



6 November 2006

Telephone: 02 4979 9521
Facsimile: 02 4925 2078

Mr James Cox
Chief Executive Officer and
Full Time Member
IPART
PO Box Q290
QVB POST OFFICE NSW 1230

Dear Mr Cox

**RE HUNTER WATER CORPORATION OPERATING LICENCE REVIEW –
SUPPLEMENTARY SUBMISSION**

I refer to your letter of 27 October 2006 seeking clarification on a number of issues raised in Hunter Water's submission. A response to the issues raised is provided in the attached Supplementary Submission.

As a general principle, I would like to clarify Hunter Water's view of the relationship between the Corporation's Integrated Water Resource Plan (IWRP) and the operating licence review process.

Hunter Water considers an IWRP fundamental in long term water resource planning. It is appropriate that the operating licence requires Hunter Water to have an IWRP and set general requirements for the plan, including the need to update the plan when material changes in the assumptions occur.

Hunter Water's comments in its Submission regarding the IWRP were not intended to suggest the IWRP process was inadequate, but rather that the current IWRP needed up-dating to reflect longer term water resource planning options given a range of recent changes to population forecasts etc.

While the Supplementary Submission provides more information on the initiatives in the current IWRP, questions on the implication of demand growth, constraints on bulk water extraction and future water efficiency options will be considered as part of the new IWRP process. IPART would agree that this is the appropriate regulatory framework for these issues and the operating licence currently under review should focus on the process for revising the IWRP rather than looking at individual issues in isolation.

Further information has been provided in the Supplementary Submission as requested on catchment management, multi-criteria analysis and leakage.

If you require any further information or wish to discuss, please contact Mr John O'Hearn on 4979 9748.

Yours sincerely


for KEVIN YOUNG
Managing Director

1 CATCHMENT MANAGEMENT

Protection of water sources is an important issue in the water management approach adopted by Hunter Water.

While providing the community's water needs both in terms of quality and quantity, Hunter Water strives to ensure appropriate protection for the source catchments and their environments. This not only benefits the broader community but also ensures that good quality and cost-effective water remains available to the Corporation for treatment and distribution, thereby protecting community health, providing an asset to business and industry, reducing treatment costs and thereby minimising water prices for Hunter Water's customers.

Hunter Water extracts bulk water from a combination of surface storages and groundwater resources under Water Management and Water Access Licences issued by the Department of Natural Resources (DNR). Surface water is extracted from Chichester Dam and the Williams River at Seaham (from where it is delivered to Grahamstown Dam). Groundwater is harvested from the sandbeds at Tomago, Anna Bay and Nelson Bay under conditions set out in the Licence and other approvals issued by DNR.

The protection of raw drinking water quality is primarily achieved through management of land use and catchment activity. It is worth noting that Hunter Water is only one of many land owners in the catchment and therefore, does not control all land use activities. However, such management occurs through:

- Ownership of land within the catchment - for example Hunter Water places land management conditions on leasees who lease land from Hunter Water for farming purposes and creates buffer zones where no activities are permitted.
- Public education - for example, to alert people to the effect of their activities on such things as catchment erosion, nutrient runoff, gross water pollution etc. This includes a Best Practice Riparian Zone demonstration project, sponsored by Hunter Water, on a farming property near Seaham.
- Statutory regulatory instruments - a raft of legislative and regulatory instruments govern and influence land use, development and human activity within the water catchments as well as Hunter Water's operations and activities.

In accordance with the operating licence, Hunter Water reports its performance against catchment activities in all of its source catchments, both surface and groundwater, in the annual Catchment Report.

The IPART issues paper raises a number of issues related to Hunter Water's catchment management obligations for consideration in the operating licence review.

Hunter Water agrees that the reporting requirements in the current licence should be updated to reflect changes in the legislative and regulatory framework since the last operating licence review. For example, the Williams River Catchment Regional Environment Plan and the Regional Planning Strategy have now been incorporated into the work of the Hunter-Central Rivers Catchment Management Authority, and the Seaham Weir Operations Plan has been incorporated into Hunter Water's Water Management Licence.

