Water Supply Services Model: Case Study of King William's Town

Report to the Water Research Commission
by
Palmer Development Group

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WATER SUPPLY SERVICES MODEL : CASE STUDY OF KING WILLIAM'S TOWN

Report on application of the WSSM to the King William's Town TLC

PALMER DEVELOPMENT GROUP

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EXECUTIVE SUMMARY

Introduction

The Water Research Commission (WRC) has, over the last two years, supported the evolution of a model to assist local authorities to assess the viability of their water supply operations, based on a variety of service level options. The most recent upgrade, undertaken by Palmer Development Group, is referred to as the Water Supply Services Model (WSSM). This is a spreadsheet model designed to test the financial viability of an urban water supply service over a period of ten years, allowing for alternative investment programmes. The WRC required that the model be tested for a particular local authority and King William's Town was selected. This report documents the results of the application of the WSSM to the King William's Town TLC.

The current situation

There are an estimated 27 535 households in the TLC area, some 10 730 of which are currently resident in either backyard shacks, informally on formal sites, or on informal sites. From the point of view of the service provider, the number of sites to be provided with services is, however, more important than the number of households in an area. The presence of backyard shacks is the main reason for a discrepancy between the number of sites and the number of households. The concept of a " residential consumer unit" (CU) is therefore used to record the number of individual residential units that a service provider must consider. Assuming that roughly 75 percent of backyard shacks will be replaced by formal sites within ten years, the number of residential consumer units falls to 25 900.

The population is predominantly poor, with almost 60 percent of households earning less than R1 500 per month. Fairly rapid population growth is expected, averaging 3.2 percent for the ten year investment period.

The economy of the area is relatively small, and only a modest rate of economic growth is expected over the next ten years, in the order of 2 percent per annum. A consequence of this is the slowly worsening income profile of households in the TLC area.

Formal plots are mainly provided with in-house water connections, although a few areas are provided with yard taps or public standpipes. All on-site connections are metered, but consumers are charged according to consumption only in Bisho, Breidbach, King William's Town and Schornville. In the other areas a flat rate is charged.

Due to the complicated supply arrangements it was not possible to establish the amount of bulk water actually used, and the amount therefore needed to be estimated. The estimate was done on the basis of the amount of water sold in January 1998, plus an allowance for water provided but not billed for, plus an estimate of an overall water loss of 20 percent. On this basis it was estimated that an amount of 8 346 Ml would be used in the 1997/8 financial year.

Income and expenditure on the water account were estimated for the 1997/8 financial year. A budgeted surplus of some R0.5 million is expected. However, non-payment rates in the previous financial year had been significant and, assuming the same rates, a total non-payment rate of 25 percent of total income due from consumers is assumed. This leads to an

actual cash deficit for the year of some R2.9 million. The income due from residential consumers refers to the amounts they are actually required to pay, after their accounts are credited with allocations from inter-government grants. It was estimated that inter-government grants will provide R1.04 million in income on the water account for the year.

Results of the modelling exercise

Key variables

For the King William's Town TLC three variables were identified as key to its future financial viability, namely

(1) the investment programme to be adopted,
(2) the amount of income from inter-government grants (IGGs) that TLC will receive in future years, and
(3) the price of (treated) bulk water, which is to be determined partly by the Amatola Water Board from next year, and partly by the cost of treating water.

Three investment scenarios were tested, which provide different levels of service to residential consumers as follows:

- Scenario 1 : In-house water or yard taps provided for all, with waterborne sanitation.
- Scenario 2 : An "intermediate" scenario, with mixed services.
- Scenario 3 : A low service level "baseline" scenario, which involves the provision of communal standpipes only, both to accommodate new low income households and to make up the backlog of services.

In these scenarios a bulk water price for treated water of R1.39 by 2003 and R1.53 by 2008 was assumed (figures in constant 1998 Rands). It was further assumed that the total amount of income to the TLC from IGGs would increase to keep pace with inflation, which means the amount would remain unchanged in real terms. However, new policy suggests that the amount might increase, and the effects of such an increase in IGGs are investigated in the form of a sensitivity analysis.

Service levels

The service levels that result from the investment programmes are shown in table 1 below.

Table 1 Service levels in 1998 and 2008 for scenarios 1, 2 and 3

	1998	2008		
		Scenario 1	Scenario 2	Scenario 3
Inadequate	27%	0%	0%	0%
Standpipes	4%	0%	8%	48%
Yard taps (on-site sanitation)	0%	0%	24%	0%
Yard taps (w/borne sanitation)	8%	26%	20%	6%
In-house	61%	74%	48%	46%

Capital expenditure and borrowing requirements

The total capital expenditure and borrowing requirements for each of the scenarios are shown in Table 2. Capital expenditure includes expenditure on all reticulated and connector infrastructure to be provided in the area within the next ten years, as well as on asset replacement. It is assumed that new bulk infrastructure will be the responsibility of the

Amatola Water Board. Capital expenditure which is not financed by means of borrowing will be funded by means of capital grants (housing and CMIP subsidies), consumer payments and contributions from current income.

Table 2. Capital expenditure and borrowing requirements (R millions, real).

R millions (1998 Rands)	Scenario 1: all on-site		Scenario 2 : mixed levels		Scenario 3 : baseline	
	Total years 1-5	Total years 6-10	Total years 1-5	Total years 6-10	Total years 1-5	Total years 6-10
Capital expenditure	24.1	26.0	18.0	20.0	11.3	13.5
Borrowing requirement	3.7	8.1	3.3	5.7	3.0	4.3

Service level "mismatches" and non-payment

Key to the financial success of an investment programme is whether the consumers provided with services are willing/able to make the monthly payments required to meet the operating costs of the service provider. Higher levels of service are generally associated with higher levels of consumption and therefore larger monthly bills. These bills can be reduced by internal cross-subsidisation and/or IGGs. There are, however, limits to how much subsidisation will be possible in the KWT TLC area. It follows therefore that the potential for non-payment in the area will be greater the higher the proportion of CUs with services they cannot afford to pay for (after the application of IGGs).

In order to gain some indication of the potential for non-payment for each scenario, the concept of a "mismatch" between incomes and services is used. A "mismatch" is said to occur primarily when CUs with incomes below R1 500 per month are provided with on-site water and waterborne sanitation. Table 3 shows the extent of the service level "mismatch" for 1998 and for the three scenarios by year 10 of the investment programme. Also shown are the non-payment rates which are calculated using the tariffs shown in Table 5.

Table 3 Service level "mismatches" and non-payment rates

	1998	2008		
		Scenario 1	Scenario 2	Scenario 3
In-house or yard tap (w/b), with incomes below R1 500 pm	38%	72%	40%	24%
Non-payment rates (total)	25%	22%	15%	11%

Recurrent expenditure and consumption

The recurrent expenditure and total bulk water purchases in 2003 and 2008 are shown in Table 4 for each scenario. Recurrent expenditure in scenario 1 is highest firstly because of the higher bulk purchase costs, secondly because of the larger interest and redemption payment and thirdly because of higher administration, operating and maintenance costs associated with more metered on-site connections and higher levels of consumption.

Table 4 Bulk water purchases and recurrent expenditure, 1998, 2003 and 2008

		Scenario 1: all on-site		Scenario 2 : mixed levels		Scenario 3 : baseline	
	1998	2003	2008	2003	2008	2003	2008
Bulk water purchased (Ml pa)	8 346	9 569	11 526	8 832	10 099	8 305	9 094
Recurrent expenditure (R millions, real)	13.5	20.3	27.0	18.9	23.7	17.6	20.8

Tariffs

The real test of the affordability of an investment programme is whether non-residential and higher income residential consumers can afford / are willing to pay the additional amounts required to cross-subsidise low income consumers when the latter are provided with high levels of service. This depends to a large extent on the relative proportions of low and high-income consumers. In the KWT TLC, the proportion of high-income households and non-residential consumers is relatively small. There are therefore limits to the amount of cross-subsidisation that is likely to be possible.

The WSSM makes provision for a number of different tariff structures. For the purposes of this exercise it was assumed that all on-site connections would be metered within three years. The tariff structure selected complies with the National Water Supply Regulations in providing for a three-block rising tariff for residential consumers, set at levels guided by costs. A fixed consumption charge for non-residential consumers is applied. An amount of R8 per CU per month is charged for communal standpipes in all scenarios.

The tariffs needed to ensure that the service provider meets its cash flow requirement are shown in Table 5 for 1999 and 2008. In setting the tariffs the assumption has been made that the tariffs for the first two residential consumption blocks are the same for all the scenarios, while those of the third block and for non-residential users are greater the higher the levels of service provided to low income CUs.

Table 5. Tariffs required to meet cash flow requirements by 2008 (c/kl, real).

Scenario 1	**1998**	**1999**	**2008**
0-10 kl	233	135	168
10-30 kl pm	233	280	349
>30 kl pm	233	470	819
non-residential	263	350	616
Scenario 2			
>30 kl pm	233	470	663
non-residential	263	350	494
Scenario 3			
>30 kl pm	233	470	546
non-residential	263	350	406

Note the relatively large increases for 1999 in the tariffs for residential consumption above 30 kl per CU per month, and for non-residential consumption. These increases are necessary to partially compensate for the current high levels of non-payment, if the service provider is to move towards meeting its annual cash flow requirements. They are also necessary to compensate for the assumed increase in the price of bulk water.

Monthly bills

The effect of introducing a block tariff structure is to keep the bills of low income (or small) consumers relatively low, and allow those of large (presumably mostly high income) consumers to increase more significantly. The increases for high-income consumers differ relatively little between scenarios, however, in spite of the differences in the tariffs for the third consumption block, because of the relatively low average monthly consumption by the higher income groups.

Because of the limited amount of consumption in the third consumption block by residential consumers, a significant amount of additional income needs to be raised from non-residential consumers. The effects of the tariff increases on the monthly bills of these consumers are

shown in Table 6. The extent of the increase is significant in all scenarios, but by far the greatest in scenario 1 by the end of the investment period when a high level of cross subsidisation to lower income residential consumers is needed. The increase in scenario 2 is also significant, but lower than in scenario 1. In scenario 3 only small increases are required after the initial increase in 1999. The issue then is the extent to which the non-residential sector is willing/able to bear this additional burden.

Table 6. Average monthly bills of non-residential consumers, 1998 and 2008

Scenario 1	**1998**	**2008**
Institutions	132	245
Commerce and "dry'" industry	678	1 216
"Wet" industry	2 630	5 382
Scenario 2		
Institutions	132	203
Commerce and "dry'" industry	678	1006
"Wet" industry	2 630	4 451
Scenario 3		
Institutions	132	172
Commerce and "dry'" industry	678	853
"Wet" industry	2 630	3 776

Alternative tariff structures.

It must be stressed that the tariff structure used in this modelling exercise is only one of many possible options. The model is unfortunately at this stage not able to explicitly model IGGs as a proportion of the bills of low-income households. IGGs have therefore been treated as a lump sum source of income, and a tariff structure adopted that lowers the bills of low-income CUs .

Final tariffs need to be set in conjunction with the Treasurer and other interested parties. The function of the model is to permit negotiation and the testing of alternatives within the constraints provided by costs and financial targets.

Sensitivity analysis

The tariff increases required would be significantly lower if the bulk water price were to remain low. Similarly, if low-income consumers could be persuaded to pay more for the water they consume, and/or if economic growth were to exceed population growth by a significant margin on a sustained basis, tariff increases would be notably lower. However, it would probably be unwise to plan on the basis of any of these eventualities.

The effect of increasing IGGs, if this takes place, is perhaps smaller than expected. Application of the new policy will decrease the tariffs applicable to less poor consumers, but not by very much.

CONCLUSION

Like many other Local Council areas in South Africa, the majority of households in the King William's Town LC are poor and the economy is relatively small. The potential for the cross-subsidisation within the area is limited, and the amount of income that will be forthcoming in the form of Inter-government Grants is unlikely to grow much, if at all. The local authority faces a dilemma :

- High levels of service, in the form of in-house water and waterborne sanitation, are politically popular. Providing these, as currently planned, is likely to be financially possible in the short term due to the availability of capital subsidies. But the long-term financial consequences of this decision could be problematic. Poor households are unlikely to be able to pay enough to cover the costs of the water they consume, and will require subsidisation. The possibility exists that there will be insufficient income from local high-income and non-residential consumers, and in the form of IGGs, to provide the subsidy required. In the absence of a national or provincial "bail-out", the consequence could be the cessation of investment and a breakdown of service provision.

- Lower levels of service, such as communal standpipes, yard tanks or yard taps with on-site sanitation, are currently not being considered. In the short term these may well prove to be politically unpopular. But in the longer term, providing services that are more affordable to the majority of households has the potential to ensure the financial sustainability of the service.

The price that consumers are asked to pay for water is likely to rise regardless of the investment programme adopted, due to the increase in the price of bulk water and to make up for unpaid bills. The question then is whether higher income and non-residential consumers are able to carry the *additional* burden of cross-subsidising high level of consumption on the part of poor households *newly provided* with services. The modelling exercise suggests that the burden may prove too onerous, with the tariff for non-residential consumers for example rising from the current R2.63 per kl to more than R6.00 per kl by 2008 if full levels of service to residential consumers are universally provided. It therefore becomes important for the municipality to consider options in the "middle ground", similar to that presented here as scenario 2. It will also be important to re-assess the situation when the new policy on IGGs is in place.

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1 INTRODUCTION

The Water Supply Services Model (WSSM) is a spreadsheet model designed to test the financial viability of an urban water supply service over a period of ten years. Viability is tested for alternative residential investment programmes, while allowing for different tariff increases, rates of economic growth, bulk water prices and other variables. The model is ideally suited to assist in the formulation of a Water Services Development Plan, and can be used to help determine tariffs and tariff increases on an annual basis. The model is owned by the Water Research Commission.

This report documents the results of the application of the WSSM to the King William's Town TLC. Section 2 contains a description of the current situation, with reference to consumers, current services and backlogs, consumption levels and the financial position of the service provider. Section 3 reports on the outcomes of the modelling exercise. Three investment scenarios are modelled, and the impacts of these on borrowing requirements, bulk water purchases, tariffs, non-payment and cash flows are investigated. This is followed by a sensitivity analysis of a number of the more important variables, using the scenario that most closely reflects the current plans of the TLC. Section 4 draws conclusions from the modelling exercise for service provision in the TLC area.

2 THE CURRENT SITUATION

2.1 THE STUDY AREA

The King William's Town Transitional Local Council, situated in the Eastern Cape, was established in 1994 and is now the seat of Provincial Government. It includes the previously independent municipalities of King William's Town, Bisho and Ginsberg, as well as the four former R293 towns of Zwelitsha, Phakamisa, Ilitha and Dimbaza. Breidbach and Schornville, referred to in the report, are the previously "Coloured" areas of the old King William's Town municipality. The rural village of Tyutyu has been part of the TLC since 1995, while other rural villages within the area have elected not to be included (Davidson et al, 1996).

An important feature of the King William's Town TLC is the geographic distance between the core and some of the outlying areas. For example, Dimbaza lies 15 km to the west of King William's Town, and Ilitha lies some 4 km to the East. In addition, the geographic area includes some rural villages that do not fall within the jurisdiction of the TLC. These features have implications for the capital and operating costs of water supply services and their institutional arrangements.

2.2 POPULATION, HOUSEHOLDS AND CONSUMER UNITS

2.2.1 Population

In a report prepared by Setplan for the King William's Town Transitional Local Council, a population estimate of some 150 000 is provided (Setplan 1997). The population for each area is given in Table 1 below. It is assumed that these are reliable estimates.

2.2.2 Households

There would appear to be some uncertainty regarding the number of households in the TLC area, particularly in the old R293 townships. This uncertainty stems largely from the presence of backyard shacks and some informal areas. Rough estimates of the number of households in the areas that make up the TLC are given in Table 1 below[1]. The sources of information are given in the notes to the table, and in greater detail in Appendix 1, Table 1.

Table 1. Population, sites and households

Area	Population [1]	Households on formal sites[2]	Households in backyard shacks [3]	Informally occupied sites[4]	Total H/holds	Average household size	Av. people per site (formal and informal) [5]
Bisho	5 840	1 465	-		**1 465**	4.0	4.0
Breidbach	6 490	955	-	150	**1 105**	5.9	5.9
Dimbaza	39 150	3438	1500	1 448	**6 386**	6.1	8.0
Ginsberg	5 860	1337	150	136	**1 623**	3.6	4.0
Ilitha	9 210	1394	-	428	**1 822**	5.1	5.1
KWT/ Schornville	23 120	3018	-		**3 018**	7.7	7.7
Phakamisa	8 920	1105	-	211	**1 316**	6.8	6.8
Tyutyu	6 920	459	706		**1 165**	5.9	15.1
Zwelitsha	40 560	3291	4888	1 112	**9 291**	4.4	9.2
Sweetwaters	na	344			**344**	na	na
TOTAL	**147 070**	**16 806**	**7 244**	**3 485**	**27 535**	**5.3**	**7.2**

1. From "King William's Town Framework Plan" (Setplan, September 1997).
2. The number of households on formal sites is taken to be the number of water bills sent for domestic consumption in January 1998. (Information obtained from the Treasury).
3. See Appendix 1,Table 1 for details of estimates.
4. "Informally occupied sites" refer to both formal sites informally occupied (in Dimbaza and Ilitha), and households on informal sites. Information obtained from Setplan (1997) and Town Engineer (see Appendix 1, Table 1).
5. "Average people per site" is greater than average household size because of the presence of backyard shack dwellers. Each dwelling on informally occupied land is counted as a "site".

