904	(88.2%)	28,490	(88.2%)	26,414	(88.2%)
	(8)Physical Contingency	7,321	(11.8%)	3,799	(11.8%)	3,522	(11.8%)
	<b>Total</b>	62,225	(100.0%)	32,288	(100.0%)	29,936	(100.0%)
	<b>VAT</b>	8,711		4,520		4,191	
<b>Grand Total</b>		70,936	35.9%	36,809	28.5%	34,128	50.1%
<b>Yard Connection</b>	(1)Direct Construction Cost	15,958		-		15,958	
	<b>VAT</b>	2,234		-		2,234	
	<b>Grand Total</b>	18,192	9.2%	-	0.0%	18,192	26.7%

		Project Cost		Stage 1 (RDP Grant)		Stage 2 (Loan/Own Fund)	
<b>Bulk Supply</b>		108,288	100.0%	92,517	85.4%	15,771	14.6%
<b>Retail Supply</b>		70,936	100.0%	36,809	51.9%	34,128	48.1%
<b>Yard Connection</b>		18,192	100.0%	-	0.0%	18,192	100.0%
<b>Total</b>		197,416	100.0%	129,326	65.5%	68,090	34.5%

<b>Stage 1</b>	<b>Bulk Supply</b>	1st Tier	92,517	71.5%	46.9%	<b>1st Tier</b>	129,326 65.5%
	<b>Retail Supply</b>	1st Tier	36,809	28.5%	18.6%		
	<b>Total</b>		129,326	100.0%	65.5%		
<b>Stage 2</b>	<b>Bulk Supply</b>	2nd Tier	15,771	23.2%	8.0%	<b>2nd Tier</b>	15,771 8.0%
	<b>Retail Supply</b>	3rd Tier	34,128	50.1%	17.3%		
	<b>Yard Connection</b>	3rd Tier	18,192	26.7%	9.2%		
	<b>Total</b>		68,090	100.0%	34.5%		52,320 26.5%
<b>Total</b>			197,416		100.0%		

Table C.2-1: Cash Flow Analysis for Bulk Supply (Case C) at 1997 Price : Klipvoor

Table C-2.1: Cash Flow Analysis for Dam Supply (Case 2)																
Water Demand and Tariff Forecast	Year	(12)														
		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
A. Service Level																
B. Water Demand																
b-1) Population																
b-2) Consumption	30 LCD															
b-3) Water Demand (WADD)	b-1) x b-2) XL/a															
b-4) Water Demand (SPDD)	b-3) x 1.5 XL/a															
b-5) Annual Water Production	b-3) x 365 XL/a															
C. Bulk Water Tariff	R/KL															
Income Statements (1,000R)																
D. Revenue																
d-1) Water Sales	C x b-5															
d-2) Revenue Total																
E. Expenses																
e-1) Raw Water Cost	(Unit Cost) 0.17 R/KL															
e-2) O&M Cost	(Real Escalation) x b-5)															
-Power	3%															
-Chemical	0.15 R/KL															
-Salaries	0.05 R/KL															
-Maintenance Cost and other	0.17 R/KL															
e-3) Expenses Total	0.05 R/KL															
e-1)+e-2)																
Net Operating Income																
Cash Flow Statements (1,000R)																
F. Inflow																
f-1) Net Operating Income																
f-2) Grant (RDP Fund)		358	2,770	29,332	43,043		17,013									
f-3) Loan							61	472	6,364	7,269	1,604					
f-4) Interest Generated	5%						5	13	20	27	34	42	51	61	69	
f-5) Inflow Total		358	2,770	29,332	43,043		17,119	206	617	6,510	7,415	1,750	2,128	2,117	2,105	2,092
G. Outflow																
g-1) CAPEX+Replacement		358	2,770	29,332	43,043		17,013	61	472	6,364	7,269	1,604				
g-2) Loan Repayment (CAPEX)													1,931	1,931	1,931	
g-3) Short Term Loan Interest	7%															
g-4) Outflow Total		358	2,770	29,332	43,043		17,013	61	472	6,364	7,269	1,604	1,931	1,931	1,931	
Surplus		0	0	0	0	0	106	145	148	146	146	146	186	174	160	
cum.		0	0	0	0	0	106	251	396	542	687	833	1,030	1,216	1,390	1,550
Loan outstanding																
Principal	20 years															
Interest	8%															
Total																

Table C.2-1: Cash Flow Analysis for Bulk (Case C) at 1997 Price : Klipvoor (cont'd)

Water Demand and Tariff Forecast	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Service Level B																
A. Service Level																
B. Water Demand																
b-1) Population	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818
b-2) Consumption	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185
b-3) Water Demand (AADD)	13,778	13,778	13,778	13,778	13,778	13,778	13,778	13,778	13,778	13,778	13,778	13,778	13,778	13,778	13,778	13,778
b-4) Water Demand (SPDD)	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686
b-5) Annual Water Production	1,27	1,31	1,31	1,31	1,31	1,31	1,31	1,35	1,35	1,35	1,35	1,39	1,39	1,39	1,39	1,39
C. Bulk Water Tariff																
D. Revenue																
d-1) Water Sales	4,258	4,392	4,392	4,392	4,392	4,392	4,526	4,526	4,526	4,526	4,526	4,660	4,660	4,660	4,660	4,660
d-2) Revenue Total	4,258	4,392	4,392	4,392	4,392	4,392	4,526	4,526	4,526	4,526	4,526	4,660	4,660	4,660	4,660	4,660
E. Expenses																
e-1) Raw Water Cost	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570
e-2) O&M Cost	1,689	1,712	1,736	1,761	1,787	1,814	1,841	1,869	1,898	1,928	1,958	1,990	2,022	2,056	2,090	2,126
-Power	784	807	831	856	882	908	936	964	993	1,022	1,053	1,085	1,117	1,151	1,185	1,221
-Chemical	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168
-Salaries	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570
-Maintenance Cost and other	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168
e-3) Expenses Total	2,259	2,282	2,306	2,331	2,357	2,383	2,411	2,439	2,468	2,497	2,528	2,560	2,592	2,626	2,660	2,696
Net Operating Income	1,999	2,110	2,086	2,061	2,035	2,009	2,115	2,087	2,058	2,029	1,998	2,100	2,068	2,034	2,000	1,964
F. Inflow																
f-1) Net Operating Income	1,999	2,110	2,086	2,061	2,035	2,009	2,115	2,087	2,058	2,029	1,998	2,100	2,068	2,034	2,000	1,964
f-2) Grant (RDP Fund)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
f-3) Loan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
f-4) Interest Generated	78	85	98	111	123	134	146	158	169	181	193	205	217	229	241	253
f-5) Inflow Total	2,077	2,195	2,184	2,171	2,158	2,142	2,150	2,133	2,114	2,094	2,071	2,100	2,068	2,034	2,000	1,966
G. Outflow																
g-1) CAPEX-Replacement	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931
g-2) Loan Repayment (CAPEX)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
g-3) Short Term Loan Interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
g-4) Outflow Total	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931	1,931
Surplus	146	264	253	240	227	212	219	202	183	163	143	142	119	84	66	38
cum.	1,696	1,960	2,212	2,452	2,679	2,891	3,100	3,308	3,516	3,724	3,932	4,140	4,348	4,556	4,764	4,972
Loan outstanding																
Principal																
Interest																
Total																