In addition, the Corporation believes that the bulk water quality provisions (ie reporting results against bulk water quality parameters and five year water quality trends in the Williams River, and reporting performance against the Water Management Licence and the Dams Safety Act) should continue to appear within the Catchment Management section of the operating licence rather than being combined with the Drinking Water Quality provisions.

These two areas essentially deal with two different products – source water and potable drinking water. Combining the licence provisions may be confusing for customers and the community who are generally only interested in the drinking water quality provisions.

The issues paper also refers to recent changes in the reporting requirements in the Sydney Catchment Authority (SCA) operating licence regarding “other catchment or landcare activities”. IPART suggests that a similar quantitative “outcome-focussed” approach may be suitable for Hunter Water’s operating licence as an alternative to providing a (qualitative) report on the details of activities conducted by Hunter Water.

Hunter Water agrees that the requirement to report on its other catchment or landcare activities within the Catchment Report provides important transparency on the Corporation’s activities and achievements in this area. However, we do not consider the reporting requirements for the SCA are appropriate for Hunter Water given the different responsibilities for catchment management between Hunter Water and the SCA.

The SCA is responsible for catchment management in the Sydney area. It has the authority to directly manage activities within its catchment area. Thus, the SCA has the legislative powers to control what can and can not occur in the catchment. Because of the SCA’s primary role in catchment management their activities and related expenditure can be reflected in a quantitative based reporting format.

On the other hand, Hunter Water has very little land management responsibility under any legislation, other than its responsibilities as a land owner or holder of lands in trust. There are a wide range of statutory regulations and agencies that control and influence land use in Hunter Water’s catchments and govern Hunter Water’s roles and responsibilities.

- Department of Natural Resources (DNR) – the DNR manages the State’s water system via Water Management Licences and Water Access Licences. DNR also has authority to issue directions for the management, disposal or removal of any substance that may detrimentally affect any waters in the designated Special Area. A Special Area is a gazetted area of land (and water) where activities are restricted to limit the impact on drinking water quality. Special Areas include areas that affect all of Hunter Water’s water sources ie the Chichester, Grahamstown and the Williams River catchment areas as well as the Nelson Bay, North Stockton and Tomago Sandbeds.
- DNR and the Hunter Central Rivers Catchment Management Authority (HCRCMA) – coordinates policy and activities related to total catchment management.
- Department of Environment and Conservation – issues Environment Protection Licences for each of Hunter Water’s wastewater systems that specify the maximum volume of effluent that may be discharged from each plant and the effluent quality standards. The State Government’s Lower Hunter Biodiversity Conservation Plan also includes areas of Crown water reserves that will be managed by DEC.
- Councils and HCRCMA – administer the Williams River Regional Planning Strategy and the Williams River Regional Environment Plan. As the Williams River is used for a wide range of activities, additional legislation is in place to further protect this important catchment. The Williams River Regional Planning Strategy (1997) is a land use management plan under the Environmental Planning & Assessment Act 1979. Primarily the Plan works by altering the provisions of the local environment plans to ensure that areas near river banks are given extra protection and that all developments proposed within the catchment meet the objectives of the Williams River Planning Strategy.
- Councils and the Department of Planning – approve development applications within the catchment. Hunter Water has an opportunity to comment on proposed developments and advise of any special conditions required to protect water quality. However Hunter Water does not have any approval authority of itself.

- Dam Safety Committee – regulates the operation and maintenance of prescribed dams as per the requirements in the Dam Safety Act. Hunter Water has three prescribed dams: Chichester Dam, Grahamstown Dam and Winding Creek Detention Basin.

Hunter Water works in collaboration with these authorities and the community to ensure the protection of water sources. Unlike the SCA, Hunter Water has limited control in this area and is only one of many organisations that undertake catchment management activities in the Hunter. As a result, the amount of information that would be provided in the proposed reporting provisions would not present a true reflection of the total catchment management activities undertaken and associated costs within Hunter Water's catchment area and would make any comparisons with the SCA's information invalid.

