SECTION E

URBAN WATER CONSERVATION AND DEMAND MANAGEMENT

Introduction to Urban Water Demand Management Options

The information presented on urban water conservation and demand management is based on the City of Cape Town's Integrated Water Resource Planning Study. Within the Berg WMA, the potential for urban water conservation and demand management exists within all municipalities. The information presented serves as an indication of the order of magnitude of the potential. It merely utilises the findings of the CCT Study as this represents the most comprehensive re-use study to date, and no bias is intended towards the CCT.

As water is a scarce resource, it needs to be used in an efficient and effective manner. Legislation has been put in place in South Africa to ensure that this requirement is met.

Through Water Demand Management (WDM), the objective is to minimise water wastage and to ensure the optimal use of water, which often requires a fundamental shift in the perception of consumers, of the value of water. This can be achieved through a number of initiatives as listed below, and presented in more detail in this document:

- Leakage detection and repair;
- Leakage repair beyond the meter;
- Pressure management;
- Use of water efficient fittings;
- Elimination of automatic flush urinals;
- Adjustment of water tariffs, metering and credit control;
- User education.

Although not necessarily direct water demand management initiatives, the following supply augmentations have also been considered as part of WDM:

- Grey water usage;
- Use of rainwater tanks; and
- Use of private well points and boreholes.

Water wastage is generally attributed to distribution losses (leakages) and consumer wastage (e.g. leaks within consumer properties and indiscriminate wastage – e.g. taps left open).

Inefficient usage is attributed to the fact that water is often used for the service derived from it, rather than for the water itself. As gardening and toilet flushing represent approximately 35% and 30% respectively of the total domestic demand, they are key focus areas for targeting inefficiencies. Certain industries and large bulk users would also be target sectors.

The various WDM options are presented as individual options in this document. However, one or a combination of the above options would be appropriate to achieve an objective in a particular area. Therefore the respective WDM options should not be considered individually, but rather as a part of an overall strategy, to achieve a specific objective.

E1. Leakage Detection and Repair

1. OPTION

Potentially applicable throughout the network of water reticulation systems.

2. OPTION DESCRIPTION

Unless otherwise stated, the information presented is taken from the CCT Integrated Water Resource Planning Study of 2001: Report No 6 of 12 – *Potential savings through leakage repair of piping.*

Leakage repair to piping entails the reduction of distribution losses in the reticulation network (i.e. between the bulk meter and the consumption meter) by implementing procedures to proactively identify and repair leaks in the network. The focus of this intervention is primarily on the larger leaks, as the smaller leaks are more difficult (expensive) to locate.

3. OPTION YIELD

The potential savings due to leakage repair is linked to the Unaccounted for Water (UAW) for a specific area, where UAW is the difference between the bulk input into the area and the measured usage/consumption within that area.

As it is generally accepted that UAW cannot economically be reduced to below 15% of the annual average daily demand (AADD) due to the high costs of identifying and repairing background leakage (small leaks). The potential savings is therefore the difference between actual UAW and the 15% of AADD target (provided the actual UAW is above the 15% level).

Investigations undertaken for the CCT during 2000 indicated the potential saving as tabulated below:

Potential savings to be achieved through leakage repair

Zone/Administration	Total Water Supplied ($Mm^{3/}a$)	UAW (%)	Potential Saving (Mm^3/a)
Blaauwberg	27.4	16	1.7
Cape Town	93.1	20	4.7
Helderberg	16.4	20	1.0
Oostenberg	23.7	17	0.5
South Peninsula	42.0	24	3.8
Tygerberg (Central)	20.0	15	0.0
Tygerberg (West)	17.2	27	2.2
Tygerberg (South)	6.6	22	0.9
Tygerberg (Coastal)	20.0	19	0.8
Tygerberg (East)	20.4	13	0.0
Tygerberg (North)	6.9	13	0.0
Total	**293.7**	**-**	**15.6**

4. UNIT REFERENCE VALUE

The URV for an option such as *leakage repair* is difficult to determine as the costs and savings will vary from area to area and will be dependent on the efficiency of the implementation initiative. The estimated costs are tabulated below:

ITEM	Escalated to 2005 (@ 7% /a)
Capital cost (R million)	63.1
Annual operating cost (R million)	0
NPV Cost (R million)	58.6
Unit Reference Value (R/m^3)[1,2]	**0.31**

1) Capital and O&M costs escalated at 7% /a to 2005
2) URV calculated at an 8% /a discount rate

5. ECOLOGICAL

This option will have no significant implications for the natural environment.