**Table C.2-2: Cash Flow Analysis for Retail Supply (Case C-1) at 1997 Price: Klipvoor**

Water Demand and Tariff Forecast	Year													
	0	1	2	3	4	5	6	7	8	9	10	11	12	13
<b>A. Service Level</b>														
<b>B. Water Demand</b>														
b-1) Population	-	-	-	-	-	83,456	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818
b-2) No. of Household	-	-	-	-	-	12,270	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885
b-3) No. of Yard Connection	-	-	-	-	-	30	30	30	30	30	30	30	30	30
b-4) Consumption	-	-	-	-	-	2,503	3,445	3,445	3,445	3,445	3,445	3,445	3,445	3,445
b-5) Water Demand	-	-	-	-	-	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
b-6) Unaccounted for water Ratio	-	-	-	-	-	2.128	2.928	2.928	2.928	2.928	2.928	2.928	2.928	2.928
b-7) Water Billed	-	-	-	-	-	913,624	1,257,257	1,257,257	1,257,257	1,257,257	1,257,257	1,257,257	1,257,257	1,257,257
b-8) Annual Water Production	-	-	-	-	-	1,068,669	1,068,669	1,068,669	1,068,669	1,068,669	1,068,669	1,068,669	1,068,669	1,068,669
b-9) Annual Water Sales	-	-	-	-	-	776,581	1,068,669	1,068,669	1,068,669	1,068,669	1,068,669	1,068,669	1,068,669	1,068,669
<b>C. Retail Water Tariff</b>														
c-1) Retail Water Tariff	-	-	-	-	-	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18
c-2) Flat Rate Tariff	-	-	-	-	-	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.02
c-3) Reserve for Upgrading	-	-	-	-	-	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00
<b>D. Revenue</b>														
d-1) Water Sales (Cost Portion)	-	-	-	-	-	822	1,260	1,260	1,260	1,260	1,260	1,260	1,260	1,260
d-2) Reserve Fund / Amortisation	-	-	-	-	-	4,467	6,019	6,019	6,019	6,019	6,019	6,019	6,019	6,019
d-3) Revenue Total	-	-	-	-	-	5,289	7,279	7,279	7,279	7,279	7,279	7,279	7,279	7,279
<b>E. Expenses</b>														
e-1) Bulk Water Tariff	-	-	-	-	-	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
e-2) Bulk Water Purchase	-	-	-	-	-	667	918	918	918	918	918	918	918	918
e-3) Maintenance & Admin. Cost	-	-	-	-	-	155	342	342	342	342	342	342	342	342
e-4) Expenses Total	-	-	-	-	-	822	1,260	1,260	1,260	1,260	1,260	1,260	1,260	1,260
<b>Net Operating Income</b>	-	-	-	-	-	<b>4,467</b>	<b>6,019</b>	<b>6,019</b>	<b>6,019</b>	<b>6,019</b>	<b>6,019</b>	<b>6,019</b>	<b>6,019</b>	<b>6,019</b>
<b>F. Inflow</b>														
f-1) Net Operating Income	-	-	-	-	-	4,467	6,019	6,019	6,019	6,019	6,019	6,019	6,019	6,019
f-2) Grant (RDP Fund)	144	866	7,506	20,786	-	7,506	-	-	-	-	-	-	-	-
f-3) Loan	-	-	-	-	-	223	529	816	833	833	833	833	833	833
f-4) Interest Generated	-	-	-	-	-	6,243	6,548	10,941	18,223	5,987	-	-	-	-
f-5) Inflow Total	144	866	7,506	20,786	-	11,974	6,243	6,548	10,941	18,223	5,987	-	-	-
<b>G. Outflow</b>														
g-1) CAPEX+Replacement	144	866	7,506	20,786	-	7,506	134	803	10,597	30,187	10,597	-	-	-
g-2) Loan Repayment (CAPEX)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
g-3) Short Term Loan Interest	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>F-4) Outflow Total</b>	144	866	7,506	20,786	-	7,506	134	803	10,597	30,187	10,597	-	-	-
<b>Surplus</b>	0	0	0	0	0	4,467	6,019	5,745	344	31,964	4,610	109	128	147
<b>Surplus cum.</b>	0	0	0	0	0	4,467	10,576	16,321	16,665	4,701	91	168	296	443



Loan outstanding		(24)															
CAPEX	20 years	4,106	15,805	21,175											37%		
Principal	8%	328	1,264	1,694											59%		
Interest		4,434	17,069	22,869													
Affordability		Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Monthly Expenditure			1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Average	68LCD R/H/M							39.02	39.02	39.02	39.02	39.02	39.02	35.51	35.51	35.51	35.51
Lower Income	25LCD R/H/M							39.02	39.02	39.02	39.02	39.02	39.02	13.06	13.06	13.06	13.06
Inflation		0%															
Economic Growth Rate		0.9% /a															
Household Income		Average R/month						332	332	332	332	332	332	332	332	332	332
Lower Income		331.3						332	332	332	332	332	332	332	332	332	332
Average Income		1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167	1167
Water Purchase/Income (Affordability Check)								11.8%	11.8%	11.8%	11.8%	11.8%	11.8%	3.9%	3.9%	3.9%	3.9%
Lower Income								33%	33%	33%	33%	33%	33%	3.0%	3.0%	3.0%	3.0%
Average Income								33%	33%	33%	33%	33%	33%	3.0%	3.0%	3.0%	3.0%

Table C.2-2: Cash Flow Analysis for Retail Supply (Case C-1) at 1997 Price : Klipvoor (cont'd)