Hunter Water believes that the current reporting arrangements would continue to provide more meaningful and detailed information for the Hunter.

Hunter Water supports the continuation of existing catchment management provisions in the operating licence, including the separation of bulk water and drinking water quality provisions. The Corporation believes that the current reporting requirements are also appropriate given the number of organisations that have different levels of catchment management responsibilities in the Hunter.

2 MANAGING THE SUPPLY & DEMAND FOR WATER

A major feature of the current Operating Licence was for Hunter Water to develop and implement an Integrated Water Resource Plan (IWRP). The IWRP seeks to achieve an appropriate level of drought security for customers while balancing available resources in a sustainable manner. The plan aims to find the best solution to meet future water demands after appropriate consideration of social, economic and environmental factors.

In accordance with the Operating Licence, Hunter Water developed a comprehensive IWRP that was published in March 2003 following public consultation. The Corporation reports its performance against the Plan on an annual basis which is available via Hunter Water's website www.hunterwater.com.au

2.1 Review of the IWRP

As previously outlined in Hunter Water's submission, whilst the current IWRP is considered to have achieved its objectives, there have been a number of changing circumstances which now necessitate a major revision of the plan.

The underlying drivers for the revision are summarised below (refer to Hunter Water's submission for further information on each of these drivers):

- Renewed focus on drought security
- Recent water supply investigations
- Expanding the planning period of the plan to beyond 25 years
- Changes in demand projections – including the Lower Hunter Regional Strategy which projects increased population forecasts compared to the Draft strategy that was available prior to Hunter Water's October submission
- New supply arrangements with the Central Coast
- Introduction of new demand management initiatives – eg introduction of BASIX and requirements for new homes to achieve up to 40% reductions in water use
- Introduction of a water sharing plan for the Williams River by the Department of Natural Resources
- A wider range of water recycling options

IPART has requested further information on some of these key drivers and their impact on the IWRP – changes in demand growth and water access licences, and any future demand and supply options being considered. Hunter Water's responses to these queries are provided below. However it should be noted that these issues, as well as the implications from the other drivers listed above, will be considered in a balanced and holistic manner via the IWRP review, rather than treating each item in isolation as part of the operating licence review and pre-empting the outcomes of the IWRP review.

1. *Implications for demand growth arising from HWC's supply of water to the Central Coast and projected increases in population growth forecast by the Department of Planning.*

The State Government's "Lower Hunter Regional Strategy" was released 17 October 2006 and now indicates that the population served by Hunter Water is expected to grow at a faster rate than originally identified in the draft report. The final strategy projects a 30% increase in population (or 160,000 people) over the next 25 years. This compares with population growth of an additional 125,000 people contained within the draft strategy

report. The implications on demand growth are currently being reviewed by Hunter Water and will be factored into the IWRP review process. What these population forecasts highlight however, is the need for the revised plan to be flexible in order to respond to changes in population dynamics without having significant impact upon the agreed water resource management strategies adopted.

Hunter Water has continued to provide an average of 6 ML/day of water to the Central Coast over the past 12 months to help alleviate the water storage situation being experienced in Gosford and Wyong. The supply rate is expected to grow up to 25 megalitres per day by December 2006 following planned upgrades to the existing connection. The additional supply however, is dependant on Hunter Water's storage levels and will reduce on a sliding scale when the Corporation's total storage level is below 80%. An important feature of this link is that there is capacity for water to be supplied in either direction. The IWRP review will also consider the demand requirements and implications of facilitating further water transfers between the two authorities to provide flexible drought management in both areas.

2. *Constraints and rules on bulk water extractions imposed by any new water licences and water sharing plans issued by the Department of Natural Resources.*

DNR is continuing to develop a macro-sharing plan for the Hunter Valley's unregulated river water sources which includes the Williams River. Hunter Water actively participated in DNR's targeted consultation for the plan in early 2006. The plan will also incorporate the agreed outcomes of a number of studies being conducted by Hunter Water in relation to water access rules for the Williams River. These studies are a requirement under Hunter Water's water management licence.