There are an estimated 27 535 households in the TLC area, some 10 730 of which are currently resident in either backyard shacks (7 245), informally on formal sites (1 175), or on informal sites (2 310). The highest concentration of backyard shacks is to be found in Zwelithsha, followed by Dimbaza. In Tyutyu, sites are large and most of them accommodate more than one household. The "backyard shacks" indicated for this area refer to the secondary dwellings on these plots, regardless of the nature of the dwelling structures. According to the Town Engineer, households on these sites would like separate water connections. This indicates that a form of "informal sub-division" has taken place.

In Dimbaza and Ilitha, there are a number of surveyed residential sites that have been informally occupied (see Appendix 1, Table 1). Water and sanitation services are available on-site, but households are not yet billed for these.

[1] At the time of writing Setplan were in the process of identifying more closely the numbers of households in the various areas.

There is a certain amount of squatting (i.e. the informal occupation of land) in the TLC area. Most squatters are to be found in Zwelithsha, while a few are to be found in Phakamisa, Ginsberg and Breidbach (Qualashe). The households indicated as resident in informal areas in Dimbaza (700) are in fact resident in the Pirie Trust area.

2.2.3 Residential Consumer Units

From the point of view of the service provider, the number of sites to be provided with services is more important than the number of households in an area. The presence of backyard shacks causes a discrepancy between the number of sites and the number of households, since one connection is provided per site and households in backyard shacks make use of this service. The concept of a " residential consumer unit" is therefore used to record the number of individual residential units that a service provider must consider[2]. To illustrate the concept, if on-site connections were provided to all individual sites, then the number of residential consumer units would be equivalent to the number of bills sent for water consumption every month.

When estimating the number of residential consumer units that the service provider is responsible for, both at present and in the future, a decision needs to be taken regarding the permanence of backyard shacks. To the extent that these structures are to be replaced by formal sites over the investment period, they form part of the backlog. If however they are to remain in use as independent dwelling units (although not necessarily by the original residents), they do not form part of the backlog because no new sites or services need to be provided to replace them.

The numbers of backyard shacks currently in Zwelitsha and Dimbaza were estimated from the total number of housing board applications, of roughly 3 000 and 6 000 respectively (Town Engineer, personal communication)[3]. This means that the households currently in these shacks require new sites. However, immigrant or newly formed households might wish to occupy the vacant shacks thus reducing the need for new sites. For the purposes of the modelling exercise the assumption was made that roughly 25 percent of the current shacks will remain in use over a period of ten years, while the rest will fall into disuse as new sites are provided. The same assumption was made for the shacks in Ginsberg.

In Tyutyu, as noted above, households in "backyard shacks" are in fact households on informally subdivided plots. To the extent that they desire individual connections, they have been included as part of the backlog.

The net result of these assumptions is that, while there are 27 535 households, there are about 25 900 residential "consumer units" that need to be considered. The remaining 1 635 households are backyard shack dwellers and this number of shacks will remain in use over the investment period.

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[2] The presence of multiple dwelling units also causes a discrepancy when water is supplied in bulk. The simplest way to deal with this problem is to treat each dwelling unit (e.g. flat, townhouse) as a separate site.

[3] Backyard shack dwellers were estimated to be the number of applications less the number of households informally occupying sites (both formal and informal). There may be a greater number of backyard shack dwellers if some households did not apply for housing board subsidies.

2.2.4 Non-residential Consumer Units

Non-residential consumer units are divided into three categories: (1) institutions; (2) commercial and "dry" industrial consumers; and (3) "wet" industries. The purpose of this subdivision is to project economic growth and consumption more accurately.

From the service provider's point of view, the number of consumer units is equivalent to the number of bills sent out in each of these categories. To this must be added any non-residential consumers who are not billed or who have inadequate services and therefore form part of the backlog of service provision. (e.g. churches or creches in rural villages or informal areas).

For the purposes of this study, it was assumed that there would be very few, if any non-residential consumers who are not billed. The total number of non-residential consumer units was therefore taken to be the number of bills sent for non-domestic water consumption in January 1998. The number of non-residential units and the breakdown between the various categories is shown in Table 2. Details of the breakdown are given in Appendix 1, Table 3.

Table 2. Non-residential consumer units

	Metered	Unmetered	Total
Institutions	66	30	96
Commerce & dry industry	574	100	674
"Wet" industry[1]	12	0	12
TOTAL	**652**	**130**	**782**

1."Wet" industry includes sports fields and industries charged the "industrial" tariff.
Sources: Treasury and Setplan (1997). See Appendix 1, Table 3 for details.

2.2.5 Residential consumer unit and economic growth

The model requires that residential consumer units (i.e. household) and economic growth be projected for ten years. The assumptions made for the KWT TLC are shown in Table 3. The falling residential consumer unit growth rate is in line with national projections of a declining rate of population growth, and is consistent with the assumption that there will not be sufficient economic growth in the area to attract large numbers of immigrants. These projections are conservative, and actual growth may be higher.

Table 3. Household and economic growth projections

Growth rate in year indicated	1998	2003	2008	Average
Residential	**3.7%**	**3.2%**	**2.8%**	**3.2%**
Institutions	2%	2%	2%	2%
Commercial and "dry"	2%	2%	2%	2%
"Wet" industrial	0%	0%	0%	0%
Average economic growth rate	**2%**	**2%**	**2%**	**2%**

A relatively slow rate of economic growth is projected. This is based on the poor record of industrial growth in the recent past (Setplan 1997), and the limited prospects for growth in this sector. However, the TLC's status as a regional commercial centre and the seat of provincial government is likely to ensure some commercial and institutional growth. It must be stressed that these projections are very rough-and-ready, and have not been based on a careful analysis of the TLC's economic potential.

2.2.6 Income distribution

Key to the affordability of any investment programme is the income profile of the consumers it is to serve. If services are provided to consumers who cannot afford (or are not willing) to pay for them, then a problem of non-payment is likely to arise and the financial viability of the service provider will be placed in jeopardy.

The current and projected future income distribution of residential consumer units is shown in Table 4 below. The distribution in 1998 was calculated by estimating the likely distribution for each area, then calculating a weighted average. The details of these calculations are shown in Appendix 2. This distribution is in line with the figure provided in Setplan (1997), where it is stated that 52 percent of households live below the minimum subsistence level which is defined to be an income of roughly R930 per month for a family of five.

Table 4. Current and projected income distribution

Category	Rands per month	1998	2008
very low	less than R800	50%	55%
Low	R801-R1 500	19%	17%
low-middle	R1 501-R3 500	11%	12%
Middle	R3 501-R5 000	10%	9%
High	more than R5 000	10%	8%

Projected income distribution is calculated on the basis of the relative rates of economic and population growth. The worsening distribution over the period is due to the assumption that the rate of economic growth is lower than the projected rate of residential consumer unit growth.

2.3 CURRENT SERVICES

Service levels in the existing formal areas are on the whole high, with in-house water and waterborne sanitation provided on most sites. There are a few sites in Ilitha (496) and Phakamisa (104) that are served by communal standpipes, but upgrading is currently in progress and all the sites in Ilitha will have on-site water within the next few months (personal communication, Town Engineer).

Table 5. Numbers of residential CUs (and %) with water supply services indicated (1998)

In-house water, metered	In-house water, unmetered	Yard taps	Communal standpipes	inadequate (informal areas)	inadequate (backyard shacks)
5 335	10 412	2 131	954	1 459	7 244
21%	40%	4%	8%	6%	22%

Source : Information provided by Treasury and Engineering department. See Appendix 1, Table 2 for details.

All the connections have water meters, but the consumers are charged according to consumption only in Bisho, Breidbach, King William's Town and Schornville. In the other areas a flat rate is charged, based on an estimated consumption of 15 kl per month.

On-site water (yard taps) with waterborne sanitation are provided on the informally occupied surveyed sites in Dimbaza (748) and Ilitha (428), although residents are not yet billed for the

service. In Tyutyu most plots have yard taps[4]. Communal standpipe services are provided in the informal areas in Dimbaza (the Pirie area) and Breidbach (Qualashe).

The service backlog is made up largely of backyard shack dwellers for whom new sites need to be provided, plus the households currently in informal areas in Ginsberg (136), Phakamisa (211) and Zwelitsha (1 112). Backyard shack dwellers do, of course, currently have access to water supply services, but they need to be recorded as part of the backlog because of the investment required to provide services on new sites.

2.4 BULK WATER SUPPLY AND CONSUMPTION

The bulk water supply arrangements are currently fairly complicated, with a combination of raw and treated water purchased from five different dams. The bulk water supply function is however due to be taken over by the newly constituted Amatola Water Board. It is unclear at this stage exactly what the arrangements will be with regard to the control of water sources currently belonging to King William's Town. It is also not known what the future arrangements will be regarding the operation of existing, and the development of new, treatment works. Given this uncertainly, for the purposes of the modelling exercise it was assumed that the provision of bulk infrastructure (including treatment works) will no longer be a function of the KWT TLC. Bulk water costs are dealt with simply as a cost per kl of treated water purchased, including purchases from the TLC's own treatment works.

Due to the complicated supply arrangements and various administrative problems, it was not possible to establish of the amount of bulk water actually used for any period in the last financial year and the amount therefore needed to be estimated. The estimate was done on the basis of the amount of water sold in January 1998, plus an allowance for water provided but not billed for, plus an estimate of an overall water loss of 20 percent. The estimated amounts are shown in Table 6.

Table 6. Estimated amounts of treated water purchased, sold and lost (Ml pa)

	Ml pa	% of total
Water sold to residential consumers	4 313	52%
Water sold to non-residential consumers	1 979	24%
Total water sold	**6 292**	**76%**
Water used by municipality and provided free of charge	345	4%
Water losses	1 709	20%
Total treated water purchased	**8 346**	**100%**

A cross-check of this estimate of water purchased is provided by the average price paid for treated water. An average price of 92c/kl for the 1997/8 financial year was estimated, using budgeted expenditure for the year. This price seems sensible, given a bulk purchase price of R1.38 per kl for treated water from the Laing Dam and about 35 c/kl for untreated water from the Rooikrantz Dam.

An additional cross-check is provided by the model in the form of a "water balance", which demands that the average monthly consumption by service type must be sensible. Average levels of consumption for metered supplies may be seen on sheet 3.13 SUMMARY DATA (operating account) in Appendices 3, 4 and 5. In estimating total consumption, the TLC's estimate of 15 kl per month for households who are charged a flat rate was used. This is a

[4] The services in Tyutyu are considered to be yard taps rather than in-house water because the dwelling structures are informal in nature and proper in-house plumbing is therefore unlikely.

fairly low level of consumption for an unmetered in-house supply, particularly when there are backyard shacks, and actual total consumption may therefore be greater than estimated here.

2.5 INCOME, EXPENDITURE AND CASH FLOWS

Ideally, the base year for the Water Supply Services Model is selected as the last year for which financial statements are available. This ensures that the base year financial position is accurately depicted. For the KWT TLC this was however not a sensible approach due to the involvement of the Provincial Government in the former R293 townships. The approach adopted is indicated in the following sections.

2.5.1 Expenditure

For King William's Town, Bisho, Breidbach, Schornville and Ginsberg, actual expenditure for the first nine months of the current financial year was annualised. For the former R293 areas, actual expenditure for the first eight months of the year was annualised, plus the budgeted amount for bulk water purchases. The latter was necessary because the TLC has thus far not been billed for bulk water delivered to these areas (Treasurer, personal communication). Total expenditure for the year is estimated to be R13.4 million.

2.5.2 Income

The two most important sources of income are income from water sales, and inter-government grants (IGGs).

Table 7. Annual expenditure, income and cash flows on the operating account (R millions)

Total expenditure	**13.40**
Income from sale of water	12.76
IGGs	1.04
Other income	0.10
Total operating income	**13.90**
Budgeted surplus	**0.50**
Non-payment	-3.42
Annual net cash flow[1]	**-2.92**

1. Annual net cash flow refers to the cash flow generated from the operating account only.

The model calculates income from the sale of water based on the information entered on consumer units, tariffs and service levels. The calculated amount is then compared to the actual amount to ensure accuracy. However, no actual amount for 1997/8 was available and the estimated income of R12.76 million was compared to the income for the previous financial year of R10.3 million (excluding VAT). The 1997/8 income from the sale of water is the estimated amount of income billed to consumers, less the amounts paid by means of inter-government grants. This was necessary because a certain percentage of the monthly bills of low-income consumers are paid by means of inter-government grant allocations, with the percentage depending on income. Income from the sale of water calculated by the model therefore refers to the amount that consumers are actually required to pay. The flat rate was therefore reduced from R30.90 per month to an average of R22.90 per month. The model is at this stage unfortunately not able to explicitly credit the accounts of low income CUs with IGG finance.

The amount received in IGGs was set at R1.04 million for the year. This was calculated from the amount actually received in January (annualised). The amount received was less than the

amount applied for. If the amount applied for were annualised, income from this source would amount to R1.66 million for the year. The accuracy of these calculations is however subject to verification.

Income from other sources, such as the testing of meters, was set at R0.1million for the year.

2.5.3 Cash flow

As shown in Table 7, a small budgeted surplus of R0.5 million is estimated for the 1997/8 financial year. However, relatively high levels of non-payment in some areas are likely to translate this budgeted surplus into a cash deficit. Non-payment rates for the current year were estimated from data for the 1996/7 financial year, and the assumption was made that levels of non-payment would be fairly similar. A total non-payment rate of 25 percent was estimated, leading to a cash deficit of R2.9 million for the year. This 25 percent total non-payment rate is calculated assuming a non-payment rate of 70 percent of the amount people are actually required to pay for unmetered water (i.e. for residential consumer units charged a flat rate), 10 percent for metered water sold and 5 percent for other income.

3 THE MODELLING EXERCISE

3.1 THE PURPOSE OF THE MODEL

The purpose of the model is to test the financial viability of a water service provider over a ten year period, allowing for alternative investment programmes and tariff increases. The investment programme allows the user to test the implications, for both the capital and the operating budgets, of providing different levels of service to residential consumer units. The basic rationale for this is as follows:

- Lower levels of service are generally cheaper to provide and result in lower levels of consumption.
- For the service provider, less capital expenditure means a lower borrowing requirement, and therefore lower interest and redemption payments in future years.
- Lower consumption means lower bulk water purchases and (where relevant) treatment costs, and therefore lower operating costs.
- Lower recurrent costs in turn translate into lower tariffs and/or greater income surpluses for the service provider.
- To the consumer, lower consumption and/or tariffs means lower monthly bills.
- For low-income consumers, monthly bills that exceed their ability and willingness to pay will inevitably lead to non-payment. Lower bills therefore reduce the potential for non-payment.
- High levels of payment of bills that generate sufficient income to cover recurrent expenditures will ensure the financial viability of the service provider.

The model thus provides a tool for testing the relationship between an investment programme, tariffs, monthly bills, non-payment rates and financial viability.

3.2 THE KEY VARIABLES

In order to test the financial viability of a water service provider over a ten year period, a range of variables need to be investigated. For the King William's Town TLC three key variables were identified. The first is the investment programme to be adopted, and the second is the amount of income from inter-government grants that the TLC will receive in future years. The third variable is the price of (treated) bulk water, which is to be determined partly by the Amatola Water Board from next year, and partly by the cost of treating water.

3.2.1 The investment programmes

The residential investment programme, which determines the levels of service provided, is of key importance in this area because of the income profile of residential consumers and the relatively small economy. The majority of households (or residential consumer units) are poor and can afford to pay only limited amounts for water, while there is restricted potential for cross-subsidisation within the TLC. High levels of service, with the associated high levels of consumption, are likely to lead to high levels of non-payment due to bills that households simply cannot afford to pay.

There are already high levels of service in the area, and high levels of non-payment. Current plans are to continue providing these high levels of service, in the form of either in-house water or yard taps with waterborne sanitation. The investment scenarios tested were therefore:

- Scenario 1 : In-house water or yard taps provided for all, with waterborne sanitation.
- Scenario 2 : An "intermediate" scenario, with mixed services.
- Scenario 3 : A low service level "baseline" scenario, which involves the provision of communal standpipes only, both to accommodate new low-income households and to make up the backlog of services.