Water Demand and Tariff Forecast	Year	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A. Service Level																	
B. Water Demand		114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818
b-1) Population		16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885
b-2) No. of Household		15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198
b-3) No. of Yard Connection		80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
b-4) Consumption		9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185
b-5) Water Demand	b-1) x b-4)	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
b-6) Unaccounted for water Ratio		7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808
b-7) Water Billed	b-5) x 1-6	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686
b-8) Annual Water Production		2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783
b-9) Annual Water Sales	b-7) x 365	2,56	2,60	2,60	2,60	2,60	2,60	2,65	2,65	2,65	2,65	2,65	2,70	2,70	2,70	2,70	2,70
C. Retail Water Tariff																	
c-1) Retail Water Tariff																	
c-2) Flat Rate Tariff																	
c-3) Reserve for Upgrading																	
Income Statements (1,000R)																	
D. Revenue		4,953	5,087	5,087	5,087	5,087	5,087	5,221	5,221	5,221	5,221	5,221	5,355	5,355	5,355	5,355	5,355
d-1) Water Sales (Cost Portion)		2,342	2,322	2,322	2,322	2,322	2,322	2,331	2,331	2,331	2,331	2,331	2,339	2,339	2,339	2,339	2,339
d-2) Reserve Fund / Amortization		7,205	7,409	7,409	7,409	7,409	7,409	7,552	7,552	7,552	7,552	7,552	7,694	7,694	7,694	7,694	7,694
d-3) Revenue Total																	
E. Expenses		1,27	1,31	1,31	1,31	1,31	1,31	1,35	1,35	1,35	1,35	1,35	1,39	1,39	1,39	1,39	1,39
e-1) Bulk Water Tariff		4,258	4,392	4,392	4,392	4,392	4,392	4,526	4,526	4,526	4,526	4,526	4,660	4,660	4,660	4,660	4,660
e-2) Bulk Water Purchase	e-1) x b-4)	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695
e-3) Maintenance & Admin. Cost		4,953	5,087	5,087	5,087	5,087	5,087	5,221	5,221	5,221	5,221	5,221	5,355	5,355	5,355	5,355	5,355
e-4) Expenses Total		2,342	2,322	2,322	2,322	2,322	2,322	2,331	2,331	2,331	2,331	2,331	2,339	2,339	2,339	2,339	2,339
Net Operating Income																	
Cash Flow Statements (1,000R)																	
F. Inflow		2,342	2,322	2,322	2,322	2,322	2,322	2,331	2,331	2,331	2,331	2,331	2,339	2,339	2,339	2,339	2,339
f-1) Net Operating Income																	
f-2) Grant (RDP Fund)																	
f-3) Loan																	
f-4) Interest Generated	5%	8	9	10	10	10	10	10	11	11	12	13	13	15	16	17	18
f-5) Inflow Total		2,351	2,332	2,332	2,332	2,332	2,332	2,341	2,341	2,342	2,343	2,343	2,352	2,354	2,355	2,356	2,357
G. Outflow																	
g-1) CAPEX+Replacement		2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329
g-2) Loan Repayment (CAPEX)																	
g-3) Short Term Loan Interest	7%	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329
g-4) Outflow Total		2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329	2,329
Surplus		189	192	195	197	200	203	215	227	240	253	268	291	315	341	368	396

Loan outstanding  
CAPEX  
Principal  
Interest

C-17

Table C.2-3: Cash Flow Analysis for Retail Supply (Case C-2) at 1997 Price: Klipvoor

Water Demand and Tariff Forecast	Year														(14)
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A. Service Level															
Service Level A															
B. Water Demand															
b-1) Population															
b-2) No. of Household															
b-3) No. of Yard Connection															
b-4) Consumption															
b-5) Water Demand															
b-6) Unaccounted for water Ratio															
b-7) Water Billed															
b-8) Annual Water Production															
b-9) Annual Water Sales															
C. Retail Water Tariff															
c-1) Retail Water Tariff															
c-2) Flat Rate Tariff															
c-3) Reserve for Upgrading															
Income Statements (1,000R)															
D. Revenue															
d-1) Water Sales (Cost Portion)															
d-2) Reserve Fund / Amortisation															
d-3) Revenue Total															
E. Expenses															
e-1) Bulk Water Tariff															
e-2) Bulk Water Purchase															
e-3) Maintenance & Admin. Cost															
e-4) Expenses Total															
Net Operating Income															
Cash Flow Statements (1,000R)															
F. Inflow															
f-1) Net Operating Income															
f-2) Grant (RDP Fund)															
f-3) Loan															
f-4) Interest Generated															
f-5) Inflow Total															
G. Outflow															
g-1) CAPEX+Replacement															
g-2) Loan Repayment (CAPEX)															
g-3) Short Term Loan Interest															
g-4) Outflow Total															
Surplus															
cam.															

**Loan outstanding**

Table C.2-3: Cash Flow Analysis for Retail Supply (Case C-2) at 1997 Price : Klipvoor (cont'd)

Table C-2-3: Cash Flow Analysis for Water Supply (Case C-2) at 2017-2030																									(34)
Water Demand and Tariff Forecast	Year																				2027				
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027									
A. Service Level																									
B. Water Demand																									
b-1) Population	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818	114,818								
b-2) No. of Household	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885	16,885								
b-3) No. of Yard Connection	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198	15,198								
b-4) Consumption	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80								
b-5) Water Demand	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185	9,185								
b-6) Unaccounted for water Ratio	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%								
b-7) Water Billed	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808	7,808								
b-8) Annual Water Production	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686	3,352,686								
b-9) Annual Water Sales	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783	2,849,783								
C. Retail Water Tariff																									
c-1) Retail Water Tariff	3.93	3.98	3.98	3.98	3.98	3.98	3.98	4.02	4.02	4.02	4.02	4.02	4.07	4.07	4.07	4.07	4.07								
c-2) Flat Rate Tariff																									
c-3) Reserve for Upgrading																									
Income Statements (1,000R)		Year		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027						
D. Revenue	4,953	5,087	5,087	5,087	5,087	5,087	5,087	5,087	5,087	5,221	5,221	5,221	5,221	5,221	5,355	5,355	5,355	5,355	5,355						
d-1) Water Sales (Cost Portion)	6,247	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255						
d-2) Reserve Fund / Amortisation	11,200	11,342	11,342	11,342	11,342	11,342	11,342	11,342	11,342	11,456	11,456	11,456	11,456	11,456	11,599	11,599	11,599	11,599	11,599						
d-3) Revenue Total																									
E. Expenses	1,27	1,31	1,31	1,31	1,31	1,31	1,31	1,31	1,31	1,35	1,35	1,35	1,35	1,35	1,39	1,39	1,39	1,39	1,39						
e-1) Bulk Water Tariff	4,258	4,392	4,392	4,392	4,392	4,392	4,392	4,392	4,392	4,526	4,526	4,526	4,526	4,526	4,660	4,660	4,660	4,660	4,660						
e-2) Bulk Water Purchase	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695						
e-3) Maintenance & Admin. Cost	4,953	5,087	5,087	5,087	5,087	5,087	5,087	5,087	5,087	5,221	5,221	5,221	5,221	5,221	5,355	5,355	5,355	5,355	5,355						
e-4) Expenses Total	6,247	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255						
Net Operating Income		2,012	2,013	2,014	2,015	2,016	2,017	2,018	2,019	2,020	2,021	2,022	2,023	2,024	2,025	2,026	2,027	2,027	2,027						
Cash Flow Statements (1,000R)		Year		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027						
F. Inflow	6,247	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255	6,255						
f-1) Net Operating Income	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
f-2) Grant (RDP Fund)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
f-3) Loan	8	9	10	11	12	14	15	15	15	16	16	16	16	16	17	18	19	19	20						
f-4) Interest Generated	6,255	6,264	6,265	6,266	6,267	6,269	6,270	6,271	6,272	6,273	6,274	6,275	6,276	6,277	6,278	6,279	6,280	6,281	6,282						
f-5) Inflow Total																									
G. Outflow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
g-1) CAPEX-Replacement	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243						
g-2) Loan Repayment (CAPEX)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
g-3) Short Term Loan Interest	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243	6,243						
g-4) Outflow Total	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486	12,486						
Surplus	181	202	224	247	272	298	304	312	319	327	336	343	351	359	367	371	390	409	430						