The water sharing plan with water access rules for the Williams River is still in development and consequently, any constraints and rules imposed by DNR will not be known until the plan is finalised. This is expected to occur mid- to late-2007. Any outcomes of the new plan will be considered as part of the IWRP review.

3. *Future water-efficiency and supply-side options being considered by HWC.*

Recent supply investigations identify pre-treatment of water pumped from the Williams River to Grahamstown Dam as the next most cost-effective supply augmentation option. Beyond this, future supply-side options and water-efficiency options will be considered as part of the IWRP review. This is a key component of the IWRP and it is not appropriate to pre-empt the outcome of the review prior to considering all the relevant factors.

Given the range and potential impact of recent changes in the assumptions underlying the IWRP, Hunter Water believes the current **plan** is no longer relevant for long term water resource planning and is therefore not adequate for future planning. The statement in Hunter Water's submission (p18) that IPART refers to in their letter dated 27 October 2006, relates to the **plan** not the IWRP **process**. To continue to be an effective water resource management tool, the **plan** should be updated to reflect the changing circumstances. Because these changes are significant and interrelate, Hunter Water has identified that a major revision of the plan is needed.

In carrying out this review, Hunter Water will be guided by the process outlined in the operating licence, including the requirement to undertake community consultation. However, some requirements in the current licence are quite prescriptive about the inputs to the IWRP, the method of analysing options, and how the outcomes should be implemented. With the benefit of having been through the process of developing an IWRP in 2002-2003, and after considering the practices of other water agencies, Hunter Water believes that these requirements could offer more flexibility. In the October 2006 submission, Hunter Water

proposed some changes to the operating licence requirements that will improve the analysis and decision making framework underpinning the plan:

- Encourage longer-term planning by setting 10 years as the minimum planning horizon
- When evaluating the demand and supply options, using multi-criteria techniques for valuing social and environmental benefits and costs (which are often difficult to quantify) and continue to value financial benefits and costs in monetary terms (which are readily quantified)
- Adopt the options identified in the multi-criteria analysis in the revised plan.

The previous analysis undertaken in the IWRP principally relied on economic criteria. Hunter Water, in the revision of the IWRP, wishes to improve the incorporation of social and environmental considerations associated with the various supply and demand options. Multi-criteria analysis (MCA) is one common way to undertake this. Indicators that can reflect various dimensions of social and environmental impacts can be developed and quantified. These can then be incorporated into the MCA and ranked accordingly in conjunction with the economic indicators. This approach therefore allows consideration of social and economic impacts without the expense and time commitments required for detailed studies that would be required to value such impacts. The Corporation has yet to finalise the evaluation methodology to be employed in the IWRP review but sees MCA, or a modified form of MCA, as a useful means to incorporate these important impacts

2.2 Performance against the IWRP

The current IWRP action plan is based on the most cost-effective demand management and water conservation strategies identified when the plan was prepared in 2002/03. The plan includes a combination of demand management initiatives, water conservation programs and strategies to improve the efficiency of water supply.

Hunter Water provides an annual report to IPART on the performance against the action plan – three reports have been produced to date and are available on Hunter Water’s website.

IPART has requested further information on Hunter Water’s actual performance for the period 2002/03 to 2005/06 against the forward projections in the IWRP for consumption growth, leakage and real losses, recycled water and demand saving initiatives. Additional commentary on these areas is provided below.

Residential Consumption

Over the last 20 years, the growth in residential properties across Hunter Water’s area of operations has been about 1.8% per annum. Over the same period annual residential consumption has increased from 27 gegalitres to 40.5 gegalitres in 2005/06 (about 0.7 gegalitres per annum), which is consistent with the rate of population growth. The annual average residential consumption per dwelling since 1982 has fluctuated between 200 and 235 kilolitres per year depending on climate. This is amongst the lowest of the major Australian water authorities.