3.2.2 Inter-government grants

The amounts that low-income households actually need to pay, and therefore the likelihood of non-payment, depends on the extent to which they can be subsidised by IGGs. The currently (fairly generous) scheme of subsidising up to 70 percent of the bills of these households will (probably) reduce the amounts payable to within an affordable range. However, the important question is whether this level of IGGs is sustainable over the investment period and beyond. It was felt prudent to make conservative assumptions during the modelling exercise, and the assumption made for scenarios 1, 2 and 3 is that the real value of the amount to be received in 1997/8 will be maintained but not increased. In other words, the amount of IGG allocated to water supply services (R1.04 million) will increase to keep pace with inflation but no more.

The recently announced policy on recurrent subsidies (RSA 1998) provides for an amount of up to R86 per household per month for households with incomes below R800 per month (1998 prices). This amount must cover all the services provided by the local authority. If the full amount due is in fact provided over the investment period, and if a reasonable share of this is allocated to water supply, then the amount received will exceed the R1.04 million estimated for this year. The effects of real increases are analysed in section 3.4 below.

3.2.3 The bulk water price

A key operating cost is the price of bulk water. As discussed in section 2.4 above, the effective price of bulk (treated) water is currently in the region of 92 c/kl. When the Amatola Water Board takes over the bulk water supply function, it is inevitable that the price of untreated water will rise. The price of treated water purchased from the Board will probably

also increase. No decisions have yet been taken on the extent and timing of these increases, and, for the purposes of this study, certain assumptions needed to be made. These assumption are shown in Table 8, which indicates a real increase of 10 percent per annum for the next four years, followed by increases of 2 percent per annum (real) for the remainder of the period. By 2008 the price (in 1998 Rands) would be R1.53 per kl. The implications of smaller price increases are analysed in section 3.4 below.

Table 8. Assumed increases in the bulk purchase price of treated water (real, 1998 prices)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
% pa	na	10%	10%	10%	10%	2%	2%	2%	2%	2%	2%
c/kl	93	102	112	124	136	139	142	145	147	150	153

3.3 RESULTS OF THE MODELLING EXERCISE

3.3.1 Residential investment programmes and service levels

An investment programme involves (1) making provision for new households, and (2) making up the current backlog of services. In all the scenarios modelled, the backlog is made up over a period of ten years along an S-curve. The services provided are as follows:

Scenario 1

- New CUs with incomes below R3 500 per month are provided with in-house water and yard taps with waterborne sanitation in a ratio of 60 to 40.
- CUs currently in backyard shacks or informal areas with no services are provided with in-house water and yard taps with waterborne sanitation in a ratio of 60 to 40.
- CUs currently served by communal standpipes (mainly in the Pirie area) are provided with in-house water and yard taps with waterborne sanitation in a ratio of 10 to 90.
- All CUs with incomes exceeding R3 500 per month are provided with in-house water.

Scenario 2

- 5 percent of new CUs with incomes below R3 500 per month are provided with in-house water, 50 percent with yard taps and on-site sanitation, 30 percent with yard taps and waterborne sanitation, and the remaining 15 percent with communal standpipes.
- CUs currently in backyard shacks or informal areas with no services are provided with services in the same ratios as new low-income CUs.
- 50 percent of CUs currently served by communal standpipes (mainly in the Pirie area) are provided with yard taps and on-site sanitation.
- All CUs with incomes exceeding R3 500 per month are provided with in-house water.

Scenario 3

- Only communal standpipes are provided when new sites or services are required for CUs with incomes below R3 500 per month.
- All CUs with incomes exceeding R3 500 per month are provided with in-house water.

The service levels resulting from these investment scenarios are shown in Table 9 for year 10 of the investment programme, along with service levels in 1998.

Table 9. Services levels in 1998 and 2008 for scenarios 1, 2 and 3

	1998	2008		
		Scenario 1	Scenario 2	Scenario 3
Inadequate	27%	0%	0%	0%
Standpipes	4%	0%	8%	48%
Yard taps (on-site sanitation)	0%	0%	24%	0%
Yard taps (w/borne sanitation)	8%	26%	20%	6%
In-house	61%	74%	48%	46%

Source : Sheet 3.12 of Appendices 3, 4 and 5.

3.3.2 "Mismatches" between services and income levels

Higher levels of service are generally associated with higher levels of consumption and therefore larger monthly bills. These bills can be reduced by internal cross-subsidisation and/or IGGs. There are, however, limits to how much subsidisation will be possible over the ten year investment period in the KWT TLC area. It follows therefore that the potential for non-payment in the area will be greater the higher the proportion of CUs with services they cannot afford to pay for (after allowing for reasonable subsidisation).

In order to gain some indication of the potential for non-payment for each scenario, the concept of a "mismatch" between incomes and services is used. A "mismatch" is said to occur when CUs with incomes below R1 500 per month are provided with on-site water and waterborne sanitation. A second type of mismatch can occur when CUs with incomes below R800 per month receive yard taps with on-site sanitation. This mismatch is however unlikely to be as important as the first type since the gap between the amounts billed and the amounts that can be paid is likely to be smaller.

Table 10 shows the extent of the "mismatch" in 1998 and in 2008 for the three investment scenarios. In 1998, 38 percent of residential CUs have on-site water and waterborne sanitation but incomes below R1 500 per month. In scenario 1, all CUs are provided with these services by 2008 and the "mismatch" increases to 72 percent. In scenario 2 the total "mismatch" amounts to 64 percent of residential CUs, but the more important type of mismatch falls to 40 percent. In spite of the unrealistically low sevice levels provided in scenario 3, by 2008 almost one quarter of CUs still have high levels of service but incomes below R1 500 per month. This is because of the high levels of service already provided[5].

Table 10. "Mismatches" between incomes and services in 1998 and 2008 for scenarios

	1998	2008		
		Scenario 1	Scenario 2	Scenario 3
In-house or yard tap (w/b), with incomes below R1 500 pm	38%	72%	40%	24%
Yard tap (on-site sanitation), with incomes below R800 pm	0%	0%	24%	0%

Source : Sheet 3.12 of Appendices 3, 4 and 5.

These "mismatches" only provide an indication of the potential for non-payment. Actual non-payment rates depend on other factors, the most important of which are willingness to pay and actual monthly bills. These are discussed in section 3.3.6 below.

[5] This "mismatch" is in fact calculated on the assumption that CUs with incomes exceeding R1 500 per month who need new sites move onto existing sites with on-site water, and the poorer CUs move onto the new sites which are provided with communal standpipes.

3.3.3 Capital expenditure and sources of finance

The capital expenditure associated with each of the scenarios is summarised in Table 11, for the first and second five year periods respectively. These amounts include total expenditure on reticulated services, connector infrastructure and asset replacement. Financing of reticulated infrastructure for non-residential and high income CUs is however not usually the responsibility of the local authority, and it is assumed that this is financed by means of consumer payments (via private developers). The amounts for which the TLC is directly responsible are shown in the last line of the table, on the assumption that the local authority is responsible for financing reticulated services for all low-income developments.

Expenditure on reticulated services for residential consumers in scenario 1 is roughly twice as much as in scenario 3, due to the significantly greater cost per CU of providing on-site water rather than communal standpipes (see Appendix 3, 4 or 5, sheet 3.12). The cost of connector infrastructure is also significantly higher, due to the higher levels of consumption in scenario 1 (see section 3.3.4 below). Note that in all the scenarios, expenditure on connector infrastructure is higher in the second period than the first. This is because of the steep price increases in the initial period (see section 3.3.7) and the assumption that higher prices will lead to water saving. Less additional capacity is therefore required to cater for new connections.

Table 11. Capital expenditure (R millions, real)

R'000 (1998 Rands)	**Scenario 1: all on-site**		**Scenario 2 : mixed levels**		**Scenario 3 : baseline**	
	Total, years 1-5	**Total, years 6-10**	**Total, years 1-5**	**Total, years 6-10**	**Total, years 1-5**	**Total, years 6-10**
Reticulated - new residential	8.23	8.46	6.83	7.07	4.58	4.84
Reticulated - new non-res.	0.19	0.21	0.19	0.21	0.19	0.21
Reticulated – backlog	6.71	6.71	5.22	5.22	3.18	3.18
Connector infrastructure	6.40	8.00	3.15	4.93	0.76	2.71
Asset replacement	2.59	2.59	2.59	2.59	2.59	2.59
TOTAL	**24.1**	**26.0**	**18.0**	**20.0**	**11.3**	**13.5**
Total by TLC	23.3	24.9	17.2	18.9	10.5	12.5

Source : Sheet 3.3 of Appendices 3, 4 and 5.

The sources of finance for capital expenditure are shown in Table 12 for the three scenarios. Housing subsidies and the CMIP grant for connector infrastructure are the most important sources of finance. Borrowing requirements are also significant in all three scenarios, and in the first five year period are required largely to finance asset replacement. The significantly greater borrowing requirement in the second five year period compared to the first in all scenarios stems largely from the assumption that the real value of housing subsidies and the CMIP grant will increase, on average, at only half the rate of inflation. This also explains the smaller amount of finance from housing subsidies in the second period in all scenarios and the level of the CMIP grant in scenario 1.

Table 12. Sources of finance for capital expenditure (R millions, real)

R'000 (1998 Rands)	Scenario 1: all on-site		Scenario 2 : mixed levels		Scenario 3 : baseline	
	Total, years 1-5	Total, years 6-10	Total, years 1-5	Total, years 6-10	Total, years 1-5	Total, years 6-10
Housing subsidies	12.80	10.79	10.21	8.60	6.60	5.56
CMIP grant	6.21	5.24	3.09	3.97	0.75	2.41
Consumer payments	1.22	1.53	1.13	1.44	0.77	1.02
Current income	0.22	0.31	0.21	0.27	0.20	0.23
Borrowing	**3.67**	**8.10**	**3.34**	**5.74**	**2.99**	**4.25**

Source : Sheet 3.3 of Appendices 3, 4 and 5.

The specific assumptions made regarding subsidies and consumer payments are as follows:

- All high-income and non-residential CUs pay the full costs of reticulated services, but the local authority finances any connector infrastructure required.
- Low-income CUs who receive communal standpipe services do not make an up-front capital payment.
- Low-income CUs who receive an on-site service pay an up-front fee of R50.
- The rest of the internal service cost for low-income consumers is paid for out of the housing subsidy in 1999, and by a combination of the housing subsidy and local authority borrowing in subsequent years as the real value of the housing subsidy falls.
- A CMIP subsidy amount of no more than R800 per household is allocated to connector infrastructure, and the real value of the allocated amount falls to R540 by 2008. The result of this assumption is that the subsidy finances most of the connector infrastructure required in the first five year period for all scenarios, and in the second five year period for scenarios 2 and 3[6].

The amount of capital expenditure financed out of current income is calculated as a percentage of total (accrued) income, and is higher in scenario 1 than in either scenarios 2 or 3 because of the larger total amount billed (see section 3.3.9 below)[7].

The amount of borrowing required is important for two reasons. Firstly, if the service provider experiences on-going cash flow problems it is unlikely that any lending institution will provide the necessary finance. Secondly, borrowing results in interest and redemption charges, which are recurrent expenditures that need to be paid annually out of current income. The greater the amount borrowed, therefore, the higher tariffs need to be in future years to cover the repayments.

3.3.4 Consumption

In estimating future consumption two important assumptions were made :

- water losses will fall to 15 percent of the total amount purchased by year 5 and remain at that level
- consumers will respond to higher water prices by reducing their demand[8].

[6] The maximum amount required in any year for scenario 2 is R650 per household, and R375 per household for scenario 3 (in 1998 Rands).

[7] It is assumed that, as from 1999, 1 percent of accrued income is spent on fixed assets, and of that amount 20 percent is spent on new infrastructure and asset replacement.

Higher levels of service are generally associated with higher levels of consumption, and for this reason predicted bulk water purchases are highest in scenario 1 and lowest in scenario 3. Total purchases in 1998, 2003 and 2008 are shown in Table 13.

Table 13. Water consumed and purchased (Ml per annum)

Ml per annum		Scenario 1: all on-site		Scenario 2 : mixed levels		Scenario 3 : baseline	
	1998	2003	2008	2003	2008	2003	2008
Total consumed	6 637	8 134	9 797	7 507	8 584	7 059	7 730
Total purchased/purified	8 346	9 569	11 526	8 832	10 099	8 305	9 094
Losses (%)	20%	15%	15%	15%	15%	15%	15%

Source : Sheet 3.11 of Appendices 3, 4 and 5.

3.3.5 Recurrent expenditure

The recurrent expenditure associated with each scenario is shown in Table 14 for the years 1998, 2003 and 2008 respectively. Recurrent expenditure is set to increase regardless of the investment programme adopted, largely due to the assumed increase in the bulk water price. Expenditure on bulk water is greatest in scenario 1, where the amount used is greatest, and lowest in scenario 3 where, because of the services provided, consumption is lowest.

Table 14. Recurrent expenditure in 1998, 2003 and 2008 (R millions, real)

R'000 (1998 Rands)		Scenario 1: all on-site		Scenario 2 : mixed levels		Scenario 3 : baseline	
	1998	2003	2008	2003	2008	2003	2008
Staff, maintenance & general (excl bulk)	3.32	4.75	6.05	4.55	5.64	4.07	4.68
Bulk purchase (treated)	7.77	13.29	17.67	12.26	15 479	11.53	13.94
Capital charges	1.50	1.25	1.87	1.19	1.48	1.13	1.23
Contributions	0.87	1.04	1.37	0.94	1.12	0.86	0.96
Total	**13.5**	**20.3**	**26 9**	**18.9**	**23.7**	**17.6**	**20.8**

Source : Sheet 3.5 of Appendices 3, 4 and 5.

Staff, maintenance and general expenditures are highest in scenario 1 and lowest in scenario 3 for two reasons. The first reason lies in the (assumed) higher administration costs per CU of metered connections than communal standpipes. Secondly, over a period of time higher levels of consumption mean additional infrastructure that needs to be operated and maintained.

Capital charges include both repayments on loans raised prior to the investment programme, and payments on new loans. In all the scenarios payments on existing loans are assumed to remain unchanged in nominal terms throughout the period, thus falling in real terms. Payments on new loans are calculated assuming a borrowing rate of 14.5 percent[8] and a repayment period of 15 years.

"Contributions" include contributions to fixed assets as well as funds. Because the model calculates contributions as a percentage of accrued income, these are greatest in scenario 1 and smallest in scenario 3.

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[8] Elasticities of demand were assumed to be –0.2 for residential consumers and –0.15 for non-residential consumers. This means that for every 10 percent increase in the price of water, residential and non-residential consumers reduce their demand by 2 percent and 1.5 percent respectively.

[9] With an inflation rate of 8 percent per annum, this translates into a real rate of 6 percent.

3.3.6 Non-payment and levels of service

To the extent that the water supply service is expected to be *at least* financially self-sufficient, consumer payments must cover *at least* the full costs of service provision. Two interrelated factors are of importance here, namely water tariffs and levels of payment.

The significance of income distribution, ability to pay and service level mismatches has already been discussed. To summarise, poor CUs have limited ability to pay for services. To the extent that such CUs are billed more than they can afford, they will not pay or will pay only a proportion of the full amount due. Other consumers, and particularly high income and non-residential consumers, will then need to pay additional amounts to make up the difference. Tariffs will need to be set in such a way that these additional amounts are recovered, and it follows that the higher the levels of non-payment, the higher tariffs need to be to provide this "cross-subsidy".

The extent of the "cross-subsidy" will depend on the proportion of CUs who cannot afford to pay the amounts billed. When water is charged for according to consumption, it follows that the larger the proportion of CUs with high levels of service but low incomes, the higher the level of non-payment and the greater the "cross-subsidy" required. An indication of the potential for non-payment was given in Table 10, which shows the service level "mismatch" for each scenario. The non-payment rates calculated by the model in 2008 for each of the scenarios are shown in Table 15. These rates are calculated for the tariffs shown in **Table 16** and on the assumption that CUs in the lower income groups are willing to pay maximum monthly amounts for water of R15, R35 and R65 respectively[10]. The figures in the table are for residential and non-residential consumers combined. A breakdown of non-payment by consumer group is given in Appendices 3, 4 and 5 (sheet 3.5).

Table 15. Non-payment rates in 1998, 2003 and 2008.

Total non-payment	1998	2003	2008
Scenario 1	25%	21%	21%
Scenario 2	25%	17%	15%
Scenario 3	25%	16%	13%

Source : Sheet 3.5 of Appendices 3, 4 and 5.

3.3.7 Tariffs

When setting tariffs two important sets of decisions need to be taken, which are (1) the tariff structure to be adopted and (2) the net cash surplus to be generated (or deficit to be permitted) for each year on the operating account.

A range of tariff structures is possible which would have similar effects on net cash surpluses (deficits). Tariff structures however also have implications for equity and conservation, which need to be considered.