(4/4)

Loan outstanding

CAPEX

20

Principal

8%

Interest

Affordability	Year	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Monthly Expenditure																	
Average	68LCD	54.52	55.21	55.21	55.21	55.21	55.21	55.77	55.77	55.77	55.77	55.77	56.46	56.46	56.46	56.46	56.46
Lower Income	25LCD	20.04	20.30	20.30	20.30	20.30	20.30	20.50	20.50	20.50	20.50	20.50	20.76	20.76	20.76	20.76	20.76
Inflation 0%																	
Economic Growth Rate 0%																	
Household Income	Average	332	332	332	332	332	332	332	332	332	332	332	332	332	332	332	332
Lower Income		331.8															
Average Income		332	332	332	332	332	332	332	332	332	332	332	332	332	332	332	332
Water Purchase/Income (Affordability Ch)		6.0%	6.1%	6.1%	6.1%	6.1%	6.1%	6.2%	6.2%	6.2%	6.2%	6.2%	6.3%	6.3%	6.3%	6.3%	6.3%
Lower Income	(25LCD)	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Average Income	(68LCD)	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%

Table C.3-1 : NPV and FIRR Analysis for Loan (Case C-1) : Klipvoor

(Unit: 000R)

Year	Cost				Benefit			Net Benefit	Real Interest Rate and NPV			Sensitivity Analysis
	Loan for Bulk CAPEX	Loan for Retail CAPEX	Bulk O&M Cost	Retail Admin. Cost	Total Cost	Annual Water Demand (KL)	Tariff (R/KL)	Benefit (8) = (6)x(7)	i=3%	i=5%	i=8%	
	(1)	(2)	(3)	(4)	(5) = (1)+(2)+(3)+(4)	(6)	(7)	(8)	NPV	NPV	NPV	
0 1997							0.00	0				1. Tariff Collection Factor FIRR 60% N.A. 70% 0.4% 80% 3.7% 90% 6.6% 100% 9.2%
1 1998			0	0	0	0	0.00	0	0	0	0	
2 1999			0	0	0	0	0.00	0	0	0	0	
3 2000			0	0	0	0	0.00	0	0	0	0	
4 2001			0	0	0	0	0.00	0	0	0	0	
5 2002			561	155	716	776,581	1.18	916	200	173	157	136
6 2003	61		778	342	1,182	1,068,669	1.18	1,261	79	66	59	50
7 2004	472		785	342	1,599	1,068,669	1.18	1,261	-338	-275	-240	-197
8 2005	6,364	4,106	792	342	11,604	1,068,669	1.18	1,261	-10,343	-8,165	-7,001	-5,588
9 2006	7,269	11,370	799	342	19,781	1,068,669	1.18	1,261	-18,520	-14,194	-11,938	-9,265
10 2007	1,604	4,106	807	342	6,859	1,068,669	1.18	1,261	-5,598	-4,165	-3,437	-2,593
11 2008			2,171	695	2,866	2,849,783	2.56	7,295	4,429	3,200	2,590	1,900
12 2009			2,192	695	2,887	2,849,783	2.56	7,295	4,408	3,092	2,455	1,751
13 2010			2,214	695	2,909	2,849,783	2.56	7,295	4,387	2,987	2,326	1,613
14 2011			2,236	695	2,931	2,849,783	2.56	7,295	4,364	2,885	2,204	1,486
15 2012			2,259	695	2,954	2,849,783	2.56	7,295	4,342	2,787	2,088	1,369
16 2013			2,282	695	2,977	2,849,783	2.60	7,409	4,320	2,762	2,030	1,294
17 2014			2,306	695	3,002	2,849,783	2.60	7,409	4,300	2,667	1,923	1,191
18 2015			2,331	695	3,026	2,849,783	2.60	7,409	4,283	2,575	1,821	1,097
19 2016			2,357	695	3,052	2,849,783	2.60	7,409	4,267	2,485	1,724	1,010
20 2017	2,194		2,383	695	5,272	2,849,783	2.60	7,409	2,137	1,183	805	459
21 2018			2,411	695	3,106	2,849,783	2.65	7,552	4,446	2,390	1,596	883
22 2019			2,439	695	3,134	2,849,783	2.65	7,552	4,418	2,306	1,510	813
23 2020			2,468	695	3,163	2,849,783	2.65	7,552	4,389	2,224	1,429	748
24 2021			2,497	695	3,193	2,849,783	2.65	7,552	4,359	2,145	1,352	687
25 2022	1,998		2,528	695	5,221	2,849,783	2.65	7,552	4,331	1,113	688	340
26 2023			2,560	695	3,255	2,849,783	2.70	7,694	4,440	2,059	1,249	600
27 2024			2,592	695	3,287	2,849,783	2.70	7,694	4,407	1,984	1,180	552
28 2025			2,626	695	3,321	2,849,783	2.70	7,694	4,374	1,912	1,116	507
29 2026			2,660	695	3,355	2,849,783	2.70	7,694	4,339	1,841	1,054	466
30 2027			2,696	695	3,391	2,849,783	2.70	7,694	4,303	1,773	996	428
Total	19,962	19,582	52,731	15,769	108,044			156,978	48,934	19,608	9,738	1,735

FIRR= 9.2%



Table C.3-2 : NPV and FIRR Analysis for Loan (Case C-2) : Klipvoor

(Unit: 000R)