When examining the average water consumption by residential properties for the period from 2002/03 to 2004/05 for 11¹ of the agencies reporting annually to WSAA, Hunter Water was the third lowest with an average of 209 kilolitres per year compared to an average of 234 for the 11 agencies examined. The two agencies with lower consumption were Gosford and

¹ As reported in WSAAfacts 2005. The 11 agencies included in this analysis are the major coastal capitals and regional centres of population greater than 150,000 plus Canberra but excluding Darwin as it is influenced by a tropical climate and typically has very high average water consumption that would distort the comparison.

Melbourne (combined) both of which had water restrictions in force for part of the reporting period.

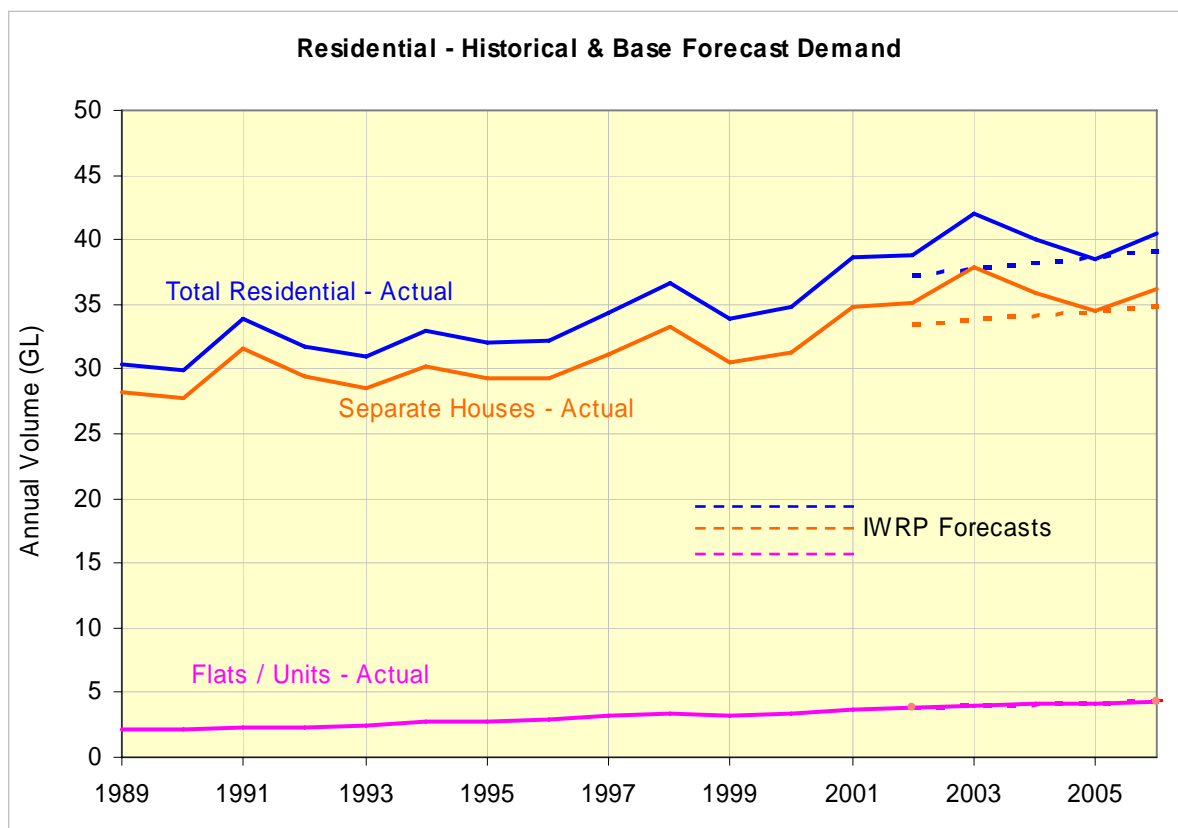
Hunter Water divides the residential sector into separate houses and flats/units for demand modelling and monitoring purposes. Each sector has different consumption behaviour, based on differences in dwelling demographics and external water use. As a proportion of total residential demand:

- flats/units have increased from 7% to 12%; and
- separate houses have decreased from 93% to 88%.