The tariff structure selected for the three scenarios is as follows:

- CUs served by communal standpipes pay a flat rate of R8 per month, and this increases only to keep pace with inflation.
- All yard and house connection services are charged according to the amount consumed within three years (i.e. consumption is metered and charged for accordingly).

[10] These payments amount to 3.8 percent, 3 percent and 2.8 percent respectively of the average incomes of the three low-income categories (R0-R800, R801-R1 500 and R1 501-R3 500 per month).

- Metered connections pay a consumption charge only (i.e. there are no fixed monthly charges).
- Residential CUs pay for water consumption according to a three block rising tariff, with blocks and tariffs set in accordance with the National Water Supply Regulations of 1997 The consumption blocks are 0-10 kl per month, 10-30 kl per month and more than 30 kl per month.
- Non-residential consumers pay a single rate for water consumed (i.e. block tariffs do not apply).

Tariff levels have been set in such a manner that the service at least breaks even by 2000, and generates a small cash surplus in at least some of the years thereafter. These surpluses are required to eliminate the accumulated cash deficit, which is eliminated by 2008 or before (see Table 19 and Appendices 3, 4 and 5 sheet 1.16).

The tariffs that meet these requirements for each of the investment scenarios are shown in **Table 16** for the years 1999, 2003 and 2008 (VAT excluded). The rates for consumption blocks 1 and 2 meet the requirements of the National Water Supply Regulations, and have been kept the same for all three scenarios. These Regulations require that the prices be set respectively no higher than the average operating cost of the system, and at least as much as the average historic cost. By 2008 these costs are in the region of 185c/kl and 270c/kl respectively. Year-by-year tariffs, real percentage increases and system costs are shown in Appendices 3, 4 and 5 (sheet 1.16)[11].

Table 16. Tariffs for 1998, 1999, 2003 and 2008 (c/kl, 1998 prices, excluding VAT)

Scenario 1	**1998**	**1999**	**2003**	**2008**
0-10 kl	233	135	160	168
10-30 kl pm	233	280	333	349
>30 kl pm	233	470	649	819
non-residential	263	350	483	616
Scenario 2				
0-10 kl	233	135	160	168
10-30 kl pm	233	280	333	349
>30 kl pm	233	470	593	663
non-residential	263	350	442	494
Scenario 3				
0-10 kl	233	135	160	168
10-30 kl pm	233	280	333	349
>30 kl pm	233	470	539	546
non-residential	263	350	402	406

Source : Sheet 1.16 of Appendices 3, 4 and 5.

Note the relatively large increases for 1999 in the tariffs for residential consumption above 30 kl per CU per month, and for non-residential consumption. These increases are necessary to partially compensate for the current high levels of non-payment[12], if the service provider is to move towards meeting its annual cash flow requirements. . They are also necessary to the compensate for the assumed increase in the price of bulk water

By year 10 of the investment programmes the tariffs for the third consumption block and non-residential CUs are highest in scenario 1. Tariffs are lowest in scenario 3 and increase

[11] For further discussion of setting tariffs according to the National Water Supply Regulations, see Module 4 of "Management Guidelines for Water Service Institutions (urban)" (WRC, forthcoming).
[12] Additional income from these sources is temporarily required while payment levels are increased, and will be permanently required to the extent that households are required to pay more than they are able to afford.

relatively little after the initial adjustment in 1999. The high tariffs in scenario 1 result from the need to charge better-off and non-residential consumers more in order to pay for the water that those with high levels of service but low incomes use, but cannot pay for. Tariffs in scenario 2 are lower than in scenario 1 because, with a smaller level service "mismatch", non-payment (or the need for cross-subsidisation) is lower (see Table 10 and Table 15).

3.3.8 Monthly bills

The average monthly amounts that residential consumers will need to pay for water (over and above subsidies provided) are shown in Table 17[13]. The bills for communal standpipes and metered on-site connections only are shown. As the figures show, the effect of introducing a block tariff structure is to keep the bills of low-income (or small) consumers relatively low, and allow those of large (presumably mostly high-income) consumers to increase more significantly. The increases for high-income consumers differ relatively little between scenarios, however, in spite of the differences in the tariffs for the third consumption block. This is because of the estimated relatively low average monthly consumption by the higher income groups, which in 1998 are 25 kl per month and 30 kl per month respectively.

Table 17. Monthly bills of residential consumer units (R per month, 1998 Rands)

Scenario 1	1998	1999	2003	2008
Communal standpipes	12.50	8	8	8
Yard taps (on-site sanitation)	Na	na	na	na
Yard taps (w/borne sanitation)	(flat rate)	23	26	27
In-house (low income)	42	38	44	45
In-house (middle income)	58	65	73	77
In-house (high income)	71	80	89	94
Scenario 2				
Communal standpipes	12.50	8	8	8
Yard taps (on-site sanitation)	na	13	14	15
Yard taps (w/borne sanitation)	(flat rate)	23	26	27
In-house (low income)	42	38	44	45
In-house (middle income)	58	65	71	74
In-house (high income)	71	80	88	91
Scenario 3				
Communal standpipes	12.50	8	8	8
Yard taps (on-site sanitation)	na	na	na	na
Yard taps (w/borne sanitation)	(flat rate)	23	26	27
In-house (low income)	42	38	44	45
In-house (middle income)	58	65	70	72
In-house (high income)	71	80	87	89

Source : Sheet 3.7 of Appendices 3, 4 and 5.

Because of the limited amount of consumption in the third consumption block by residential consumers, a significant amount of additional income needs to be raised from non-residential consumers. The effects of the tariff increases on the monthly bills of these consumers are shown in Table 18. The extent of the increase is significant in all scenarios, but by far the greatest is for scenario 1, by the end of the investment period, when high levels of cross-subsidisation to lower income residential consumers are needed. The increase in scenario 2 is also significant, but lower than in scenario 1. In scenario 3 only small increases are required after the initial increase in 1999.

[13] These amounts are calculated after allowing for reduced consumption levels induced by the higher prices. For example, the average monthly consumption of high income households is assumed to fall from 30 kl per month in 1998 to 28 kl per month in 2008 in scenario 1 (see sheet 3.13 of Appendices 3,4 and 5).

Table 18. Monthly bills of non-residential consumer units (R per month, 1998 Rands)

Scenario 1	1998	1999	2003	2008
Institutions	132	165	199	245
Commerce and "dry"" industry	678	832	985	1 216
"Wet" industry	2 630	3 500	4 421	5 382
Scenario 2				
Institutions	132	165	184	203
Commerce and "dry""industry	678	832	910	1006
"Wet" industry	2 630	3 500	4 087	4 451
Scenario 3				
Institutions	132	165	169	172
Commerce and "dry"industry	678	832	837	853
"Wet" industry	2 630	3 500	3 757	3 776

Source : Sheet 3.7 of Appendices 3, 4 and 5.

3.3.9 Cash surpluses (deficits) and budgeted surpluses (deficits).

The cash flows and budgeted surpluses (deficits) that result from the tariff increases adopted are shown in Table 19 for each of the scenarios. The gap between the budgeted surplus and the annual net cash flow (on the operating account) is due to non-payment, and is thus the greatest in scenario 1 and the smallest in scenario 3.

Table 19. Budgeted surpluses and cash flows (R millions, 1998 Rands)

Scenario 1	1998	2003	2008
Budgeted surplus (-deficit)	0.4	5.7	7.3
Annual net cash flow	-3.3	0.1	0.0
Year end cash balance[1]	-3.3	-1.8	0.0
Scenario 2			
Budgeted surplus (-deficit)	0.4	4.5	4.2
Annual net cash flow	-3.3	0.0	0.0
Year end cash balance[1]	-3.3	-2.2	0.0
Scenario 3			
Budgeted surplus (-deficit)	0.4	4.0	3.2
Annual net cash flow	-3.3	0.4	0.0
Year end cash balance[1]	-3.3	-1.4	0.0

1 It is assumed that the cash balance at the beginning of 1998 is zero.

Source : Sheet 3.13 of Appendices 3, 4 and 5.

3.3.10 Inter-government grants and alternative tariff structures.

It must be stressed that the tariff structure used in this modelling exercise is only one of many possible options. The model is unfortunately at this stage not able to explicitly model IGGs as a proportion of the bills of low-income households. IGGs have therefore been treated as a lump sum source of income, and a tariff structure adopted that effectively lowers the bills of low-income CUs (on the assumption that their consumption is relatively low). The effect of this on the tariffs applicable to non-residential consumers is similar to adopting higher tariffs for the first two residential consumption blocks and then subsidising the bills of low income CUs with the money provided by IGGs.

Final tariffs need to be set in conjunction with the Treasurer and other interested parties. The function of the model is to permit negotiation and the testing of alternatives within the constraints provided by costs and financial targets.

3.4 SENSITIVITY ANALYSIS

As previously discussed, a large number of factors influence the cost of running a water supply service. In this section, a number of the more important assumptions are changed to see the effect these can have on tariffs and cash flows, and therefore the viability of the investment programme selected.

A sensitivity analysis was conducted for scenario 1, which is the scenario reflecting the current plans of the King William's Town TLC. Alternative assumptions were made regarding the bulk water price, the amounts that low income CUs are willing to pay for water, the rate of economic growth, the rate of increase in capital subsidies, and the rate of increase in inter-government grants. The effects were tested by establishing the tariffs for non-residential consumers that are required to meet the cash flow requirements specified in the original scenario. The tariffs in 2008 are shown in Table 20, along with the percentage differences compared to the original scenario.

Table 20. Sensitivity of the non-residential tariff to various factors (scenario 1)

	Tariff	% change
Original scenario	570	na
Bulk water tariff : originally increases to R1.53 by 2008		
Bulk water tariff = R1/kl over investment period	275	-52%
Bulk water tariff = R1.35/kl for 2002-2008	498	-13%
Willingness to pay : increased from R15, R35 and R65 to:		
R25, R45 and R70	460	-19%
R20, R40 and R70	500	-12%
Economic growth : increased from average of 2% to:		
5 % per annum	460	-19%
4 % per annum	480	-16%
Capital subsidies : originally nominal increases of 50 % of inflation rate		-
Maintain real value	538	-6%
Inter-government grants : originally zero real increase		
Real increase of 5 % pa	543	-5%
Real increase of 10 % pa	490	-14%
Increases to R4.66 million pa by 2008, but very poor CUs pay only R5 per month (instead of R15)	540	-5%

Of the variables tested, the bulk water tariff has potentially the most significant effect on non-residential tariffs, and therefore the financial viability of the investment programme. If the price of bulk treated water were to remain R1 per kl (excluding VAT) throughout the period in real terms (i.e. increasing only to keep pace with inflation), the tariff for non-residential consumers would be less than half of the tariff in the original scenario. The (real) increase from the base year tariff of R2.63 would be minimal. It is however improbable that the bulk water price will remain this low, and a price increase to R1.35 per kl would result in an increase in the tariff to R4.98 per kl by 2008 (1998 prices). The sensitivity of the non-residential tariff to the bulk water price indicates the importance of making a well considered decision regarding this variable. Planning on the basis of unrealistic assumptions has potentially serious consequences for the financial viability of the service provider.

Increasing the amounts that low-income CUs are willing to pay for water has potentially significant effects on the tariff increase required for non-residential consumption. If larger amounts are paid, non-payment will be lower and the "cross-subsidy' required from the non-residential sector will be lower.

A higher rate of economic growth rate will lower the tariff applicable to non-residential consumers. The first reason for this is that there will be more non-residential consumers to share the burden of "cross-subsidisation". Secondly, with more employment and higher household incomes, residential CUs will be in a position to make larger monthly payments. A rapid rate of economic growth may however attract new low-income households to the area, which would once again increase the amount of "cross-subsidisation" required.

Allowing capital subsidies to keep pace with inflation has a small impact only on non-residential tariffs.

The effects in increasing IGGs are less significant than expected. Perhaps the most important result is the last, which is a rough estimate of the effects of the new policy on recurrent subsidies. It was assumed that roughly R20 of the R85 will be made available for water supply for all CUs with incomes below R800 per month. It was further assumed that these CUs pay an additional R5 per month (instead of R15 as in the other scenarios). The non-residential tariff is then some 5 percent lower by year 10 compared to the original scenario.

4 CONCLUSION

Like many other Local Council areas in South Africa, the majority of households in the King William's Town LC are poor and the economy is relatively small. The potential for the cross-subsidisation within the area is limited, and the amount of income that will be forthcoming in the form of Inter-government Grants is unlikely to grow much, if at all. The local authority faces a dilemma :

- High levels of service, in the form of in-house water and waterborne sanitation, are politically popular. Providing these, as currently planned, is likely to be financially possible in the short term due to the availability of capital subsidies. But the long-term financial consequences of this decision could be problematic. Poor households are unlikely to be able to pay enough to cover the costs of the water they consume, and will require subsidisation. The possibility exists that there will be insufficient income from local high-income and non-residential consumers, and in the form of IGGs, to provide the subsidy required. In the absence of a national or provincial "bail-out", the consequence could be the cessation of investment and a breakdown of service provision.

- Lower levels of service, such as communal standpipes, yard tanks or yard taps with on-site sanitation, are currently not being considered. In the short term these may well prove to be politically unpopular. But in the longer term, providing services that are more affordable to the majority of households has the potential to ensure the financial sustainability of the service.

The price that consumers are asked to pay for water is likely to rise regardless of the investment programme adopted, due to the increase in the price of bulk water and to make up for unpaid bills. The question then is whether higher income and non-residential consumers are able to carry the *additional* burden of cross-subsidising high levels of consumption on the part of poor households *newly provided* with services. The modelling exercise suggests that

the burden may prove too onerous, with the tariff for non-residential consumers for example rising from the current R2.63 per kl to more than R6.00 per kl by 2008 if full levels of service are universally provided.

If the whole town were to be subsidised by means of a bulk water price in the order of R1.00 per kl for treated water, then the universal provision of high levels of service becomes a possibility. It would however probably be unwise to plan on the assumption that the bulk water price will continue to be substantially subsidised, given current national policy on the issue.

The final conclusion to be drawn from this study is that the financial viability of providing full levels of service to everyone in the King William's Town TLC is questionable. It therefore becomes important to consider options in the "middle ground", similar to that presented here as scenario 2. It will also be important to re-assess the situation when the new policy on IGGs is in place.

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APPENDIX 1 POPULATION, CONSUMER UNITS AND SERVICE LEVELS

APPENDIX 1. POPULATION, CONSUMER UNITS AND SERVICE LEVELS

Table 1 Numbers of households

Area	Populaton [1]	Occupied formal residential sites [1]	Number of water bills sent (Jan 1998) [2]	Households in backyard shacks [3]	Informally occupied formal sites (no. h/hs)[3]	Dwellings in informal areas [3]	Total h/hs (billed + informal + backyard)	Average household size	Av persons per site (formal and informal) [8]
Bisho	5 839	1 400	1 465	-		-	1 465	4.0	4.0
Breidbach[4]	6 485	1 100	955	-		150	1 105	5.9	5.9
Dimbaza[5]	39 147	3 100	3 438	1 500	748	700	6 386	6.1	8.0
Ginsberg	5 858	1 300	1 337	150		136	1 623	3.6	4.0
Ilitha	9 207	1 300	1 394	-	428	-	1 822	5.1	5.1
KWT/Schornville	23 116	2 400	3 018	-		-	3 018	7.7	7.7
Phakamisa	8 921	1 250	1 105	-		211	1 316	6.8	6.8
Tyutyu[6]	6 922	1 100	459	706			1 165	5.9	15.1
Zwelitsha[7]	40 562	2 400	3 291	4 888		1 112	9 291	4.4	9.2
Sweetwaters			344	-		-	344	-	-
TOTAL	**146 057**	**15 350**	**16 806**	**7 244**	**1 176**	**2 309**	**27 535**	**5.3**	**7.2**

1. Information from Setplan (1997).
2. Number of bills sent from Treasury, for January 1998.
3. Estimated after personal communication with Setplan and KWT TLC engineering department.
4. Informal areas in Breidbach are in Qualashe (zoned agricultural). Estimated after communication with engineering department.
5. "Informal" areas in Dimbaza refer to the Pirie area, which is in fact a rural village. Informal dwellings in Dimbaza on (informally occupied) formal sites have water and sanitation services, but households are not yet billed. The number of backyard shacks is extimated, based on the 3 000 housing board applications received by the TLC (Chris Hetem, personal commucation).
6. Sites in Tyutyu are large and accommodate more than one family each. The number of "informal structures" provided by Setplan are recorded as "backyard shacks". If it is assumed that most sites have yard taps (459, as billed), then there are on average 2.5 households per site.
7. There are currently some 6 000 households in Zwelishsa who have applied for houses (Chris Hetem, personal communication). The estimate of dwellings in informal areas was provided by Setplan (1997 and personal communication).
8. The difference between household size and and persons per site stems from the presence of backyard shacks in some areas.