Year	Cost					Benefit			Net Benefit	Real Interest Rate and NPV		
	Loan for Bulk CAPEX	Loan for Retail	Bulk O&M Cost	Retail Admin. Cost	Total Cost	Annual Water Demand (K/L)	Tariff (R/K/L)	Benefit		i=3%	i=5%	i=8%
	(1)	(2)	(3)	(4)	(5)= (1)+(2)+(3)+(4)	(6)	(7)	(8)= (6)X(7)	(9)=(8)-(4)	NPV	NPV	NPV
0 1997							0.00	0	0			
1 1998				0	0	0	0.00	0	0	0	0	0
2 1999				0	0	0	0.00	0	0	0	0	0
3 2000				0	0	0	0.00	0	0	0	0	0
4 2001				0	0	0	0.00	0	0	0	0	0
5 2002						776,581	1.18	916	200	173	157	136
6 2003	61	134	561	155	716	1,068,669	1.18	1,261	-54	-46	-41	-34
7 2004	472	803	785	342	2,402	1,068,669	1.18	1,261	-1,141	-928	-811	-666
8 2005	6,364	10,597	792	342	18,096	1,068,669	1.18	1,261	-16,835	-13,289	-11,394	-9,095
9 2006	7,269	30,187	799	342	38,598	1,068,669	1.18	1,261	-37,337	-28,615	-24,067	-18,678
10 2007	1,604	10,597	807	342	13,350	1,068,669	1.18	1,261	-12,089	-8,996	-7,422	-5,600
11 2008			2,171	695	2,866	2,849,783	3.93	11,200	8,333	6,020	4,872	3,574
12 2009			2,192	695	2,887	2,849,783	3.93	11,200	8,312	5,830	4,629	3,301
13 2010			2,214	695	2,909	2,849,783	3.93	11,200	8,291	5,646	4,397	3,049
14 2011			2,236	695	2,931	2,849,783	3.93	11,200	8,269	5,467	4,176	2,815
15 2012			2,259	695	2,954	2,849,783	3.93	11,200	8,246	5,293	3,966	2,599
16 2013			2,282	695	2,977	2,849,783	3.98	11,342	8,365	5,213	3,832	2,442
17 2014			2,306	695	3,002	2,849,783	3.98	11,342	8,341	5,046	3,639	2,254
18 2015			2,331	695	3,026	2,849,783	3.98	11,342	8,316	4,885	3,455	2,081
19 2016			2,357	695	3,052	2,849,783	3.98	11,342	8,290	4,728	3,281	1,921
20 2017	2,194		2,383	695	3,052	2,849,783	3.98	11,342	6,070	3,361	2,288	1,302
21 2018			2,411	695	3,106	2,849,783	4.02	11,456	8,350	4,489	2,997	1,659
22 2019			2,439	695	3,134	2,849,783	4.02	11,456	8,322	4,343	2,845	1,531
23 2020			2,468	695	3,163	2,849,783	4.02	11,456	8,293	4,202	2,700	1,412
24 2021			2,497	695	3,193	2,849,783	4.02	11,456	8,264	4,065	2,562	1,303
25 2022	1,998		2,528	695	3,221	2,849,783	4.02	11,456	6,235	2,978	1,841	910
26 2023			2,560	695	3,255	2,849,783	4.07	11,599	8,344	3,869	2,347	1,128
27 2024			2,592	695	3,287	2,849,783	4.07	11,599	8,311	3,742	2,226	1,040
28 2025			2,626	695	3,321	2,849,783	4.07	11,599	8,278	3,618	2,112	960
29 2026			2,660	695	3,355	2,849,783	4.07	11,599	8,243	3,498	2,003	885
30 2027			2,696	695	3,391	2,849,783	4.07	11,599	8,208	3,381	1,899	816
Total	10,962	52,319	52,731	15,769	140,780			235,204	94,424	37,071	18,489	3,046

FIRR= 9.0%

## C.4 Economic Analysis

### 1. Conversion Factor and Calculated Project Cost

Project cost which is use for economic analysis must be based on the economic price, which under perfect market circumstance without any transfer expenses such as tax.

Unskilled labour cost and fuel is assumed to be differing from the economic price in the project cost.

#### 1. Labour Conversion Factor (LCF)

$$\text{LCF} = 30\%$$

##### (1) Unemployment Rate

	Economic Active Population	Unemploye nt	Unemployment Rate				
			Total	Black	Coloured	Indians	White
North West	973,000	325,000	33.4%	37.4%	17.6%	12.6%	7.9%
Mpmalanga	1,147,000	376,000	32.8%	35.8%	27.8%	4.4%	6.0%

"Source: 1995 October Household Survey (OHS), CSS"

##### (2) Wage of Labour 1303 R/month

(1997 Feb. Current Price. Average Salaries and Wages and Bonuses per Month)

"Source: Labour Statistics. Employment and salaries and wages, CSS P0242.1, June 1997"

##### (3) Shadow Wage (Opportunity Cost) of Unskilled Labour

Labour intensive construction, as RDP project will maximise community Labour resources. Under this high unemployment circumstance, marginal cost of labour is assumed very low. Opportunity cost of labour is estimated by economic value of domestic work as below.

Domestic Work Salaries 550R/month

Unemployed is assumed to do economic activity 5days out of 7days

$$550 \times 5/7 = 392.86 \text{ R/month}$$

##### (4) Labour Conversion Factor (LCF)

LCF is calculated as below

Shadow Wage / Nominal Wage

$$392.86/1303 = 30\%$$

### 2. Fuel Conversion Factor (FCF)

Nominal Fuel Cost including tax duty and levy and it is estimated 30% of consumer prices.

Fuel Conversion Factor (FCF) which convert nominal price to the economic price is calculated as below

$$\text{FCF} = 70\%$$

Calculated project cost is estimated preliminary following the manner as below.

- 1) Breakdown Direct Construction Cost of each infrastructural component into four components as a) Labour, b) Material, c) Plant and d) Fuel in the same process of price adjustment formula of civil (RDP) contract.
- 2) Convert cost of unskilled labour and fuel using LCF and FCF respectively.
- 3) Calculate project cost with the multiplier.

## **2. Economic Benefit**

Under the principle of “with” and “without” project applied in the economic analysis, an economic benefit for Cases C is measured as saving of cost for labour to be required for water cartage between residence and standpipe. In the level of yard-connection, a beneficiary is planned to consume 73 lcd or 496 liters per day per household consisting of 6.8 members on the average. Usually, community people use a polyethylene container with capacity of 20 liters and wheelbarrow for water cartage. Assuming two containers can be loaded in a wheelbarrow, it requires about 12 times round trip with average distance of 100 meters, requiring 15 minutes per trip or 180 minutes (3 hours) per day. On the other hand, it is reported that a daily unskilled labour costs around R4 to 5 per hour in rural communities, which is converted as the economic value at R1.2 to 1.5 per hour applying the labour conversion factor (LCF) as mentioned in the above. Thus, the economic benefit of the project can be worked out R3.6 per day or R108 per month per beneficial household.