6. SOCIO-ECONOMIC

This option will have slight positive impacts in terms of the following:

- Reduced number of standing water pools and associated health benefits in poorer communities (a high percentage of leakages in these areas);
- This option is labour intensive by nature, and therefore has the ability to generate a large number of semi-skilled and skilled employment opportunities.

7. OTHER ISSUES

Specific strengths and weaknesses of the option include:

- **Strengths**
  - Short implementation period
  - Positive socio-economic, environmental and financial impacts.
  - On going capital costs are funded through savings after about three years.

- **Weakness**
  - Has a large institutional implications.
  - The sustainability of the benefits over the long-term are unknown.

E2. Leakage Repair Beyond the Meter

(Not available for background reading. Will be provided at the Workshop.)

The repair of leakages beyond the domestic meters (i.e. household leaks such as leaking taps and toilets) is not included in the definition of "*Leakage Repair*", but projects have been initiated in the past to undertake *leakage repairs* within households, especially low income households, with significant impact. It must be noted that even good quality water fittings will start to leak with time, if they are subjected to high pressures. Therefore, retrofitting of water fittings should, where appropriate, be implemented in conjunction with *pressure management*.

E3. Pressure Management

1. OPTION

Potentially applicable throughout the urban areas of the study area.

2. OPTION DESCRIPTION

Unless otherwise stated, the information presented is taken from the CCT Integrated Water Resource Planning Study of 2001: Report No 5 of 12 – *Potential savings through pressure management.*

Normal reticulation design practice requires that reticulation networks are designed to accommodate peak design flows, whilst maintaining certain minimum and maximum pressures throughout the network. The peak conditions are often related to fire flow conditions i.e. design for worst case scenario, which may happen infrequently. The effect of the above is that networks may experience relatively high pressures during times of low demand, e.g. at night. As leakage rates are dependent on the pressures within a network, by reducing the pressure during low demand periods, it is possible to reduce the volume of water wasted through leakage.

This option therefore entails dividing the reticulation network into defined zones, and installing equipment to reduce the pressures within these zones during periods of low demand.

Pressure management reduces both reticulation/distribution and household losses. It is therefore necessary to distinguish between the savings due to *pressure management* and the savings due to *leakage repair.* Leakage repair generally focuses on larger leaks, whereas pressure management generally focuses on background leaks (leaks that can not readily/economically be addressed through leakage repair).

3. OPTION YIELD

The estimated yield for this option ranges from between 27.8 million m^3/a to 11.1 million m^3/a. An amount of 16.7 million m^3/a has however been deemed to be a realistic figure.

The above yield estimate was based on data from a select area (only area that had adequate data at the time of the investigation) and then projected throughout the CMA area via a benchmarking methodology. The yield represents the potential savings from pressure management, less the potential savings from *leakage repair*, to avoid double counting of savings.

Some have considered the yield estimate to be subjective and conservative.

4. UNIT REFERENCE VALUE

The potential financial costs are as follows:

ITEM	Escalated to 2005 (@ 7% /a) [1]
Capital cost (R million)	77,1
Annual operating cost (R million)	1,2
NPV Cost (R million)	81,7
Unit Reference Value (R/m^3)	**0,40** [2,3]

1) Capital and O&M costs escalated at 7% /a to 2005
2) URV calculated at an 8% /a discount rate
3) The above figures do not include the potential positive financial benefits ito wastewater infrastructure i.e. the impact of delayed upgrade costs; reduced treatment costs.

5. ECOLOGICAL

The option will have no significant implications for the natural environment.

6. SOCIO-ECONOMIC

The consequence of *pressure management* is not a reduced level of service, but rather an appropriate level of service throughout the day. The option will therefore have a positive socio-economic impact as a result of reduced water "leakage" loss and a longer replacement period of household fittings. This could be significant for low income households.

Pressure management will have no impact on fire fighting ability at night, provided the controllers installed are able to respond to the increased demands.

7. OTHER ISSUES

Specific strengths and weakness of the option include:

- **Strengths**
  - Can be implemented within a relatively short period.
  - Increases the longevity of both water and wastewater infrastructure.
  - Has no negative environmental and socio-economic impact.