APPENDIX 1. (continued)

Table 2 Residential service levels

Area	In-house water, metered	In-house water, unmetered 1	Yard taps	Communal s/pipes	Inadequate (informal)	Inadequate (b/yard shacks)7
Bisho	1 465				-	-
Breidbach2	852	103		150		-
Dimbaza3		3 438	748	700		1 125
Ginsberg		1 337			136	112.50
Illitha4		898	924		-	-
KWT/Schornville	3 018				-	-
Phakamisa5		1 001		104	211	-
Tyutyu6			459			706
Zwelitsha		3 291			1 112	3 666
Sweetwaters		344			-	-
TOTAL	5 335	10 412	2 131	954	1 459	5 610
%	20.6%	40.2%	8.2%	3.7%	5.6%	21.7%

1. All on-site connections do in fact have meters, but households in the areas indicated are being charged a flat rate.
2. The informal areas are provided with public standpipes (Engineering Department).
3. Households in the Pirie area of Dimbaza currently have access to comunmunal standpipes, for which they are not charged. Upgrading planned.
4. According to the billing information for January, 428 sites in Illitha were served by communal standpipes. Upgrading is however currently in progress, so that within the next few months all (formal?) sites will have on-site water. It is assumed that the new, and some of the existing services are yard taps rather than in-house water.
5. In January 1998, 104 households in Phakamisa were billed for standpipe water.
6. The 459 yard taps in Tyutyu refer to the billed connections. Although other households on the sites use the service, they are recorded as having an inadequate service because the provision of new sites, or formal subdivisions of existing sites, will require new connections.
7. It has been assumed that 75 percent of the backyard shacks in Dimbaza, Ginsberg and Zwelitsha are to fall into disuse over the period.

Table 3 Non-residential consumer units

	Total	Metered	Unmetered
Institutions	96	66	30
Commerce & dry industry	674	574	100
Sportsfields	10	10	0
"Wet" industry	2	2	0
TOTAL	782	652	130

1. The split between (total) metered and unmetered consumers is provided in the record of bills sent (Treasury).
2. In the Selplan (1997) report, a total of 676 formal industrial and commercial enterprises is recorded. The total number of commercial and dry industrial consumers is taken to be this number less the two "wet" industries.
3. "Wet" industry refers to non-domestic consumers being charged a special ("industrial") tariff.
4. Sportsfields are charged a lower tariff than commerce of institutions, and are therefore classified as "wet industry".
5. The number of institutions is calculated as a residual.
6. The split of unmetered consumers between institutions institutions and commerce is arbitrary.

APPENDIX 2 INCOME DISTRIBUTION (estimate for 1998, guide by pattern as in 1991/2)

APPENDIX 2. INCOME DISTRIBUTION (estimate for 1998, guided by pattern as in 1991/2)

1991/2 distribution from "Urban Upgrading Programme. Rapid Appraisal of King William's Town". Report for GTZ, February 1996 (draft).

Estimated number of consumer units	Formal	Multiple dw	Dus/MD	MDUs	Informal & b/y	**Total Dus**
KWT/Schornville	3 018			-		**3 018**
Breidbach	955			-	150	**1 105**
Ginsberg	1 337			-	249	**1 586**
Bisho	1 465			-		**1 465**
Tyutyu	459			-	706	**1 165**
Sweetwat/Tiitha/Zweli/Phaka	6 134			-	5 417	**11 551**
Dimbaza	3 438			-	2 573	**6 011**
				-		-
				-		-
TOTAL	**16 806**	-	-	-	**9 095**	**25 901**
						-

% to income categories

	very low	low	low-middle	middle	high	tot formal
KWT/Schornville=E8	5%	5%	5%	25%	60%	3 018
Breidbach	20%	15%	30%	30%	5%	955
Ginsberg	30%	30%	25%	10%	5%	1 337
Bisho	5%	10%	20%	25%	40%	1 465
Tyutyu	21%	5%	20%	20%	34%	459
Sweetwat/Tiitha/Zweli/Phaka	35%	35%	20%	10%	0%	6 134
Dimbaza	50%	25%	15%	10%	0%	3 438
0					100%	-
0					100%	-
						- check=0

Informal dwellers and b/yard shacks

Number	very low	low
-	90%	10%
150	90%	10%
249	90%	10%
-	90%	10%
706	90%	10%
5 417	90%	10%
2 573	90%	10%
-	90%	10%
-	90%	10%
-		

Allocation to income categories

numbers to income categories - formal

	very low	low	low-middle	middle	high
KWT Schornville=E21	151	151	151	755	1 811
Breidbach	191	143	287	287	48
Ginsberg	401	401	334	134	67
Bisho	73	147	293	366	586
Tyutyu	96	23	92	92	156
Sweetwat/Tiitha/Zweli/Phaka	2 147	2 147	1 227	613	-
Dimbaza	1 719	860	516	344	-
0	-	-	-	-	-
0	-	-	-	-	-
Total	**4 779**	**3 871**	**2 899**	**2 590**	**2 667**
				check=0	-

numbers to income categories - inform

very low	low
-	-
135	15
224	25
-	-
635	71
4 875	542
2 316	257
-	-
-	-
8 185	**909**
	-

Total formal and informal

	number	%
very low	12 964	50.1%
low	4 781	18.5%
low-middle	2 899	11.2%
middle	2 590	10.0%
high	2 667	10.3%
Total	**25 901**	**100%**

APPENDIX 3. OUTPUT DATA, SCENARIO 1

CONTENTS

1.16 FUTURE TARIFFS (4) : CONSUMPTION CHARGES

3.3 CAPITAL REQUIREMENTS (Real)

3.5 INCOME AND EXPENDITURE (Real)

3.7 MONTHLY BILLS (Real)

3.12 SUMMARY DATA 1 (Capital account)

3.13 SUMMARY DATA 2 (Operating account)

PDG Water Supply Services Model (v1.0) King Williamstown 1 Base year = 1998

1.16 FUTURE TARIFFS (4) : CONSUMPTION CHARGES

Nominal (=1) or real (=0) 0 0

Block 1	0	to	10	kl per month									
				2000	2001	2002	2003	2004	2005	2006	2007	2008	
% increase pa	1998	1999	1999	5.2	5.2	5.2	2.1	2.1	2.1	0.2	0.2	0.2	
Price (c/kl,real)	233	135	135	142	149	157	160	164	167	168	168	168	
Price (c/kl, nominal)	233		146	166	188	214	236	260	287	310	336	363	
O&M cost of system (c/k,real)		132	140	150	160	171	173	176	179	182	185	188	30 % bulk cost capital
Block 2	10	to	30	kl per month									0
% increase pa				5.2	5.2	5.2	2.1	2.1	2.1	0.2	0.2	0.2	
Price (c/kl,real)	233	280	280	295	310	326	333	340	347	348	348	349	
Price (c/kl, nominal)	233		302	344	390	444	489	539	595	643	696	754	
Average historic cost (c/kl,real)		209	209	219	233	247	250	255	261	266	270	275	
Block 3	30	kl per month and above											
% increase pa				8.4	8.4	8.4	8.4	8.4	4.5	4.5	4.5	2.0	
Price (c/kl,real)	233	470	470	509	552	599	649	703	735	768	803	819	
Price (c/kl, nominal)	233		508	594	696	814	954	1 116	1 260	1 422	1 605	1 768	

Non-residential constant consumption charge												
% increase pa			8.4	8.4	8.4	8.4	8.4	4.5	4.5	4.5	3.0	
Price (c/kl,real)	263	350	350	379	411	446	483	524	547	572	598	616
Price (c/kl, nominal)	263		378	443	518	607	710	831	938	1 059	1 195	1 329

(Rm, real)	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Annual net cash flow		-3.3	-0.8	0.1	0.8	0.2	0.1	0.4	0.4	0.3	0.3	0.0
Cash balance (yr end	0.00	-3.3	-3.8	-3.4	-2.4	-2.0	-1.8	-1.2	-0.7	-0.3	0.0	0.0
Budgeted surp/(-deficit)		0.4	3.1	3.9	4.8	5.0	5.7	6.5	6.9	7.0	7.2	7.3
% non-payment		25%	19%	17%	16%	18%	21%	21%	21%	21%	21%	21%

view in real (=0) or nominal (=1) terms 0 0

3.3 CAPITAL REQUIREMENTS (real)

R thousands 1998 Rands	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	TOTAL yrs 1-5	TOTAL yrs 6-10
CAPITAL EXPENDITURE	R thousands											
Internal services - new residential	1 604	1 644	1 654	1 662	1 666	1 686	1 691	1 694	1 695	1 692	8 230	8 458
Internal services - new non-residential	36	37	38	39	39	40	41	42	43	43	189	209
Internal - backlog and upgrading	469	872	1 341	1 878	2 146	2 146	1 378	1 341	872	469	6 706	6 706
Metering programme	0	0	0	0	0	0	0	0	0	0	0	0
Connector infrastructure	1 286	191	1 444	1 700	1 777	1 955	1 771	1 573	1 454	1 248	6 397	8 001
Bulk infrastructure	0	0	0	0	0	0	0	0	0	0	0	0
Asset replacement	518	518	518	518	518	518	518	518	518	518	2 592	2 592
Other	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL CAPEX	**3 914**	**3 263**	**4 995**	**5 796**	**6 146**	**6 345**	**5 899**	**5 168**	**4 582**	**3 972**	**24 114**	**25 966**
Service provider CAPEX	3 877	3 089	4 815	5 609	5 952	6 111	5 674	4 952	4 374	3 775	23 343	24 885
Developer CAPEX	36	174	180	187	194	234	226	217	207	197	771	1 081
SUBSIDIES	R thousands											
Housing subsidy	2 012	2 224	2 568	2 938	3 052	2 923	2 619	2 132	1 724	1 388	12 794	10 785
Infrastructure grant	971	1 077	1 247	1 431	1 487	1 425	1 275	1 035	835	669	6 213	5 239
Other subsidies/grants	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL SUBSIDIES	**2 983**	**3 301**	**3 815**	**4 369**	**4 539**	**4 348**	**3 894**	**3 167**	**2 558**	**2 057**	**19 007**	**16 024**
CONSUMER PAYMENTS	99	247	269	294	310	349	332	306	281	258	1 218	1 526
CURRENT INCOME	35	39	44	48	52	57	60	63	66	68	219	314
BORROWING REQUIREMENTS												
TOTAL BORROWING	**797**	**-324**	**867**	**1 084**	**1 245**	**1 591**	**1 613**	**1 632**	**1 676**	**1 588**	**3 670**	**8 102**

3.5 INCOME AND EXPENDITURE (real)

1998 Rands

R thousands pa	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
INCOME (accrued)												
Unmetered, residential		3 446	2 561	1 319	73	60	46	31	18	9	3	0
Unmetered, non-residential		117	59	0	0	0	0	0	0	0	0	0
Metered, residential		4 094	6 807	9 649	12 683	14 086	15 177	16 505	17 709	18 524	19 307	19 934
Metered, non-residential		5 102	7 009	7 422	8 117	8 876	9 705	10 612	11 186	11 860	12 574	13 139
Recurrent subsidies		1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044
Other income		100	100	100	100	100	100	100	100	100	100	100
TOTAL		13 903	17 579	19 534	22 017	24 166	26 072	28 292	30 057	31 537	33 028	34 217
EXPENDITURE												
Admin, storage and reticulation		3 318	3 555	3 827	4 136	4 433	4 752	5 073	5 373	5 633	5 856	6 047
Bulk - purification of own		0	0	0	0	0	0	0	0	0	0	0
Bulk - purchase of purified		7 771	8 774	9 804	11 083	12 601	13 285	14 222	15 128	16 000	16 857	17 667
Capital charges		1 501	1 420	1 172	1 154	1 185	1 249	1 374	1 501	1 626	1 755	1 865
Contributions to fixed assets		0	352	391	440	483	521	566	601	631	661	684
to capital development fund		0	176	195	220	242	261	283	301	315	330	342
to replacement provision		0	0	0	0	0	0	0	0	0	0	0
to other funds		867	176	195	220	242	261	283	301	315	330	342
Other expenditure		0	0	0	0	0	0	0	0	0	0	0
TOTAL		13 457	14 452	15 585	17 253	19 186	20 329	21 801	23 204	24 529	25 789	26 947
Budgeted surplus (-deficit)		446	3 127	3 950	4 763	4 981	5 743	6 491	6 852	7 016	7 239	7 269
Unpaid accounts (-)		-3 466	-3 400	-3 275	-3 575	-4 457	-5 356	-5 848	-6 289	-6 622	-6 952	-7 226
REALISED SURPLUS(-DEFICIT)		-3 020	-273	675	1 189	524	387	643	564	394	287	43
Return on surplus (-cost of deficit)		-251	-527	-534	-426	-325	-278	-217	-138	-73	-24	-1
Annual net cash flow		-3 272	-800	141	763	199	109	426	426	321	262	43
CASH BALANCE (year end)	-	-3 272	-3 829	-3 605	-2 390	-2 014	-1 756	-1 280	-685	-313	-27	17

DEBT-SERVICE RATIO	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Capital charges/accrued income	11%	8%	6%	5%	5%	5%	5%	5%	5%	5%	5%
C+A11capital charges/received income	14%	10%	7%	6%	6%	6%	6%	6%	7%	7%	7%

NON-PAYMENT	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of total accrued income unpaid	25%	19%	17%	16%	18%	21%	21%	21%	21%	21%	21%
% of unmetered income unpaid	70%	66%	62%	58%	54%	50%	41%	32%	23%	14%	5%
% of metered residential income unpaid	10%	14%	18%	22%	26%	30%	31%	31%	32%	32%	33%
% of metered non-residential income unpaid	10%	10%	9%	9%	8%	8%	7%	7%	6%	6%	5%

3.7 MONTHLY BILLS (Real)

Unmetered connections (Rands per month, real)

Residential	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
None/inadequate	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Communal standpipes	R 0	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 0
Yard tanks	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Yard taps (on-site san)	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Yard taps (w/borne san)	R 23	R 23	R 23	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
In-house, low income	R 23	R 25	R 25	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
In-house, middle income	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
In-house, high income	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Non-residential											
Institutions	R 75	R 75	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Commerce&dry industry	R 75	R 75	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0

Metered connections (Rands per month, real)

Residential	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Yard taps (on-site san)	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Yard taps (w/borne san)	R 0	R 23	R 24	R 25	R 26	R 26	R 26	R 27	R 27	R 27	R 27
In-house, low income	R 42	R 38	R 42	R 42	R 44	R 44	R 45	R 45	R 45	R 45	R 45
In-house, middle income	R 58	R 65	R 66	R 69	R 72	R 73	R 75	R 76	R 76	R 77	R 77
In-house, high income	R 71	R 80	R 81	R 85	R 88	R 89	R 92	R 93	R 93	R 94	R 94
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0

Non-residential	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Institutions - constant	R 132	R 165	R 161	R 173	R 186	R 199	R 214	R 221	R 230	R 239	R 245
Commerce&dry - constant	R 678	R 832	R 795	R 854	R 917	R 985	R 1 057	R 1 094	R 1 139	R 1 186	R 1 216
Wet industry - constant	R 2 630	R 3 500	R 3 606	R 3 859	R 4 131	R 4 421	R 4 732	R 4 883	R 5 066	R 5 261	R 5 382
Institutions - block tariff	R 117	R 169	R 151	R 162	R 171	R 180	R 190	R 195	R 201	R 207	R 209
Commerce&dry - block	R 601	R 1 063	R 901	R 968	R 1 037	R 1 110	R 1 188	R 1 228	R 1 275	R 1 325	R 1 345
Wet industry - block tariff	R 2 330	R 4 629	R 4 261	R 4 560	R 4 878	R 5 215	R 5 576	R 5 751	R 5 965	R 6 188	R 6 267
Institutions, as RUEs	R 117	R 102	R 102	R 106	R 110	R 123	R 113	R 114	R 114	R 115	R 127
Commerce&dry, as RUEs	R 601	R 542	R 532	R 553	R 574	R 669	R 589	R 600	R 599	R 602	R 668
Wet industrial, as RUEs	R 2 330	R 2 305	R 2 429	R 2 515	R 2 606	R 2 619	R 2 657	R 2 696	R 2 684	R 2 688	R 2 692

3.12 SUMMARY DATA 1 (Capital account)

Town	Run	Base yr	Assessed by	Assessment date	Run date
King Williams Town	1	1998	Bee Thompson	01-Mar-98	30-Apr-98

Scenario Current plans : on-site water and waterborne sanitation on all sites
Treating bulk water supply as if treated water purchased

TABLE 1 CAPITAL ACCOUNT : CAPITAL EXPENDITURE, CAPITAL INCOME AND BORROWING REQUIREMENTS (R thousands)