**Table C.4-1 : Direct Construction Cost Breakdown and Converted Cost : Klipvoor**

**Direct Cost Breakdown**

(Unit: '000Rand)

Item	Total	Labour				Materials		Plant		Fuel	
		amount	%	(Skilled)	(Unskilled)	amount	%	amount	%	amount	%
<b>Case A</b>	<b>76,465</b>	<b>19,593</b>				<b>15,893</b>		<b>34,944</b>		<b>6,035</b>	
Bulk	54,604	13,836				12,614		23,192		4,942	
- Intake and Pump Station	303	76	25%	61	15	45	15%	167	55%	15	5%
- Raw Water Pipeline	50	13	25%	10	3	13	25%	20	40%	5	10%
- WTW and Pump Station	4,950	1,238	25%	990	248	743	15%	2,723	55%	248	5%
- Bulk Supply Pipelines	44,186	11,047	25%	4,419	6,628	11,047	25%	17,674	40%	4,419	10%
- Regional Reservoirs	4,100	1,230	30%	984	246	615	15%	2,050	50%	205	5%
- Pump Stations	1,015	254	25%	203	51	152	15%	558	55%	51	5%
Retail	21,861	5,737				3,279		11,752		1,093	
- Service Reservoir	5,435	1,631	30%	1,304	326	815	15%	2,718	50%	272	5%
- Reticulation Pipelines	15,882	3,971	25%	794	3,176	2,382	15%	8,735	55%	794	5%
- Standpipes	544	136	25%	27	109	82	15%	299	55%	27	5%
Yard Connection	-	-				-		-		-	
<b>Case B</b>	<b>122,308</b>	<b>31,607</b>				<b>23,770</b>		<b>59,605</b>		<b>8,327</b>	
Bulk	63,912	16,363				15,010		28,131		5,407	
- Intake and Pump Station	454	114	25%	91	23	68	15%	250	55%	23	5%
- Raw Water Pipeline	50	13	25%	10	3	13	25%	20	40%	5	10%
- WTW and Pump Station	10,000	2,500	25%	2,000	500	2,500	25%	5,500	55%	500	5%
- Bulk Supply Pipelines	44,186	11,047	25%	4,419	6,628	11,047	25%	17,674	40%	4,419	10%
- Regional Reservoirs	7,700	2,310	30%	1,848	462	1,155	15%	3,850	50%	385	5%
- Pump Stations	1,522	381	25%	304	76	228	15%	837	55%	76	5%
Retail	42,438	11,254				6,366		22,696		2,122	
- Service Reservoir	12,890	3,867	30%	3,094	773	1,934	15%	6,445	50%	645	5%
- Reticulation Pipelines	29,004	7,251	25%	1,450	5,801	4,351	15%	15,952	55%	1,450	5%
- Standpipes	544	136	25%	27	109	82	15%	299	55%	27	5%
Yard Connection	15,958	3,990	25%	798	3,192	2,394	15%	8,777	55%	798	5%

**Converted Direct Cost**

Item	Total	Labour				Materials		Plant		Fuel	
		amount	%	(Skilled)	(Unskilled)	amount	%	amount	%	amount	%
<b>Conversion Factor</b>				100%	30%	100%		100%		70%	
<b>Case A</b>	<b>67,094</b>	<b>12,032</b>				<b>15,893</b>		<b>34,944</b>		<b>4,225</b>	
Bulk	48,089	8,823				12,614		23,192		3,459	
- Intake and Pump Station	288	65	25%	61	5	45	15%	167	55%	11	5%
- Raw Water Pipeline	47	11	25%	10	1	13	25%	20	40%	4	10%
- WTW and Pump Station	4,703	1,064	25%	990	74	743	15%	2,723	55%	173	5%
- Bulk Supply Pipelines	38,221	6,407	25%	4,419	1,988	11,047	25%	17,674	40%	3,093	10%
- Regional Reservoirs	3,866	1,058	30%	984	74	615	15%	2,050	50%	144	5%
- Pump Stations	964	218	25%	203	15	152	15%	558	55%	36	5%
Retail	19,005	3,209				3,279		11,752		765	
- Service Reservoir	5,125	1,402	30%	1,304	98	815	15%	2,718	50%	190	5%
- Reticulation Pipelines	13,420	1,747	25%	794	953	2,382	15%	8,735	55%	556	5%
- Standpipes	460	60	25%	27	33	82	15%	299	55%	19	5%
Yard Connection	-	-				-		-		-	
<b>Case B</b>	<b>108,514</b>	<b>19,310</b>									
Bulk	57,906	10,979		8,672		15,010		28,131		3,785	
- Intake and Pump Station	431	98	25%	91	7	68	15%	250	55%	16	5%
- Raw Water Pipeline	47	11	25%	10	1	13	25%	20	40%	4	10%
- WTW and Pump Station	10,500	2,150	25%	2,000	150	2,500	15%	5,500	55%	350	5%
- Bulk Supply Pipelines	38,221	6,407	25%	4,419	1,988	11,047	25%	17,674	40%	3,093	10%
- Regional Reservoirs	7,261	1,987	30%	1,848	139	1,155	15%	3,850	50%	270	5%
- Pump Stations	1,446	327	25%	304	23	228	15%	837	55%	53	5%
Retail	37,123	6,576		4,571		6,366		22,696		1,485	
- Service Reservoir	12,155	3,326	30%	3,094	232	1,934	15%	6,445	50%	451	5%
- Reticulation Pipelines	24,508	3,190	25%	1,450	1,740	4,351	15%	15,952	55%	1,015	5%
- Standpipes	460	60	25%	27	33	82	15%	299	55%	19	5%
Yard Connection	13,485	1,755	25%	798	957	2,394	15%	8,777	55%	559	5%

Table C.4-2 : Calculated Project Cost at 1997 Constant Price : Klipvoor (1/2)

(Unit: 000Rand)