- **Weaknesses**
  - Will have increased institutional implications.

E4. Use of Water Efficient Fittings

1. LAYOUT

Potentially applicable throughout the urban areas of the study area.

2. OPTION DESCRIPTION

Unless otherwise stated, the information presented is taken from the CCT Integrated Water Resource Planning Study of 2001: Report No 7 of 12 – *Water efficient fittings, automatic flush urinals, grey water and private boreholes and wellpoints.*

This option entails the use of water efficient fittings for toilets, showers and hand basin taps/mixers for both domestic and non-domestic users (commercial, municipal and industrial users).

Options for implementation include both new developments and the retrofitting of existing installations.

3. OPTION YIELD

During previous investigations, it was deemed that only 30% of the estimated potential saving would be realistic, implying the following likely savings:

- Residential users = 6.1 million m^3/a
- Non-residential users = 1.8 million m^3/a
- Total = 7.9 million m^3/a

4. UNIT REFERENCE VALUE

The potential financial costs are as follows :

ITEM	Escalated to 2005 (@ 7% /a) (1)
Capital cost (R million)	62.0
Annual operating cost (R million)	0
NPV Cost (R million)	51.6
Unit Reference Value (R/m^3)	**0.60** (2)

1) Capital and O&M costs escalated at 7% /a to 2005
2) URV calculated at an 8% /a discount rate

5. ECOLOGICAL

This option will have no significant implications for the natural environment.

6. SOCIO-ECONOMIC

This option has the potential to create limited skilled and semi-skilled employment opportunities.

7. OTHER ISSUES

Specific strengths and weaknesses of the option include :

- **Strengths**
  - Relatively quick to implement for short-term benefits.
  - Has certain socio-economic benefits, e.g. can create employment opportunities.

- **Weaknesses**
  - No by-laws are in place at present to enforce usage of water efficient fittings (new installations or retrofitting of existing installations).
  - Requires ongoing maintenance to remain effective.
  - Should be implemented together with a user education programme.
  - Needs continuous involvement i.e. can't be a once-off initiative for sustainable benefits.
  - Requires consumer buy-in.
  - Some have considered the yield estimate to be subjective and conservative.

E5. Elimination of Automatic Flush Urinals

1. LAYOUT

Potentially applicable throughout the urban areas of the study area.

2. OPTION DESCRIPTION

Unless otherwise stated, the information presented is taken from the CCT Integrated Water Resource Planning Study of 2001: Report No 7 of 12 – *Water efficient fittings, automatic flush urinals, grey water and private boreholes and wellpoints.*

This option entails the replacement of automatic flush urinals (AFUs) with either user-activated or waterless urinals.

AFUs are water wasters by their very design (operate even when not specifically required to do so). Furthermore, as AFUs are predominantly found in public office buildings, railway stations, schools and privately owned hotels, bars and restaurants, they tend to be poorly maintained. Malfunctioning AFUs use substantially more water than a functioning AFU.

3. OPTION YIELD

Previous studies (based on an estimated 5 000 AFUs within the CMA area) estimate the potential savings for this option at 4.2 million m^3/a.

4. UNIT REFERENCE VALUE

The potential financial costs are as follows:

ITEM	Escalated to 2005 (@ 7% /a) (1)
Capital cost (R million)	14.2
Annual operating cost (R million)	0
NPV Cost (R million)	13.6
Unit Reference Value (R/m^3)	**0.26** (2)

1) Capital and O&M costs escalated at 7% /a to 2005
2) URV calculated at an 8% /a discount rate

5. ECOLOGICAL

The option will have no significant implications for the natural environment.

6. SOCIO-ECONOMIC

No significant socio-economic impacts (positive or negative) are foreseen.

7. OTHER ISSUES

Specific strengths and weaknesses of the option include :

- **Strengths**
  - Can be implemented within a relatively short time period.
  - Has limited impact on users.

- **Weaknesses**
  - Only the former Cape Town Administration had by-laws enforcing the retrofitting of alterations to AFUs (was required with a 2-year period – 2000 base year).
  - Needs to be implemented concurrently with an active public awareness campaign, especially to address those AFUs in private institutions.
  - Local authorities have limited capacity to enforce/police the replacement programme.