Real	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Year 1-5	Year 6-10
Capital expenditure	3 914	3 263	4 995	5 796	6 146	6 345	5 899	5 168	4 582	3 972	24 114	25 966
of which by service provider	*3 877*	*3 089*	*4 815*	*5 609*	*5 952*	*6 111*	*5 674*	*4 952*	*4 374*	*3 775*	*23 343*	*24 885*
Capital subsidies	2 983	3 301	3 815	4 369	4 539	4 348	3 894	3 167	2 558	2 057	19 007	16 024
Consumer payments	99	247	269	294	310	349	332	306	281	258	1 218	1 526
Exp from current income	35	39	44	48	52	57	60	63	66	68	219	314
Borrowing	797	-324	867	1 084	1 245	1 591	1 613	1 632	1 676	1 588	3 670	8 102
Nominal												
Capital expenditure	*4 227*	*3 806*	*6 293*	*7 885*	*9 031*	*10 069*	*10 110*	*9 566*	*9 159*	*8 575*	*31 242*	*47 480*
of which by service provider	4 188	3 603	6 066	7 631	8 745	9 698	9 724	9 165	8 745	8 149	30 233	45 480
Capital subsidies	*3 222*	*3 850*	*4 806*	*5 944*	*6 669*	*6 900*	*6 673*	*5 862*	*5 114*	*4 441*	*24 491*	*28 990*
Consumer payments	*107*	*288*	*339*	*400*	*456*	*554*	*569*	*566*	*562*	*556*	*1 588*	*2 808*
Exp from current income	*38*	*46*	*55*	*66*	*77*	*90*	*103*	*117*	*132*	*148*	*281*	*589*
Borrowing	*861*	*-378*	*1 093*	*1 475*	*1 830*	*2 525*	*2 765*	*3 022*	*3 351*	*3 429*	*4 881*	*15 092*

TABLE 2 NUMBERS OF CONSUMER UNITS AND AVERAGE GROWTH RATES

	1998	2003	2008	Av % pa :	Year 1-5	Years 6-10
Residential	**25 901**	**30 613**	**35 420**		**3.4%**	**3.0%**
Institutions	**94**	**104**	**115**		**2.0%**	**2.0%**
Commerce and "dry"	**676**	**746**	**824**		**2.0%**	**2.0%**
"Wet" industrial	**12**	**12**	**12**		**0.0%**	**0.0%**
Local average economic growth rate					**2.0%**	**2.0%**

TABLE 3 INCOME DISTRIBUTION

	1998	2003	2008
very low	**50%**	**53%**	**54%**
low	**19%**	**18%**	**17%**
low-middle	**11%**	**12%**	**12%**
middle	**10%**	**9%**	**9%**
high	**10%**	**8%**	**8%**

TABLE 4 RESIDENTIAL SERVICE LEVELS

	none	s/pipe	Yard tanks	Y/ taps(on-s)	Y/ taps(wb)	In-house	0%	0%
Category	0	1	1	2	3	3,4,5	3	3
1998	**27%**	**4%**	**0%**	**0%**	**8%**	**61%**	**0%**	**0%**
2003	**12%**	**2%**	**0%**	**0%**	**19%**	**68%**	**0%**	**0%**
2008	**0%**	**0%**	**0%**	**0%**	**26%**	**74%**	**0%**	**0%**

TABLE 5 MISMATCH : SERVICES VS INCOMES

% of consumers with service categories and incomes:	1998	2003	2008
3/low,very low	**38%**	**57%**	**72%**
2/very low	**0%**	**0%**	**0%**

3.13 SUMMARY DATA 2 (Operating account)

Town	Run	Base yr	Assessed by	Assessment date	Run date
King William's Town	1	1998	Ilse Thompson	01-Mar-98	30-Apr-98

TABLE 1 OPERATING ACCOUNT : INCOME, EXPENDITURE AND CASH FLOWS (R thousands)

Real	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Accrued income		13 903	17 579	19 534	22 017	24 166	26 072	28 292	30 057	31 537	33 028	34 217
of which sale of water		12 759	16 435	18 390	20 873	23 022	24 928	27 148	28 913	30 393	31 884	33 073
Expenditure		13 457	14 452	15 585	17 253	19 166	20 326	21 801	23 204	24 520	25 786	26 947
Surplus (deficit)		446	3 127	3 950	4 763	4 981	5 743	6 491	6 852	7 016	7 239	7 269
Non-payment (bad debts)		-3 466	-3 400	-3 275	-3 575	-4 457	-5 356	-5 948	-6 289	-6 622	-6 952	-7 226
Return on surplus (-cost of deficit)		-251	-527	-534	-426	-325	-278	-217	-136	-73	-24	-1
Annual net cash flow		-3 272	-800	141	763	199	159	426	426	321	262	43
CASH BALANCE (year end)	0	-3 272	-3 529	-3 405	-2 390	-2 014	-1 756	-1 200	-665	-313	-27	17
Nominal												
Accrued income		13 903	18 985	22 785	27 735	32 878	38 208	44 896	51 512	58 272	66 034	73 871
of which sale of water		12 759	17 750	21 451	26 294	31 322	36 528	43 081	49 551	56 255	63 737	71 401
Expenditure		13 457	15 609	18 178	21 734	26 102	29 870	34 595	39 768	45 366	51 532	58 177
Surplus (deficit)		446	3 377	4 607	6 000	6 776	8 438	10 301	11 744	12 907	14 471	15 694
Non-payment (bad debts)		-3 466	-3 672	-3 829	-4 503	-6 064	-7 870	-9 280	-10 778	-12 254	-13 898	-15 601
Return on surplus (-cost of deficit)		-251	-569	-622	-536	-442	-409	-344	-236	-135	-49	-1
Annual net cash flow		-3 272	-864	165	961	271	160	676	730	595	525	92
CASH BALANCE (year end)	0	-3 272	-4 136	-3 971	-3 010	-2 740	-2 580	-1 904	-1 174	-579	-55	37

TABLE 2 UNIT COST, CONSUMPTION, BILLS AND PRICE OF WATER BY SERVICE TYPE

	Cost (R/CU pm, real) (excluding RSC/LIP charges)			Consumption (kl/CU pm) kl/month per CU			Monthly bills (R pm, real) R per month per CU			Price per kl c/kl		
	1998	2003	2008	1998	2003	2008	1998	2003	2008	1998	2003	2008
None/inadequate	2	2	0	1	1	0	0	0	0	0	0	0
Communal standpipes	9	11	0	4	4	0	0	0	0	0	200	200
Yard tanks	0	0	0	0	0	0	0	0	0	0	0	0
Yard taps (on-site san)*	0	0	0	0	0	0	0	0	0	0	0	0
Yard taps (w/borne san)*	22	29	30	0	12	12	23	35	37	191	222	231
In-house, low income*	28	38	40	18	18	18	42	44	45	233	247	257
In-house, middle income*	39	50	54	25	24	23	58	73	77	233	307	330
In-house, high income*	46	60	65	30	29	28	71	89	94	233	310	332
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
Institutions	41	76	79	50	40	39	132	199	245	263	483	616
Commerce&dry industry	84	325	344	258	184	179	678	985	1 216	263	483	616
Wet industry	1 073	1 414	1 483	1 000	821	785	2 630	4 421	5 382	263	483	616

*Values shown for metered connections only

TABLE 3 TOTAL CONSUMPTION (Ml per annum)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total consumed	6 637	6 906	7 115	7 412	7 786	8 134	8 537	8 903	9 231	9 535	9 767
Total purchased/purified	8 346	8 560	8 716	8 957	9 258	9 569	10 043	10 474	10 860	11 217	11 526
% physical losses	20%	19%	18%	17%	16%	15%	15%	15%	15%	15%	15%

TABLE 4 DEBT SERVICE RATIOS AND NON-PAYMENT

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Capital charges/accrued income	11%	8%	6%	5%	5%	5%	5%	5%	5%	5%	5%
Capital charges/received income	14%	10%	7%	6%	6%	6%	6%	6%	7%	7%	7%
% of total accrued income unpaid	25%	19%	17%	16%	18%	21%	21%	21%	21%	21%	21%

APPENDIX 4. OUTPUT DATA, SCENARIO 2

CONTENTS

1.16 FUTURE TARIFFS (4) : CONSUMPTION CHARGES

3.3 CAPITAL REQUIR EMENTS (Real)

3.5 INCOME AND EXPENDITURI E (Real)

3.7 MONTHLY BILLS (Real)

3.12 SUMMARY DATA 1 (Capital account)

3.13 SUMMARY DATA 2 (Operating account)

PDG water supply services model (v1.0) King William's Town 2 Base year = 1998

1.16 FUTURE TARIFFS (4) : CONSUMPTION CHARGES

Nominal (=1) or real (=0)? 0 0

Block 1	0	to	10	kl per month									
					2000	2001	2002	2003	2004	2005	2006	2007	2008
% increase pa		1998	1999	1999	5.2	5.2	5.2	2.1	2.1	2.1	0.2	0.2	0.2
Price (c/kl,real)		233	135	135	142	149	157	160	164	167	168	168	168
Price (c/kl, nominal)		233		146	166	188	214	236	260	287	310	336	363
O&M cost of system (c/k,real)			132	141	151	162	172	175	179	182	186	189	192

30 % bulk cost capital

Block 2	10	to	30	kl per month									0
% increase pa					5.2	5.2	5.2	2.1	2.1	2.1	0.2	0.2	0.2
Price (c/kl,real)		233	280	280	295	310	326	333	340	347	348	348	349
Price (c/kl, nominal)		233		302	344	390	444	489	539	595	643	696	754
Average historic cost (c/kl,real)			203	209	222	235	249	252	257	263	267	272	276

Block 3	30	kl per month and above									
% increase pa				6.0	6.0	6.0	6.0	6.0	4.0	0.7	0.7	0.0
Price (c/kl,real)	233	470	470	498	528	560	593	629	654	659	663	663
Price (c/kl, nominal)	233		508	581	665	762	872	998	1 121	1 219	1 326	1 432

Non-residential constant consumption charge												
% increase pa				6.0	6.0	6.0	6.0	6.0	4.0	0 7	0.7	0.0
Price (c/kl,real)	263	350	350	371	393	417	442	468	487	491	494	494
Price (c/kl, nominal)	263		378	433	495	567	649	743	835	908	987	1 066

(Rm, real)	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Annual net cash flow		-3.3	-0.7	0.0	0.6	0.1	0.0	0.4	0.6	0.4	0.3	0.0
Cash balance (yr end	0.00	-3.3	-3.8	-3.5	-2.7	-2.4	-2.2	-1.6	-0.9	-0.4	-0.1	0.0
Budgeted surp/(-deficit)		0.4	3.1	3.5	4.1	4.0	4.5	4.9	5.1	4.8	4.5	4.2
% non-payment		25%	19%	16%	15%	16%	17%	17%	16%	16%	15%	15%

view in real (=0) or nominal (=1) terms? 0 0

3.3 CAPITAL REQUIREMENTS (real)

R thousands 1998 Rands	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	TOTAL yrs 1-5	TOTAL yrs 6-10
CAPITAL EXPENDITURE	**R thousands**											
Internal services - new residential	1 310	1 368	1 377	1 384	1 389	1 412	1 415	1 416	1 414	1 411	6 829	7 069
Internal services - new non-residential	36	37	38	39	39	40	41	42	43	43	189	209
Internal - backlog and upgrading	365	678	1 043	1 460	1 669	1 669	1 460	1 043	678	365	5 216	5 216
metering programme	0	0	0	0	0	0	0	0	0	0	0	0
Connector infrastructure	799	1	428	943	977	1 141	1 036	935	966	852	3 148	4 929
Bulk infrastructure	0	0	0	0	0	0	0	0	0	0	0	0
Asset replacement	518	518	518	518	518	518	518	518	518	518	2 592	2 592
Other	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL CAPEX	**3 029**	**2 602**	**3 405**	**4 345**	**4 594**	**4 781**	**4 471**	**3 954**	**3 619**	**3 189**	**17 975**	**20 015**
service provider CAPEX	2 993	2 429	3 225	4 158	4 399	4 547	4 246	3 737	3 412	2 992	17 204	18 934
developer CAPEX	36	174	180	187	194	234	226	217	207	197	771	1 081
SUBSIDIES	**R thousands**											
Housing subsidy	1 624	1 783	2 048	2 334	2 420	2 318	2 080	1 700	1 382	1 120	10 209	8 599
Infrastructure grant	778	8	419	919	963	975	925	799	685	586	3 087	3 971
Other subsidies/grants	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL SUBSIDIES	**2 402**	**1 791**	**2 467**	**3 253**	**3 383**	**3 293**	**3 005**	**2 499**	**2 067**	**1 706**	**13 295**	**12 570**
CONSUMER PAYMENTS	88	234	252	273	287	327	312	289	268	248	1 134	1 442
CURRENT INCOME	35	38	41	44	47	50	52	53	55	56	205	266
BORROWING REQUIREMENTS												
TOTAL BORROWING	**504**	**540**	**644**	**774**	**877**	**1 112**	**1 103**	**1 113**	**1 230**	**1 180**	**3 340**	**5 737**

3.5 INCOME AND EXPENDITURE (real)

1998 Rands

R thousands pa	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
INCOME (accrued)												
Unmetered, residential		3 448	2 580	1 360	141	162	184	205	226	244	260	275
Unmetered, non-residential		117	59	0	0	0	0	0	0	0	0	0
Metered, residential		4 094	6 562	9 030	11 655	12 530	13 100	13 853	14 542	14 903	15 303	15 628
Metered, non-residential		5 102	7 009	7 258	7 790	8 360	8 971	9 627	10 135	10 363	10 648	10 865
Recurrent subsidies		1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044
Other income		100	100	100	100	100	100	100	100	100	100	100
TOTAL		**13 903**	**17 353**	**18 791**	**20 730**	**22 195**	**23 399**	**24 829**	**26 047**	**26 654**	**27 355**	**27 912**
EXPENDITURE												
Admin, storage and reticulation		3 318	3 526	3 764	4 032	4 280	4 545	4 813	5 064	5 282	5 471	5 635
Bulk - purification of own		0	0	0	0	0	0	0	0	0	0	0
Bulk - purchase of purified		7 771	8 654	9 515	10 593	11 633	12 262	12 917	13 558	14 183	14 842	15 479
Capital charges		1 501	1 371	1 271	1 209	1 184	1 186	1 236	1 288	1 343	1 418	1 484
Contributions to fixed assets		0	347	376	415	444	468	497	521	533	547	558
to capital development fund		0	174	188	207	222	234	248	260	267	274	279
to replacement provision		0	0	0	0	0	0	0	0	0	0	0
to other funds		867	174	188	207	222	234	248	260	267	274	279
Other expenditure		0	0	0	0	0	0	0	0	0	0	0
TOTAL		**13 457**	**14 246**	**15 302**	**16 663**	**18 184**	**18 929**	**19 960**	**20 951**	**21 874**	**22 826**	**23 715**
Budgeted surplus (-deficit)		**446**	**3 107**	**3 489**	**4 067**	**4 011**	**4 470**	**4 870**	**5 096**	**4 780**	**4 530**	**4 197**
Unpaid accounts (-)		-3 466	-3 312	-2 993	-3 011	-3 565	-4 092	-4 211	-4 287	-4 253	-4 223	-4 162
REALISED SURPLUS(-DEFICIT)		**-3 020**	**-205**	**496**	**1 057**	**446**	**378**	**659**	**809**	**526**	**307**	**34**
Return on surplus (-cost of deficit)		-251	-521	-537	-454	-372	-336	-279	-183	-92	-33	-9
Annual net cash flow		-3 272	-726	-42	602	74	42	380	626	434	273	25
CASH BALANCE (year end)	-	**-3 272**	**-3 755**	**-3 519**	**-2 656**	**-2 385**	**-2 167**	**-1 626**	**-880**	**-381**	**-79**	**-48**

DEBT-SERVICE RATIO	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
capital charges/accrued income	11%	8%	7%	6%	5%	5%	5%	5%	5%	5%	5%
capital charges/received income	14%	10%	8%	7%	6%	6%	6%	6%	6%	6%	6%

NON-PAYMENT	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of total accrued income unpaid	25%	19%	16%	15%	16%	17%	17%	16%	16%	15%	15%
% of unmetered income unpaid	70%	66%	62%	58%	54%	50%	41%	32%	23%	14%	5%
% of metered residential income unpaid	10%	13%	16%	19%	22%	25%	25%	24%	24%	23%	23%
% of metered non-residential income unpaid	10%	10%	9%	9%	8%	8%	7%	7%	6%	6%	5%

3.7 MONTHLY BILLS (Real)

Unmetered connections (Rands per month, real)

Residential	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
None/inadequate	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Communal standpipes	R 0	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8
Yard tanks	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Yard taps (on-site san)	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Yard taps (w/borne san)	R 23	R 23	R 23	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
In-house, low income	R 23	R 25	R 25	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
In-house, middle income	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
In-house, high income	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Non-residential											
Institutions	R 75	R 75	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Commerce&dry industry	R 75	R 75	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0