Item				Total	1 1998	2 1999	3 2000	4 2001	5 2002
<b>Case A Total</b>				<b>99,338</b>	<b>386</b>	<b>2,796</b>	<b>28,455</b>	<b>48,973</b>	<b>18,729</b>
<b>Bulk</b>	(1)Direct Calculated Cost			48,089	-	-	15,601	23,877	8,610
	(2)P&G	(1)x 15%		7,213	-	-	2,340	3,582	1,292
	(3)Base Cost	(1)+(2)		55,302	-	-	17,941	27,459	9,902
	(4)Engineering Fee	(3)x 10%		5,530	-	1,383	1,383	1,383	1,383
	(5)Miscellaneous	(1)x 2%		962	-	481	481	-	-
	(6)Institutional Developme	(3)x 2.5%		1,383	277	277	277	277	277
	(7)Sub-Total	(3)+(4)+(5)+(6)		63,176	277	2,140	20,081	29,118	11,561
	(8)Physical Contingency	(3)x 15%		8,295	-	-	2,691	4,119	1,485
	<b>Grand Total</b>			<b>71,472</b>	<b>277</b>	<b>2,140</b>	<b>22,773</b>	<b>33,236</b>	<b>13,046</b>
<b>Retail</b>	(1)Direct Calculated Cost			19,005	-	-	3,801	11,403	3,801
	(2)P&G	(1)x 15%		2,851	-	-	570	1,710	570
	(3)Base Cost	(1)+(2)		21,856	-	-	4,371	13,114	4,371
	(4)Engineering Fee	(3)x 10%		2,186	-	546	546	546	546
	(5)Miscellaneous			-	-	-	-	-	-
	(6)Institutional Support	(3)x 2.5%		546	109	109	109	109	109
	(7)Sub-Total	(3)+(4)+(5)+(6)		24,588	109	656	5,027	13,769	5,027
	(8)Physical Contingency	(3)x 15%		3,278	-	-	656	1,967	656
	<b>Grand Total</b>			<b>27,866</b>	<b>109</b>	<b>656</b>	<b>5,683</b>	<b>15,736</b>	<b>5,683</b>
<b>Case B Total</b>				<b>153,979</b>	<b>546</b>	<b>3,858</b>	<b>42,568</b>	<b>78,801</b>	<b>28,207</b>
<b>Bulk</b>	(1)Direct Calculated Cost			57,906	-	-	19,806	28,714	9,386
	(2)P&G	(1)x 15%		8,686	-	-	2,971	4,307	1,408
	(3)Base Cost	(1)+(2)		66,592	-	-	22,777	33,021	10,793
	(4)Engineering Fee	(3)x 10%		6,659	-	1,665	1,665	1,665	1,665
	(5)Miscellaneous	(1)x 2%		1,158	-	579	579	-	-
	(6)Institutional Developme	(3)x 2.5%		1,665	333	333	333	333	333
	(7)Sub-Total	(3)+(4)+(5)+(6)		76,074	333	2,577	25,354	35,019	12,791
	(8)Physical Contingency	(3)x 15%		9,989	-	-	3,417	4,953	1,619
	<b>Grand Total</b>			<b>86,063</b>	<b>333</b>	<b>2,577</b>	<b>28,771</b>	<b>39,972</b>	<b>14,410</b>
<b>Retail</b>	(1)Direct Calculated Cost			37,123	-	-	7,425	22,274	7,425
	(2)P&G	(1)x 15%		5,568	-	-	1,114	3,341	1,114
	(3)Base Cost	(1)+(2)		42,692	-	-	8,538	25,615	8,538
	(4)Engineering Fee	(3)x 10%		4,269	-	1,067	1,067	1,067	1,067
	(5)Miscellaneous			-	-	-	-	-	-
	(6)Institutional Support	(3)x 2.5%		1,067	213	213	213	213	213
	(7)Sub-Total	(3)+(4)+(5)+(6)		48,028	213	1,281	9,819	26,896	9,819
	(8)Physical Contingency	(3)x 15%		6,404	-	-	1,281	3,842	1,281
	<b>Grand Total</b>			<b>54,432</b>	<b>213</b>	<b>1,281</b>	<b>11,100</b>	<b>30,738</b>	<b>11,100</b>
<b>Yard Connection</b>									
<b>Yard</b>	(1)Direct Calculated Cost			13,485	-	-	2,697	8,091	2,697
	<b>Connection Grand Total</b>			<b>13,485</b>	<b>-</b>	<b>-</b>	<b>2,697</b>	<b>8,091</b>	<b>2,697</b>
<b>Level B-A</b>									
<b>Bulk</b>				14,591	56	437	5,998	6,736	1,364
<b>Retail</b>				26,566	104	625	5,417	15,002	5,417
<b>Yard Connection</b>				13,485	-	-	2,697	8,091	2,697
<b>Total</b>				<b>54,641</b>	<b>161</b>	<b>1,062</b>	<b>14,112</b>	<b>29,828</b>	<b>9,478</b>

**Table C.4-2 : Calculated Project Cost at 1997 Constant Price : Klipvoor (2/2)**

(Unit: ,000Rand)

Item				Total	6	7	8	9	10
					2003	2004	2005	2006	2007
Case C(Higher Service Pution)				54,641	161	1,062	14,112	29,828	9,478
Bulk	(1)Direct Calculated Cost			9,817	-	-	4,205	4,837	775
	(2)P&G	(1)x 15%		1,473	-	-	631	726	116
	(3)Base Cost	(1)+(2)		11,290	-	-	4,836	5,563	892
	(4)Engineering Fee	(3)x 10%		1,129	-	282	282	282	282
	(5)Miscellaneous			196	-	98	98	-	-
	(6)Institutional Developme	(3)x 2.5%		282	56	56	56	56	56
	(7)Sub-Total	(3)+(4)+(5)+(6)		12,898	56	437	5,273	5,901	1,230
	(8)Physical Contingency	(3)x 15%		1,694	-	-	725	834	134
	Grand Total			14,591	56	437	5,998	6,736	1,364
Retail	(1)Direct Calculated Cost			18,118	-	-	3,624	10,871	3,624
	(2)P&G	(1)x 15%		2,718	-	-	544	1,631	544
	(3)Base Cost	(1)+(2)		20,836	-	-	4,167	12,502	4,167
	(4)Engineering Fee	(3)x 10%		2,084	-	521	521	521	521
	(5)Miscellaneous			-	-	-	-	-	-
	(6)Institutional Support	(3)x 2.5%		521	104	104	104	104	104
	(7)Sub-Total	(3)+(4)+(5)+(6)		23,440	104	625	4,792	13,127	4,792
	(8)Physical Contingency	(3)x 15%		3,125	-	-	625	1,875	625
	Grand Total			26,566	104	625	5,417	15,002	5,417
Yard	(1)Direct Calculated Cost			13,485	-	-	2,697	8,091	2,697
Connection Grand Total				13,485	-	-	2,697	8,091	2,697

Table C.4-3 : EIRR Analysis (Case C-1) : Klipvoor

(Unit: 000R)