E6. Adjustment of Water Tariffs, Metering and Credit Control

1. LAYOUT

Applicable throughout the urban areas of the study area.

2. DESCRIPTION

Unless otherwise stated, the information presented is taken from the CCT Integrated Water Resource Planning Study of 2001: Report No 9 of 12 – *Adjustment of Water Tariffs, Metering, Credit Control, Water Restrictions and User Education.*

The adjustment of tariffs, metering and credit control are separate initiatives, which collectively have the objectives of:

- Reducing water consumption by making people aware of and paying for the water they consume; and
- Ensuring the equitable distribution of the costs of water provision.

Sliding scale tariffs are used to both subsidise a basic water supply and to encourage efficient use of water by charging progressively higher costs, the higher the water consumption (i.e. the user pays). The overall objective of balancing income and expenditure however still remains. Price elasticity is the measure of the % change in consumption divided by the percentage change in tariff (i.e. consumption sensitivity to price). There is however limited information available regarding price elasticity in the study area.

Universal metering is required in order to know the location and volume of water usage, the extent of water losses and to ensure an equitable distribution of the costs of supply *(i.e. to meter accurately is to know).* Although the installation of meters in itself will not directly reduce water consumption, case studies have indicated savings of up to 20 % where individual meters have been installed.

Effective credit control and debt management is fundamental to sound financial management and WDM. By making people pay for the water they consume, the value of the service is reinforced and water is more efficiently used.

Public acceptance of the above measures will however to a large extent be dependent on the effectiveness of an associated user education/public awareness campaign.

3. OPTION YIELD

Based on a 30 % tariff increase and *price elasticity of -0.2* (not tested but perceived to be appropriate, possibly even conservative, over the full range of water consumer categories), a savings of 6 % (20 million m^3/a) should be obtainable.

Although metering and credit control may indirectly result in savings, no potential savings have been determined for these options.

Previous studies have however indicated that 50% of the potential savings would be realistic, implying a resulting yield of 10 million m³/a.

4. UNIT REFERENCE VALUE

No significant costs are envisaged for the implementation of increased tariffs or stricter credit controls, and as the costs of universal metering and meter replacement should be covered by connection fees and a levy on water tariffs, a URV of R 0.00/m³ was adopted for this option.

5. ECOLOGICAL

This option should have no significant implications for the environment.

6. SOCIO-ECONOMIC

This option would impact on the higher water consumers (i.e. middle to high income households, commercial, industrial and institutional consumers) with insignificant impact on low consumers (poor). This option will have no impact in terms of employment and health, but its acceptance by the public would be dependent on the effectiveness of an associated public awareness campaign.

7. OTHER ISSUES

The specific strengths and weaknesses of the option include:

- **Strengths**
  - Relatively quick to implement.
  - Is fundamental to sound financial management.
  - Should be accepted if consumers are adequately informed of objectives/developments (i.e. transparency is key).

- **Weaknesses**
  - A culture of non-payment exists in certain areas and sectors.
  - Could be politically sensitive if communities currently not paying for water are required to pay for consumption over and above the basic free water allocation.

E7. User Education

1. OPTION

Applicable throughout the study area

2. OPTION DESCRIPTION

Unless otherwise stated, the information presented is taken from the CCT Integrated Water Resource Planning Study of 2001: Report No 9 of 12 – *Adjustment of Water Tariffs, Metering, Credit Control, Water Restrictions and User Education.*

An effective education and public awareness campaign is essential to the successful implementation of water demand management initiatives. This focuses on making consumers aware of their responsibility to use water more efficiently by providing them with tools and guidelines to enable them to reduce their water consumption, without necessarily having a negative impact on the quality of their life; i.e. focus on achieving behavioural changes.

Typical user education initiatives would include:

- Informative billing;
- Distribution of informative information (media marketing);
- Provision of consumer advisory services;
- Creation of forums to interact with specific sectors; and
- Community outreach programmes.

3. OPTION YIELD

Based on previous investigations, it was deemed that only 50% of the estimated potential savings of 20 million m^3 /a would be realistic, implying savings of 10 million m^3 /a.

4. UNIT REFERENCE VALUE

The potential financial costs are as follows:

ITEM	Escalated to 2005 (@ 7% /a) (1)
Capital cost (R million)	0
Annual operating cost (R million)	7.0
NPV Cost (R million)	92.7
Unit Reference Value (R/m^3)	0.70

1) The annual cost of R 5.0 million escalated from 2000 at 7 % /a.
2) URV calculated using a discount rate of 8 %.