Metered connections (Rands per month, real)

Residential	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Yard taps (on-site san)	R 0	R 13	R 13	R 14	R 14	R 14	R 14	R 15	R 15	R 15	R 15
Yard taps (w/borne san)	R 0	R 23	R 24	R 25	R 26	R 26	R 26	R 27	R 27	R 27	R 27
In-house, low income	R 42	R 38	R 42	R 42	R 44	R 44	R 45	R 45	R 45	R 45	R 45
In-house, middle income	R 58	R 65	R 65	R 68	R 71	R 71	R 73	R 74	R 74	R 74	R 74
In-house, high income	R 71	R 80	R 81	R 84	R 87	R 88	R 90	R 91	R 91	R 91	R 91
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Non-residential	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Tariff option selected :	**Constant tariffs**										
Institutions - constant	R 132	R 165	R 158	R 166	R 175	R 184	R 194	R 200	R 201	R 202	R 203
Commerce&dry - constant	R 678	R 832	R 778	R 820	R 864	R 910	R 959	R 991	R 995	R 1 004	R 1 006
Wet industry - constant	R 2 630	R 3 500	R 3 526	R 3 704	R 3 891	R 4 087	R 4 293	R 4 425	R 4 429	R 4 455	R 4 451
Institutions - block tariff	R 117	R 169	R 148	R 157	R 165	R 171	R 178	R 183	R 183	R 185	R 185
Commerce&dry - block	R 601	R 1 063	R 882	R 931	R 980	R 1 030	R 1 084	R 1 119	R 1 123	R 1 133	R 1 135
Wet industry - block tariff	R 2 330	R 4 629	R 4 168	R 4 379	R 4 599	R 4 828	R 5 068	R 5 221	R 5 226	R 5 256	R 5 251
Institutions, as RUEs	R 117	R 102	R 102	R 106	R 110	R 123	R 113	R 114	R 114	R 115	R 127
Commercial&dry, as RUEs	R 601	R 542	R 532	R 553	R 574	R 669	R 589	R 600	R 599	R 602	R 688
Wet industrial, as RUEs	R 2 330	R 2 305	R 2 429	R 2 516	R 2 606	R 2 619	R 2 657	R 2 696	R 2 684	R 2 688	R 2 692

PDG water supply services model (v1.0) King Williams Town 2 Base year = 1998

3.12 SUMMARY DATA 1 (Capital account)

Town	Run	Base yr	Assessed by	Assessment date	Run date
King Williams Town	2	1998	Bee Thompson	01-Mar-98	11-Apr-98

Scenario Intermediate scenario : mixed services supplied
Treating bulk water supply as if trusted water purchased

TABLE 1 CAPITAL ACCOUNT : CAPITAL EXPENDITURE, CAPITAL INCOME AND BORROWING REQUIREMENTS (R thousands)

Real	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	Year 1-5	Year 6-10
Capital expenditure	**3 029**	**2 602**	**3 405**	**4 345**	**4 591**	**4 781**	**4 471**	**3 934**	**3 615**	**3 188**	**17 975**	**20 015**
of which by service provider	*2 093*	*2 429*	*3 225*	*4 158*	*4 399*	*4 547*	*4 246*	*3 737*	*3 412*	*2 992*	*17 204*	*18 934*
Capital subsidies	**2 402**	**1 791**	**2 467**	**3 253**	**3 383**	**3 293**	**3 065**	**2 499**	**2 067**	**1 706**	**13 295**	**12 575**
Consumer payments	**88**	**254**	**252**	**273**	**287**	**327**	**312**	**289**	**268**	**248**	**1 134**	**1 442**
Exp from current income	**35**	**38**	**41**	**44**	**47**	**50**	**52**	**53**	**55**	**58**	**255**	**356**
Borrowing	**504**	**540**	**644**	**774**	**877**	**1 112**	**1 103**	**1 113**	**1 230**	**1 180**	**3 340**	**5 737**
Nominal												
Capital expenditure	*3 272*	*3 035*	*4 269*	*5 911*	*6 749*	*7 587*	*7 663*	*7 319*	*7 235*	*6 885*	*23 257*	*36 890*
of which by service provider	*3 232*	*2 833*	*4 062*	*5 657*	*6 464*	*7 216*	*7 277*	*6 917*	*6 821*	*6 459*	*22 248*	*34 890*
Capital subsidies	*2 594*	*2 089*	*3 107*	*4 426*	*4 970*	*5 226*	*5 150*	*4 625*	*4 133*	*3 682*	*17 186*	*22 816*
Consumer payments	*95*	*272*	*318*	*371*	*422*	*518*	*534*	*535*	*536*	*534*	*1 479*	*2 557*
Exp from current income	*37*	*44*	*52*	*60*	*69*	*79*	*89*	*99*	*109*	*121*	*263*	*497*
Borrowing	*545*	*630*	*812*	*1 053*	*1 288*	*1 766*	*1 890*	*2 060*	*2 456*	*2 648*	*4 329*	*10 720*

TABLE 2 NUMBERS OF CONSUMER UNITS AND AVERAGE GROWTH RATES

	1998	2003	2008	Av % pa :	Year 1-5	Years 6-10
Residential	**25 901**	**30 613**	**35 420**		**3.4%**	**3.0%**
Institutions	**94**	**104**	**115**		**2.0%**	**2.0%**
Commercial and "dry"	**676**	**746**	**824**		**2.0%**	**2.0%**
"Wet" industrial	12	12	12		**0.0%**	**0.0%**
Local average economic growth rate					**2.0%**	**2.0%**

TABLE 3 INCOME DISTRIBUTION

	1998	2003	2008
very low	**50%**	**53%**	**54%**
low	**19%**	**18%**	**17%**
low-middle	**11%**	**12%**	**12%**
middle	**10%**	**9%**	**9%**
high	**10%**	**8%**	**8%**

TABLE 4 RESIDENTIAL SERVICE LEVELS

	none	s/pipe	Yard tanks	Y/ taps(on-s)	Y/ taps(wb)	In-house	0%	0%
Category	0	1	1	2	3	3.4.5	3	3
1998	**27%**	**4%**	**0%**	**0%**	**8%**	**61%**	**0%**	**0%**
2003	**12%**	**6%**	**0%**	**14%**	**15%**	**54%**	**0%**	**0%**
2008	**0%**	**8%**	**0%**	**24%**	**20%**	**48%**	**0%**	**0%**

TABLE 5 MISMATCH : SERVICES VS INCOMES

% of consumers with service categories and incomes	1998	2003	2008
3/low,very low	**38%**	**39%**	**40%**
2/very low	**0%**	**14%**	**24%**

TABLE 6 UNIT COSTS : INTERNAL SERVICES, SUBSIDIES AND CONSUMER PAYMENTS

	Capital costs Rands / CU (real) new internal services	metering programme	Subsidies and payments (R/CU, real) housing subsidy (real value) 1998	2003	2008	payments real value, all years
Communal standpipes	900	na	**900**	774	641	0
Yard tanks	1 200	na	1 150	989	819	50
Yard taps (on-site san)	1 400	0	1 350	1 161	961	50
Yard taps (w/borne san)	1 600	0	1 550	1 333	1 104	50
In-house, low income	1 800	0	1 750	1 505	1 246	50
In-house, middle income	2 100	0	na	na	na	2 100
In-house, high income	2 400	0	na	na	na	2 400
0	0	0	0	0	0	0
0	0	0	0	0	0	0
Institutions	2 100	with upgrading	na	na	na	2 100
Commerce&dry industry	2 400	with upgrading	na	na	na	2 400
Wet industry	12 000	metered	na	na	na	12 000

TABLE 7 UNIT COSTS : BULK AND CONNECTOR

Bulk infrastructure (R millions)		
Source of supply	na	Rm/Ml/day additional capacity
Treatment	na	Rm/Ml/day additional capacity
Pumping	na	Rm/Ml/day additional capacity
Transmission	na	Rm/Ml/day additional capacity
Connector infrastructure (R millions)		
Pipelines	0.20	Rm/Ml/day additional capacity
Reservoirs	0.40	Rm/Ml storage capacity
Pumps	0.10	Rm/Ml/hr pumping capacity
Water towers	0.20	Rm/Ml storage capacity
Infrastructure grants	**CMIP (R/Hh)**	**% B&C**	**Flat (R'000 total)**
	650	**0%**	**0**

TABLE 8 Inflation and borrowing rates for long term loans

	1998	2003	2008
general inflation rate	**8%**	**8%**	**8%**
inflation in construction	**8%**	**8%**	**8%**
nominal borrowing rate	**14.5%**	**14.5%**	**14.5%**

3.13 SUMMARY DATA 2 (Operating account)

Town	Run	Base yr	Assessed by	Assessment date	Run date
King Williams Town	2	1996	Bee Thompson	01-Mar-96	11-Apr-96

TABLE 1 OPERATING ACCOUNT : INCOME, EXPENDITURE AND CASH FLOWS (R thousands)

Real	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Accrued income		13 903	17 353	18 791	20 730	22 195	23 399	24 829	26 047	26 854	27 355	27 913
of which sale of water		12 759	16 209	17 647	19 586	*21 051*	22 255	*23 685*	*24 903*	*25 510*	*26 211*	*26 768*
Expenditure		13 457	14 246	15 302	15 963	16 184	16 929	19 960	20 951	21 674	22 826	23 715
Surplus (deficit)		446	3 107	3 489	4 067	4 011	4 470	4 870	5 096	4 780	4 530	4 197
Non-payment (bad debts)		-3 486	-3 352	-2 993	-3 011	-3 565	-4 062	-4 211	-4 287	-4 253	-4 223	-4 152
Return on surplus (-cost of deficit)		-251	-521	-537	-454	-372	-336	-279	-183	-92	-33	-9
Annual net cash flow		-3 272	-726	-42	602	74	42	380	626	434	273	35
CASH BALANCE (year end)	0	-3 272	-3 755	-3 519	-2 856	-2 385	-2 167	-1 626	-680	-381	-79	-45
Nominal												
Accrued income		13 903	18 741	21 919	26 114	30 197	34 381	39 401	44 847	49 335	54 883	60 259
of which sale of water		12 759	17 506	20 584	24 673	28 640	32 700	37 586	42 880	47 217	52 587	57 796
Expenditure		13 457	15 385	17 849	20 990	24 740	27 813	31 673	35 907	40 488	45 829	51 199
Surplus (deficit)		446	3 356	4 069	5 124	5 457	6 567	7 728	8 734	8 847	9 055	9 060
Non-payment (bad debts)		-3 486	-3 577	-3 491	-3 793	-4 850	-6 012	-6 682	-7 347	-7 873	-8 442	-8 696
Return on surplus (-cost of deficit)		-251	-562	-627	-572	-506	-494	-443	-314	-170	-66	-20
Annual net cash flow		-3 272	-784	-49	759	100	61	602	1 072	804	547	74
CASH BALANCE (year end)	0	-3 272	-4 056	-4 104	-3 345	-3 245	-3 184	-2 581	-1 509	-705	-158	-84

TABLE 2 UNIT COST, CONSUMPTION, BILLS AND PRICE OF WATER BY SERVICE TYPE

	Cost (R/CU pm, real) (excluding capital charges)			Consumption (kl/CU pm) kl/month per CU			Monthly bills (R pm, real) R per month per CU			Price per kl c/kl		
	1998	2003	2008	1998	2003	2008	1998	2003	2008	1998	2003	2008
None/inadequate	2	2	0	1	1	0	0	0	0	0	0	0
Communal standpipes	9	11	12	4	4	4	0	0	0	0	200	200
Yard tanks	0	0	0	0	0	0	0	0	0	0	0	0
Yard taps (on-site san)*	0	22	23	0	0	0	0	14	15	0	183	191
Yard taps (w/borne san)*	22	29	30	0	12	12	23	26	27	191	222	231
In-house, low income*	28	38	40	18	18	18	42	44	45	233	246	257
In-house, middle income*	39	50	54	25	24	23	58	71	74	233	300	315
In-house, high income*	46	60	63	30	29	29	71	88	91	233	304	319
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
Institutions	41	78	81	50	41	40	132	184	203	263	442	484
Commerce&dry industry	54	328	354	258	186	184	678	910	1 006	263	442	484
Wet industry	1 073	1 428	1 525	1 000	630	609	2 630	4 067	4 451	263	442	484

*Values shown for metered connections only.

TABLE 3 TOTAL CONSUMPTION (Ml per annum)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total consumed	8 637	8 814	8 906	7 085	7 292	7 507	7 754	7 978	8 183	8 395	8 584
Total purchased/purified	8 346	8 483	8 456	8 581	8 894	8 832	9 122	9 386	9 627	9 877	10 099
% physical losses	20%	19%	18%	17%	18%	15%	15%	15%	15%	15%	15%

TABLE 4 DEBT SERVICE RATIOS AND NON-PAYMENT

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
capital charges/accrued income	11%	8%	7%	6%	5%	5%	5%	5%	5%	5%	5%
capital charges/received income	14%	10%	8%	7%	6%	6%	6%	6%	6%	6%	6%
% of total accrued income unpaid	25%	19%	16%	15%	16%	17%	17%	16%	16%	15%	15%

APPENDIX 5 OUTPUT DATA, SCENARIO 3

CONTENTS

1.16 FUTURE TARIFFS (4) : CONSUMPTION CHARGES

3.3 CAPITAL REQUIREMENTS (real)

3.5 INCOME AND EXPENDITURE (real)

3.7 MONTHLY BILLS (Real)

3.12 SUMMARY DATA 1 (Capital account)

3.13 SUMMARY DATA 2 (Operating account)

PDG water supply services model (v1.0) King Williams Town 3 Base year = 1998

1.16 FUTURE TARIFFS (4) : CONSUMPTION CHARGES

Nominal (=1) or real (=0)? 0

Block 1	0	to	10	kl per month									
					2000	2001	2002	2003	2004	2005	2006	2007	2008
% increase pa		1998	1999	1999	5.2	5.2	5.2	2.1	2.1	2.1	0.2	0.2	0.2
Price (c/kl,real)		233	135	135	142	149	157	160	164	167	168	168	168
Price (c/kl, nominal)		233		146	166	188	214	236	260	287	310	336	363
O&M cost of system (c/k,real)		132		140	150	160	170	172	175	178	181	184	187
Block 2	10	to	30	kl per month									
% increase pa					5.2	5.2	5.2	2.1	2.1	2.1	0.2	0.2	0.2
Price (c/kl,real)		233	280	280	295	310	326	333	340	347	348	348	349
Price (c/kl, nominal)		233		302	344	390	444	489	539	595	643	696	754
Average historic cost (c/kl,real)		203		209	221	234	247	249	253	257	261	265	269
Block 3	30	kl per month and above											
% increase pa					3.5	3.5	3.5	3.5	1.0	0.2	0.0	0.0	0.0
Price (c/kl,real)		233	470	470	486	503	521	539	545	546	546	546	546
Price (c/kl, nominal)		233		508	567	634	709	792	864	935	1 010	1 091	1 178
Non-residential constant consumption charge													
% increase pa					3.5	3.5	3.5	3.5	1.0	0.2	0.0	0.0	0.0
Price (c/kl,real)		263	350	350	362	375	388	402	406	406	406	406	406
Price (c/kl, nominal)		263		378	423	472	528	590	644	697	752	813	878

30 % bulk cost capital

0

(Rm, real)	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Annual net cash flow		-3.3	-0.6	0.0	0.7	0.3	0.4	0.4	0.4	0.3	0.1	0.0
Cash balance (yr end	0.00	-3.3	-3.7	-3.4	-2.4	-1.9	-1.4	-0.9	-0.4	-0.1	0.0	0.0
Budgeted surp/(-deficit)		0.4	3.2	3.4	3.9	3.7	4.0	4.0	4.0	3.7	3.4	3.2
% non-payment		25%	19%	16%	14%	15%	16%	15%	15%	15%	14%	13%

view in real (=0) or nominal (=1) terms? 0 0

3.3 CAPITAL REQUIREMENTS (real)

R thousands 1998 Rands	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	TOTAL yrs 1-5	TOTAL yrs 6-10
CAPITAL EXPENDITURE	R thousands											
Internal services - new residential	839	925	933	940	946	974	973	970	965	959	4 584	4 841
Internal services - new non-residential	36	37	38	39	39	40	41	42	43	43	189	209
Internal - backlog and upgrading	223	414	636	891	1 018	1 018	891	636	414	223	3 181	3 181
metering programme	0	0	0	0	0	0	0	0	0	0	0	0
Connector infrastructure	418	0	1	12	325	557	550	521	562	523	755	2 714
Bulk infrastructure	0	0	0	0	0	0	0	0	0	0	0	0
Asset replacement	518	518	518	518	518	518	518	518	518	518	2 592	2 592
Other	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL CAPEX	**2 034**	**1 895**	**2 127**	**2 399**	**2 846**	**3 108**	**2 974**	**2 687**	**2 502**	**2 266**	**11 301**	**13 537**
service provider CAPEX	1 998	1 721	1 947	2 213	2 652	2 874	2 748	2 471	2 295	2 069	10 530	12 456
developer CAPEX	36	174	180	187	194	234	226	217	207	197	771	1 081
SUBSIDIES	***R thousands***											
Housing subsidy	1 062	1 158	1 324	1 502	1 555	1 489	1 339	1 099	898	732	6 601	5 556
Infrastructure grant	413	4	5	6	319	514	533	484	456	429	747	2 414
Other subsidies/grants	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL SUBSIDIES	**1 475**	**1 162**	**1 329**	**1 508**	**1 874**	**2 003**	**1 871**	**1 582**	**1 353**	**1 160**	**7 347**	**7 970**
CONSUMER PAYMENTS	36	174	180	187	194	234	226	217	207	197	771	1 081
CURRENT INCOME	34	37	40	42	43	44	46	46	47	48	196	232
BORROWING REQUIREMENTS												
TOTAL BORROWING	**489**	**522**	**578**	**663**	**735**	**827**	**831**	**842**	**894**	**861**	**2 987**	**4 254**