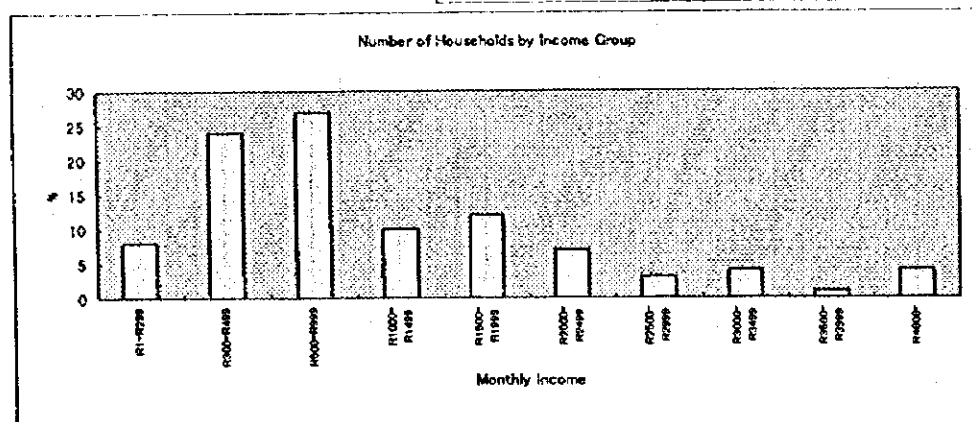
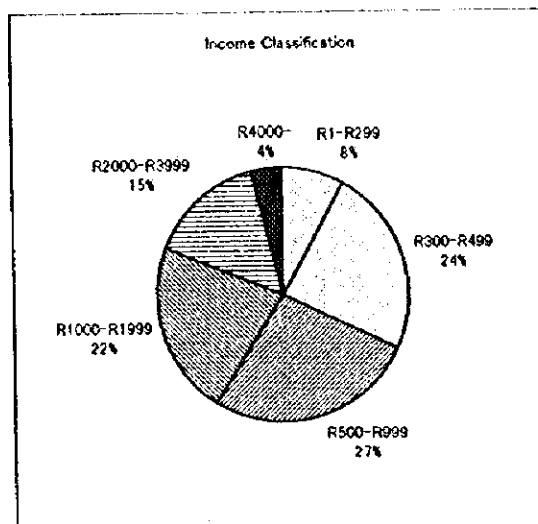
EIRR = 5.3 %

Year	Calculated Cost				Benefit			Net Benefit	Real Interest Rate and NPV		
	CAPEX	Bulk O&M Cost	Retail Admin. Cost	Total Cost	Higher Service Beneficiaries (Household)	Economic Value of Cartage (R/month)	Benefit		i=3%	i=5%	i=8%
	(1)	(2)	(3)	(4)=(1)+(2)+(3)	(5)	(6)	(7)=(5)X(6)X12m	(8)=(7)-(4)	NPV	NPV	NPV
0 1997					0	108	0	0			
1 1998	386	0	0	386	0	108	0	(386)	(375)	(367)	(357)
2 1999	2,796	0	0	2,796	0	108	0	(2,796)	(2,635)	(2,536)	(2,397)
3 2000	28,455	0	0	28,455	0	108	0	(28,455)	(26,041)	(24,581)	(22,589)
4 2001	48,973	0	0	48,973	0	108	0	(48,973)	(43,512)	(40,290)	(35,996)
5 2002	18,729	561	155	19,445	0	108	0	(19,445)	(16,773)	(15,235)	(13,234)
6 2003	161	778	342	1,281	0	108	0	(1,281)	(1,073)	(956)	(807)
7 2004	1,062	785	342	2,189	0	108	0	(2,189)	(1,780)	(1,556)	(1,277)
8 2005	14,112	792	342	15,247	0	108	0	(15,247)	(12,036)	(10,320)	(8,237)
9 2006	29,828	799	342	30,970	0	108	0	(30,970)	(23,736)	(19,963)	(15,493)
10 2007	9,478	807	342	10,627	0	108	0	(10,627)	(7,908)	(6,524)	(4,922)
11 2008		2,171	695	2,866	15,198	108	19,697	16,830	12,158	9,840	7,218
12 2009		2,192	695	2,887	15,198	108	19,697	16,809	11,790	9,360	6,675
13 2010		2,214	695	2,909	15,198	108	19,697	16,788	11,432	8,903	6,173
14 2011		2,236	695	2,931	15,198	108	19,697	16,766	11,084	8,468	5,708
15 2012		2,259	695	2,954	15,198	108	19,697	16,743	10,747	8,054	5,278
16 2013		2,282	695	2,977	15,198	108	19,697	16,719	10,419	7,659	4,880
17 2014		2,306	695	3,002	15,198	108	19,697	16,695	10,101	7,284	4,512
18 2015		2,331	695	3,026	15,198	108	19,697	16,670	9,792	6,927	4,172
19 2016		2,357	695	3,052	15,198	108	19,697	16,644	9,492	6,587	3,857
20 2017		2,383	695	3,079	15,198	108	19,697	16,618	9,201	6,263	3,565
21 2018		2,411	695	3,106	15,198	108	19,697	16,591	8,918	5,955	3,296
22 2019		2,439	695	3,134	15,198	108	19,697	16,563	8,644	5,662	3,047
23 2020		2,468	695	3,163	15,198	108	19,697	16,534	8,378	5,383	2,816
24 2021		2,497	695	3,193	15,198	108	19,697	16,504	8,119	5,117	2,603
25 2022		2,528	695	3,223	15,198	108	19,697	16,473	7,868	4,865	2,405
26 2023		2,560	695	3,255	15,198	108	19,697	16,442	7,624	4,624	2,223
27 2024		2,592	695	3,287	15,198	108	19,697	16,409	7,387	4,395	2,054
28 2025		2,626	695	3,321	15,198	108	19,697	16,376	7,157	4,177	1,898
29 2026		2,660	695	3,355	15,198	108	19,697	16,341	6,934	3,970	1,754
30 2027		2,696	695	3,391	15,198	108	19,697	16,306	6,718	3,773	1,620
Total	153,979	52,731	15,769	222,479			393,932	171,453	48,095	4,938	(29,555)

**Figure C.5-1 : Income Classification : Klipvoor**

**1. Monthly Household Income**

Income	%	(R/month) Average
R1-R299	8%	134
R300-R499	24%	390
<b>Lower</b>	<b>32%</b>	<b>326</b>
R500-R999	27%	648
R1000-R1999	22%	1,399
<b>Middle</b>	<b>49%</b>	<b>980</b>
R2000-R3999	15%	2,523
R4000-	4%	4,800
<b>Higher</b>	<b>19%</b>	<b>3,002</b>
<b>Total</b>	<b>100%</b>	<b>1,167</b>



**2. Household Income by Occupation**

Income	Total	Employee	Dom. Work	Worker	Self Empl.	Driver	Teacher	Pensioner	Others
R1-R299	7	0	0	2	2	0	0	1	2
R300-R499	19	7	1	0	0	0	0	11	0
<b>Lower</b>	<b>26</b>	<b>7</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>2</b>
R500-R999	32	17	6	1	1	1	0	2	4
R1000-R1999	23	18	1	0	1	1	1	0	1
<b>Middle</b>	<b>55</b>	<b>35</b>	<b>7</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>5</b>
R2000-R3999	15	14	0	1	0	0	0	0	0
R4000-	4	4	0	0	0	0	0	0	0
<b>Higher</b>	<b>19</b>	<b>18</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total</b>	<b>100</b>	<b>60</b>	<b>8</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>14</b>	<b>7</b>

Source: Questioner Survey by JICA Study Team (1997)





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