5. ECOLOGICAL

This option will have no significant implications on the environment.

6. SOCIO-ECONOMIC

This option should assist all consumers to manage their water consumption and hence water bills. No health impacts are envisaged, whilst the impact on employment will be dependent on the scope of the programme employed.

7. OTHER ISSUES

Specific strengths and weaknesses of the option include:

- **Strengths**
  - Relatively quick to implement.
  - Brings the provider/authority in close contact with the consumer (i.e. facilitates an informed environment).

- **Weaknesses**
  - Would have an institutional impact on the authority.

E8. Promotion of Grey Water Usage

1. LAYOUT

Potentially applicable throughout the urban areas of the study area.

2. OPTION DESCRIPTION

Unless otherwise stated, the information presented is taken from the CCT Integrated Water Resource Planning Study of 2001: Report No 7 of 12 – *Water efficient fittings, automatic flush urinals, grey water and private boreholes and wellpoints.*

This option entails the interception of water from showers, baths and hand basins on site, before it enters the sewer systems, and the use of this grey water for gardening purposes. The use of grey water for toilet flushing has not been considered, as there are currently no commercially viable systems which can treat the grey water to the required standards.

The wastewater from kitchen sinks and washing machines is also not considered due to the high solids content and the possible negative impacts of softeners and other chemicals on the environment.

3. OPTION YIELD

Based on previous investigations, it was deemed that only 30% of the estimated potential savings would be realistic, implying a total savings of 1 million m^3/a.

4. UNIT REFERENCE VALUE

The URV calculations for these options do not include the potential positive financial impacts on wastewater infrastructure, i.e. the impact of delayed upgrade costs and reduced treatment costs. The potential financial costs are as follows:

Low density households (i.e. larger households/higher income)

ITEM	Escalated to 2005 (@ 7% /a) (1)
Capital cost (R/household)	5 610
Annual operating cost (R/household)	-330(3)
NPV Cost (R/household)	1 199
Unit Reference Value (R/m^3)	**1.05**

1) Capital and O&M costs escalated at 7% /a to 2005
2) URV calculated at an 8% /a discount rate
3) This figure is an annual average of maintenance, overhaul and electricity costs and the savings due to reduced water usage, over a specific time period.

Medium density households (i.e. smaller sized households)

ITEM	Escalated to 2005 (@ 7% /a) (1)
Capital cost (R/household)	5 610
Annual operating cost (R/household)	-145
NPV Cost (R/household)	3 636
Unit Reference Value (R/m^3)	**4.88** (2)

1) Capital and O&M costs escalated at 7% /a to 2005
2) URV calculated at an 8% /a discount rate
3) This figure is an annual average of maintenance, overhaul and electricity costs and the savings due to reduced water usage, over a specific time period.

5. ECOLOGICAL

There is a potential negative impact, as a result of medium to long-term build-up of pollutants in the soil and possibly in the groundwater.

6. SOCIO-ECONOMIC

This option could have a slight positive impact in terms of employment but would have a negative health impact if used and maintained inappropriately.

7. OTHER ISSUES

Specific strengths and weaknesses of the option include:

- **Strengths**
  - Relatively quick to implement.

- **Weaknesses**
  - Owner/user driven initiative (dependent on costs and public acceptance).
  - Potential health hazard.
  - Systems on the market at the time of the study made no provision for treatment i.e. could not be used for toilet flushing.
  - Long term impact of detergents/pollutants on the environment is unknown.
  - No quality standards in place within South Africa at the time of the study for gardening and toilet use.
  - System will only be used during the summer months (reduced saving potential).
  - Systems are more cost effective for higher income households.
  - Some have considered the yield estimate to be subjective and conservative.

E9. Rainwater Tanks

1. OPTION

Potentially applicable throughout the study area

2. OPTION DESCRIPTION

Unless otherwise stated, the information presented is taken from the CCT Integrated Water Resource Planning Study of 2001: Report No 7 of 12 – *Water efficient fittings, automatic flush urinals, grey water and private boreholes and wellpoints.*

This option, which is in fact a supply augmentation option as opposed to a demand management option, entails the collection of rainwater from roofs, primarily for toilet flushing. The collection of rainwater for gardening is not deemed feasible for the study area, due to the amount of storage required for use during the drier periods. This option has therefore to a large extent been used as an alternative to *grey water* use for toilet flushing.