Over time we expect this trend to continue. Since 1982, the average consumption per separate house has remained relatively stable. The average consumption per flat/unit has also remained relatively stable since 1982. The Base Case demand forecasts contained within the IWRP assume a continuation of these trends in the short to medium term.

As can be observed in graph below, actual consumption over 2003, 2004 and 2006 was higher than that forecast for average climate conditions within the IWRP. In 2005/06, the actual residential consumption of 40.5 gegalitres was higher than the forecast residential consumption of 39.1 gegalitres. The variation in forecast residential water consumption over 2002/03 to 2005/06 was due to the higher rate of growth in connections than forecast and hotter climate conditions experienced during the period.

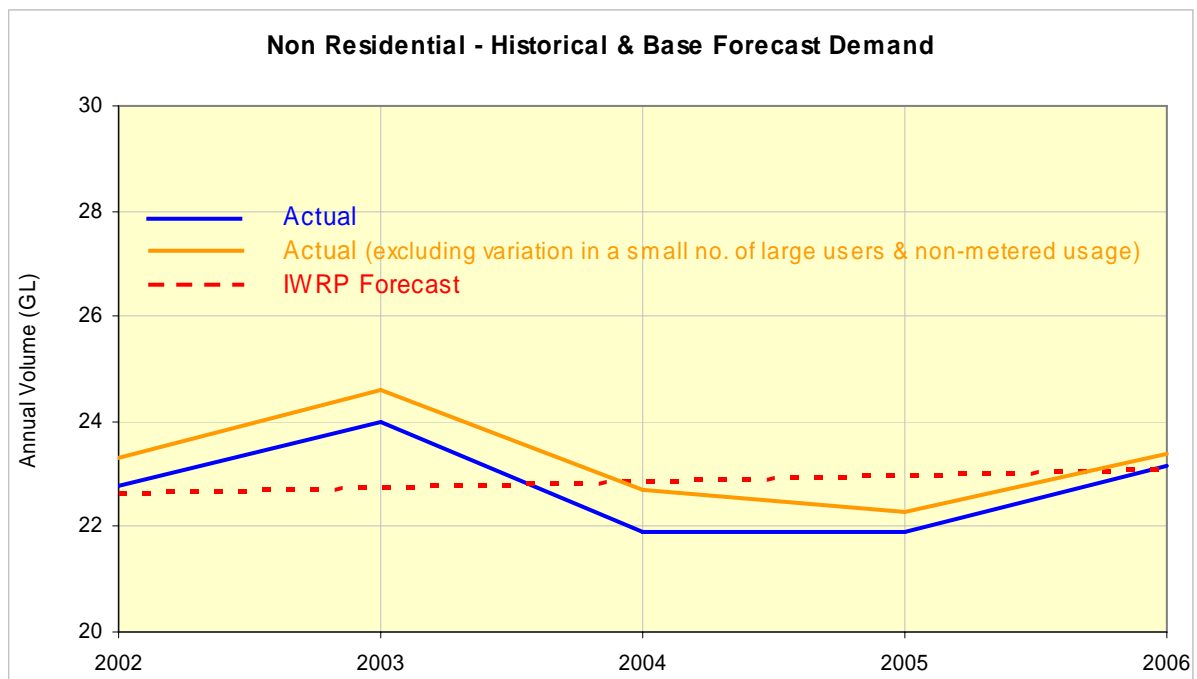
The underlying target set within the operating licence for residential consumption however, requires Hunter Water to ensure that residential water use equals, or is less than, 215 kilolitres per year when calculated as five-year moving average. Hunter Water's performance against the current target in 2005/06 was 208 kilolitres per year (5 year average). The Corporation's residential customers are among the lowest water users in Australia and, in turn, Hunter Water has a strong record in consistently meeting the water conservation target in the current operating licence.



Non-Residential Consumption

Hunter Water categorises non-residential customers into two consumption bands: major large users (more than 2000 kilolitres per annum), and small users (up to 2,000 kilolitres per annum). Major users may also be categorised as industrial or other users. Major users represent a higher proportion of total non-residential consumption (typically about 84%). The graph below presents the Corporation's historical and forecast non-residential demand.