3.5 INCOME AND EXPENDITURE (real)

1998 Rands

R thousands pa	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
INCOME (accrued)												
Unmetered, residential		3 446	2 678	1 569	485	665	858	1 050	1 229	1 381	1 511	1 620
Unmetered, non-residential		117	59	0	0	0	0	0	0	0	0	0
Metered, residential		4 094	6 347	8 506	10 778	11 210	11 337	11 579	11 809	11 843	11 934	12 014
Metered, non-residential		5 102	7 009	7 087	7 454	7 841	8 247	8 464	8 650	8 833	9 023	9 216
Recurrent subsidies		1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044	1 044
Other income		100	100	100	100	100	100	100	100	100	100	100
TOTAL		13 903	17 236	18 307	19 862	20 859	21 585	22 236	22 832	23 202	23 612	23 994
EXPENDITURE												
Admin, storage and reticulation		3 318	3 457	3 615	3 787	3 922	4 066	4 212	4 351	4 473	4 582	4 678
Bulk - purification of own		0	0	0	0	0	0	0	0	0	0	0
Bulk - purchase of purified		7 771	8 561	9 299	10 232	11 278	11 530	11 990	12 464	12 940	13 441	13 939
Capital charges		1 501	1 368	1 266	1 193	1 150	1 132	1 138	1 151	1 171	1 204	1 232
Contributions to fixed assets		0	345	366	397	417	432	445	457	464	472	480
to capital development fund		0	172	183	199	209	216	222	228	232	236	240
to replacement provision		0	0	0	0	0	0	0	0	0	0	0
to other funds		867	172	183	199	209	216	222	228	232	236	240
Other expenditure		0	0	0	0	0	0	0	0	0	0	0
TOTAL		13 457	14 076	14 912	16 007	17 184	17 591	18 230	18 880	19 513	20 171	20 809
Budgeted surplus (-deficit)		446	3 160	3 395	3 855	3 675	3 995	4 006	3 952	3 689	3 441	3 185
Unpaid accounts (-)		-3 466	-3 285	-2 854	-2 692	-3 056	-3 367	-3 432	-3 453	-3 394	-3 315	-3 209
REALISED SURPLUS(-DEFICIT)		-3 020	-126	541	1 163	619	628	575	499	295	126	-24
Return on surplus (-cost of deficit)		-251	-515	-520	-424	-316	-242	-166	-92	-37	-6	1
Annual net cash flow		-3 272	-640	20	740	302	386	410	407	258	119	-24
CASH BALANCE (year end)	-	*-3 272*	*-3 670*	*-3 378*	*-2 388*	*-1 908*	*-1 381*	*-869*	*-398*	*-110*	*18*	*-7*

DEBT-SERVICE RATIO	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
capital charges/accrued income	11%	8%	7%	6%	6%	5%	5%	5%	5%	5%	5%
capital charges/received income	14%	10%	8%	7%	6%	6%	6%	6%	6%	6%	6%

NON-PAYMENT	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of total accrued income unpaid	25%	19%	16%	14%	15%	16%	15%	15%	15%	14%	13%
% of unmetered income unpaid	70%	66%	62%	58%	54%	50%	41%	32%	23%	14%	5%
% of metered residential income unpaid	10%	12%	14%	16%	18%	20%	20%	21%	21%	21%	22%
% of metered non-residential income unpaid	10%	10%	9%	9%	8%	8%	7%	7%	6%	6%	5%

3.7 MONTHLY BILLS (Real)

Unmetered connections (Rands per month, real)

Residential	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
None/inadequate	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Communal standpipes	R 0	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8
Yard tanks	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Yard taps (on-site san)	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Yard taps (w/borne san)	R 23	R 23	R 23	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
In-house, low income	R 23	R 25	R 25	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
In-house, middle income	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
In-house, high income	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Non-residential											
Institutions	R 75	R 75	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Commerce&dry industry	R 75	R 75	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0

Metered connections (Rands per month, real)

Residential	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Yard taps (on-site san)	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Yard taps (w/borne san)	R 0	R 23	R 24	R 25	R 26	R 26	R 26	R 27	R 27	R 27	R 27
In-house, low income	R 42	R 38	R 42	R 42	R 44	R 44	R 45	R 45	R 45	R 45	R 45
In-house, middle income	R 58	R 65	R 65	R 67	R 70	R 70	R 71	R 72	R 72	R 72	R 72
In-house, high income	R 71	R 80	R 80	R 83	R 86	R 87	R 88	R 89	R 88	R 89	R 89
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0	R 0
Non-residential	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Tariff option selected :	**Constant tariffs**										
Institutions - constant	R 132	R 165	R 154	R 159	R 164	R 169	R 170	R 171	R 171	R 172	R 172
Commerce&dry - constant	R 678	R 832	R 760	R 785	R 810	R 837	R 843	R 846	R 848	R 851	R 853
Wet industry - constant	R 2 630	R 3 500	R 3 443	R 3 545	R 3 649	R 3 757	R 3 775	R 3 777	R 3 776	R 3 776	R 3 776
Institutions - block tariff	R 117	R 169	R 149	R 153	R 158	R 162	R 164	R 165	R 165	R 166	R 166
Commerce&dry - block	R 601	R 1 063	R 862	R 893	R 923	R 952	R 960	R 965	R 967	R 970	R 973
Wet industry - block tariff	R 2 330	R 4 629	R 4 072	R 4 195	R 4 319	R 4 446	R 4 467	R 4 471	R 4 469	R 4 469	R 4 470
Institutions, as RUEs	R 117	R 102	R 102	R 106	R 110	R 123	R 113	R 114	R 114	R 115	R 127
Commercial&dry, as RUEs	R 601	R 542	R 532	R 553	R 574	R 669	R 589	R 600	R 599	R 602	R 668
Wet industrial, as RUEs	R 2 330	R 2 305	R 2 429	R 2 516	R 2 606	R 2 619	R 2 657	R 2 696	R 2 684	R 2 688	R 2 692

PDG water supply services model (v1.0) King Williams Town 3 Base year = 1998

3.12 SUMMARY DATA 1 (Capital account)

Town	Run	Base yr	Assessed by	Assessment date	Run date
King Williams Town	3	1998	Bee Thompson	01-Mar-98	30-Apr-98

Scenario: Baseline minimum : only communal standpipes for sites for low income households
Treating bulk water supply as if treated water purchased

TABLE 1 CAPITAL ACCOUNT : CAPITAL EXPENDITURE, CAPITAL INCOME AND BORROWING REQUIREMENTS (R thousands)

Real	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	Year 1-5	Year 6-10
Capital expenditure	2 034	1 895	2 127	2 399	2 846	3 106	2 974	2 687	2 502	2 256	11 301	13 537
of which by service provider	1 898	1 721	1 947	2 213	2 652	2 874	2 748	2 471	2 295	2 069	10 530	12 456
Capital subsidies	1 475	1 162	1 329	1 508	1 874	2 063	1 871	1 582	1 353	1 160	7 347	7 979
Consumer payments	36	174	186	187	194	234	226	217	207	197	771	1 881
Exp from current income	34	37	40	42	43	44	46	46	47	48	196	232
Borrowing	489	522	578	663	735	827	831	842	894	861	2 987	4 294
Nominal												
Capital expenditure	2 197	2 210	2 679	3 264	4 182	4 932	5 266	4 974	5 002	4 860	14 532	24 897
of which by service provider	2 158	2 007	2 452	3 010	3 897	4 561	4 709	4 573	4 587	4 457	13 524	22 887
Capital subsidies	1 593	1 356	1 674	2 052	2 753	3 178	3 207	2 929	2 706	2 545	9 427	14 525
Consumer payments	39	203	227	254	286	371	387	401	414	435	1 006	2 000
Exp from current income	37	43	50	57	63	71	78	86	94	104	250	433
Borrowing	529	609	729	902	1 080	1 312	1 424	1 558	1 788	1 856	3 847	7 940

TABLE 2 NUMBERS OF CONSUMER UNITS AND AVERAGE GROWTH RATES

	1998	2003	2008	Av % pa :	Year 1-5	Years 6-10
Residential	25 901	30 613	35 420		3.4%	3.0%
Institutions	94	104	115		2.0%	2.0%
Commercial and "dry"	676	748	824		2.0%	2.0%
"Wet" industrial	12	12	12		0.0%	0.0%
Local average economic growth rate					2.0%	2.0%

TABLE 3 INCOME DISTRIBUTION

	1998	2003	2008
very low	50%	53%	54%
low	19%	18%	17%
low-middle	11%	12%	12%
middle	10%	9%	9%
high	10%	8%	8%

TABLE 4 RESIDENTIAL SERVICE LEVELS

	none	s/pipe	Yard tanks	Y/ taps(on-s)	Y/ taps(wb)	In-house	0%	0%
Category	0	1	1	2	3	3.4,5	3	3
1998	27%	4%	0%	0%	8%	61%	0%	0%
2003	12%	29%	0%	0%	7%	52%	0%	0%
2008	0%	48%	0%	0%	8%	46%	0%	0%

TABLE 5 MISMATCH : SERVICES VS INCOMES

% of consumers with service categories and incomes	1998	2003	2008
3/low,very low	38%	30%	24%
2/very low	0%	0%	0%

TABLE 6 UNIT COSTS : INTERNAL SERVICES, SUBSIDIES AND CONSUMER PAYMENTS

	Capital costs Rands / CU (real)		Subsidies and payments (R/CU, real) housing subsidy (real value)			payments real value, all years
	new internal services	metering programme	1998	2003	2008	
Communal standpipes	900	na	900	774	641	0
Yard tanks	1 200	na	1 150	989	819	50
Yard taps (on-site san)	1 400	0	1 350	1 161	961	50
Yard taps (w/borne san)	1 800	0	1 550	1 333	1 104	50
In-house, low income	1 800	0	1 750	1 505	1 246	50
In-house, middle income	2 100	0	na	na	na	2 100
In-house, high income	2 400	0	na	na	na	2 400
0	0	0	0	0	0	0
0	0	0	0	0	0	0
Institutions	2 100	with upgrading	na	na	na	2 100
Commerce&dry industry	2 400	with upgrading	na	na	na	2 400
Wet industry	12 000	metered	na	na	na	12 000

TABLE 7 UNIT COSTS : BULK AND CONNECTOR

Bulk infrastructure (R millions)		
Source of supply	na	Rm/Mlday additional capacity
Treatment	na	Rm/Mlday additional capacity
Pumping	na	Rm/Mlday additional capacity
Transmission	na	Rm/Mlday additional capacity
Connector infrastructure (R millions)		
Pipelines	0.20	Rm/Mlday additional capacity
Reservoirs	0.40	Rm/Ml storage capacity
Pumps	0.10	Rm/Mlhr pumping capacity
Water towers	0.20	Rm/Ml storage capacity

Infrastructure grants	CMIP (R/hh)	% B&C	Flat (R'000 total)
	350	0%	0

TABLE 8 Inflation and borrowing rates for long term loans

	1998	2003	2008
general inflation rate	8%	8%	8%
inflation in construction	8%	8%	8%
nominal borrowing rate	14.5%	14.5%	14.5%

3.13 SUMMARY DATA 2 (Operating account)

Town	Run	Base yr	Assessed by	Assessment date	Run date
King Williams Town	3	1998	Bee Thompson	01-Mar-98	30-Apr-98

TABLE 1 OPERATING ACCOUNT : INCOME, EXPENDITURE AND CASH FLOWS (R thousands)

Real	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Accrued income		13 903	17 236	18 307	19 862	20 859	21 585	22 236	22 832	23 202	23 812	23 994
of which sale of water		12 759	16 092	17 163	18 718	19 715	20 441	21 092	21 688	22 058	22 468	22 850
Expenditure		13 457	14 076	14 912	16 007	17 184	17 391	18 230	18 880	19 513	20 171	20 809
Surplus (deficit)		446	3 160	3 395	3 855	3 675	3 995	4 006	3 952	3 689	3 441	3 185
Non-payment (bad debts)		-3 486	-3 285	-2 934	-2 992	-3 056	-3 387	-3 432	-3 453	-3 394	-3 215	-3 209
Return on surplus (-cost of deficit)		-251	-515	-520	-424	-316	-242	-165	-92	-37	-6	1
Annual net cash flow		-3 272	-640	20	340	302	366	410	407	258	119	-24
CASH BALANCE (year end)	0	-3 272	-3 670	-3 378	-2 358	-1 908	-1 381	-869	-396	-110	58	-7
Nominal												
Accrued income		13 903	18 814	21 353	25 020	28 379	31 716	35 287	39 130	42 946	47 200	51 801
of which sale of water		12 759	17 379	20 019	23 579	26 823	30 035	33 471	37 186	40 828	44 914	49 332
Expenditure		13 457	15 202	17 394	20 164	23 379	25 546	28 929	32 357	36 117	40 221	44 926
Surplus (deficit)		446	3 613	3 959	4 856	5 000	5 869	6 358	6 773	6 829	6 979	6 875
Non-payment (bad debts)		-3 486	-3 548	-3 329	-3 391	-4 158	-4 947	-5 446	-5 918	-6 282	-6 520	-6 920
Return on surplus (-cost of deficit)		-251	-556	-607	-534	-430	-355	-262	-158	-68	-13	1
Annual net cash flow		-3 272	-691	24	932	411	567	650	697	479	239	-51
CASH BALANCE (year end)	0	-3 272	-3 963	-3 940	-3 008	-2 596	-2 029	-1 379	-682	-203	35	-16

TABLE 2 UNIT COST, CONSUMPTION, BILLS AND PRICE OF WATER BY SERVICE TYPE

	Cost (R/CU pm, real) (excluding capital charges)			Consumption (kl/CU pm) kl/month per CU			Monthly bills (R pm, real) R per month per CU			Price per kl c/kl		
	1998	2003	2008	1998	2003	2008	1998	2003	2008	1998	2003	2008
None/inadequate	2	2	0	1	1	0	0	0	0	0	0	0
Communal standpipes	9	11	12	4	4	4	6	8	8	0	200	200
Yard tanks	0	0	0	0	0	0	0	0	0	0	0	0
Yard taps (on-site san)*	0	0	0	0	0	0	0	0	0	0	0	0
Yard taps (w/borne san)*	22	29	30	0	12	12	23	35	27	191	222	231
In-house, low income*	29	38	40	18	18	18	42	44	45	233	246	257
In-house, middle income*	39	50	54	25	24	24	58	70	72	233	294	303
In-house, high income*	46	60	65	30	29	29	71	87	89	233	299	309
0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0
Institutions	41	77	83	50	41	41	132	166	172	263	402	406
Commercial&dry industry	64	331	363	258	188	189	676	837	853	263	402	406
Wet industry	1 073	1 442	1 567	1 000	839	833	2 630	3 757	3 776	263	402	406

*Values shown for metered connections only

TABLE 3 TOTAL CONSUMPTION (Ml per annum)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total consumed	6 637	6 741	6 749	6 844	6 950	7 059	7 197	7 335	7 486	7 602	7 730
Total purchased/purified	8 346	8 372	8 267	8 269	8 286	8 305	8 467	8 629	8 783	8 944	9 094
% physical losses	20%	19%	18%	17%	16%	15%	15%	15%	15%	15%	15%

TABLE 4 DEBT SERVICE RATIOS AND NON-PAYMENT

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
capital charges/accrued income	11%	8%	7%	6%	6%	5%	5%	5%	5%	5%	5%
capital charges/received income	14%	10%	8%	7%	6%	6%	6%	6%	6%	6%	6%
% of total accrued income unpaid	25%	19%	16%	14%	15%	16%	15%	15%	15%	14%	13%