The costs of the infrastructure required to implement this option vary significantly from installation to installation, depending on the roof configuration and the location of the toilets.

3. OPTION YIELD

The potential yield for his option is estimated at 15 m^3/a per household, whereas the water requirement for toilet flushing for high consumption households is estimated at between 50 m^3/a to 70 m^3/a, i.e. a potable water supply is still required.

4. UNIT REFERENCE VALUE

The potential financial costs are as follows:

ITEM	Escalated to 2005 (@ 7% /a) (1)
Capital cost (R/household)	7 013 (3)
Annual operating cost (R/household)	0
NPV Cost (R/household)	7 013
Unit Reference Value (R/m^3)	**35.4 (2)**

1) Capital and O&M costs escalated at 7% /a to 2005.
2) URV calculated at an 8% /a discount rate.
3) The costs given above are based on the average of a range of options.

5. ECOLOGICAL

No negative environmental impact is anticipated.

6. SOCIO-ECONOMIC

No negative socio-economic impact is anticipated (nominal loss of revenue to the local authority).

7. OTHER ISSUES

Specific strengths and weaknesses of the option include:

- **Strengths**
  - Quick to implement.
  - Recent reductions in the costs of rainwater tanks may make it more affordable.

- **Weaknesses**
  - The use of unsterilised rainwater from rainwater tanks for domestic purposes has been prohibited since 1972.
  - The option would largely be driven by the property owner.
  - Limited potential savings.
  - Expensive to implement but recent price decreases.

E10. Promotion of Private Boreholes and Wellpoints

1. LAYOUT

Potentially applicable throughout the urban areas of the study area.

2. OPTION DESCRIPTION

Unless otherwise stated, the information presented is taken from the CCT Integrated Water Resource Planning Study of 2001: Report No 7 of 12 – *Water efficient fittings, automatic flush urinals, grey water and private boreholes and wellpoints.*

This option, which is a supply augmentation option as opposed to a demand management option, entails the use of groundwater, either via boreholes or wellpoints, for garden watering.

The use of either a borehole (a submerged pump located 10 to 60m below the surface) or a wellpoint (a surface mounted pump which can abstract water from up to 8m below the ground) is dependent on the nature of the ground conditions. Wellpoints, which are cheaper to install than boreholes, have lower yields than boreholes, but are generally adequate for watering small to medium sized gardens.

The quality of the groundwater that can be abstracted from either boreholes or wellpoints will generally be suitable for garden watering. Due to the high costs of a borehole installation to most households, this option has been evaluated based on wellpoint usage.

3. OPTION YIELD

During previous investigations it was deemed that only 40% of the estimated yield was realistic, implying a yield of 3,6 million m^3/a (i.e. some 35 000 additional households install private wellpoints).

4. UNIT REFERENCE VALUE

The potential financial costs are as follows :

ITEM	Escalated to 2005 (@ 7% /a) (1)
Capital cost (R/household)	3 156
Annual operating cost (R/household)	-154(2)
NPV Cost (R/household)	622
Unit Reference Value (R/m^3)	**0.46**

1) Updated URV using a Discount Rate of 8%
2) This figure is an annual average of maintenance, electricity and overhaul costs and the savings due to reduced water usage, over a specific time period.

5. ECOLOGICAL

The influence of the abstraction from the aquifers, via boreholes and wellpoints could impact on springs, seeps and river base flow, especially if relatively large volumes are abstracted from small areas or areas with low recharge.

6. SOCIO-ECONOMIC

No negative health impacts are anticipated, unless wellpoints are located close to waste disposal sites and/or wastewater treatment works.

7. OTHER ISSUES

Specific strengths and weaknesses of the option include :

- **Strengths**
  - Quick to implement.
  - Wellpoints are relatively inexpensive when compared with boreholes.

- **Weaknesses**
  - The option is driven by the property owner.
  - The areas suitable for the use of wellpoints (i.e. the Cape Flats) are generally associated with low income households and low gardening use.
  - The effectiveness of this option is dependent on the household consumption and the marginal water tariff.
  - May have an impact on local authority revenues, especially during the summer months.