The graph below compares Hunter Water's historical and IWRP forecasts for non-residential demand. While non-domestic consumption fell from 2002/03 to 2003/04 due to the closure of several large water users consumption in 2005/06 was fairly similar to the forecast value. One of the main areas where consumption increased was in bulk sales. This was primarily attributable to the Corporation supplying the Gosford Wyong Joint Water Authority with an increased amount of water during 2005/06. Supply to the Central Coast has averaged approximately 6 megalitres per day over the previous 12 months. Construction of additional infrastructure is also complete in order to increase the capacity to provide or receive additional flows between Hunter Water and the Central Coast. This additional demand (up to approximately 25 megalitres per day) is a drought measure only and will not be included into long term demand forecasts.



Demand Management Initiatives

The most cost-effective demand management strategies were chosen for inclusion in the IWRP action plan as well as a range of pilot programs in order to design the next round of water conservation initiatives.

The plan identified water savings of around 230 megalitres per year arising from these demand management initiatives. The plan also acknowledged the difficulty in setting meaningful targets for many of the initiatives however, Hunter Water has been closely monitoring its progress against each initiative and has reported its performance annually to IPART. This report is also available to the community via Hunter Water's website.

Hunter Water has made good progress on the demand management programs in the IWRP over the past few years. The residential REFIT program undertaken in conjunction with

Energy Australia and the five local government areas has installed over 9,000 kits throughout homes in the Lower Hunter since its introduction in July 2004. This program has the potential to save householders up to \$150 per year through the use of water and energy efficient products and services. On this basis, it is estimated that approximately 15-20 kilolitres per year of water can be saved per household as a result of installation of the REFIT kits.

The program has not been running long enough to develop accurate data on water savings, but preliminary data collected to date suggests the program is worthwhile continuing with an estimated 145 megalitres of water saved per year from the kits.

The REFIT project was promoted throughout a range of community events and venues and a trial telemarketing campaign is planned for 2006/07 in an attempt to recruit additional participants in the program. Hunter Water will also undertake further analysis of water consumption data to determine the water savings the REFIT program is achieving during the IWRP revision.

The REFIT program has also expanded into the commercial sector, with high-density accommodation such as hotels, camping grounds and nursing homes targeted, and a program was initiated with the Department of Housing in early 2004. The Department of Housing REFIT program involved the installation of a REFIT kit to about 300 properties and initial analysis has shown that these houses have seen water savings of around 10%. It is estimated that this program has saved 7 megalitres of water per year and discussions are occurring with the Department of Housing about extending the program.

In total, it is estimated that REFIT kit programs to date have reduced the annual Lower Hunter greenhouse gas emissions by over 5000 tonnes per year and reduced annual water consumption by about 160 megalitres per year.

Another initiative of the IWRP was to assess the opportunity of introducing a rebate program for customers who install a rainwater tank and therefore help reduce consumption demands on major water storages. Hunter Water introduced a rainwater tank rebate program from 1 July 2004 for a two year trial period. The program provides rebates to customers who install a rainwater tank that is connected into the household plumbing for use such as toilet flushing and washing clothes. The rebate does not apply to customers that install a rainwater tank as part of a requirement to meet BASIX or other regulatory requirements. It is estimated that rainwater tank rebates have contributed to 5 megalitres water savings per year and due to the growing success of the trial, it has been decided to continue the trial indefinitely.

Work has also progressed on other demand management initiatives, including pilot programs, where it is not possible to attribute the related savings in water consumption.

- **Community awareness campaign** – In addition to conducting water conservation campaigns over the summer, Hunter Water has focussed educational campaigns at local schools. In June 2005 Hunter Water launched a new Water Kit for schools in the Lower Hunter. The Water Kit is regional in its content and context, and is a comprehensive education resource for students and teachers on water supply, water conservation, and wastewater/stormwater. Overall feedback on the kit has been positive and comments have been used to improve the resource kit.

Hunter Water is also undertaking a new water conservation school program for 2006. In August 2006, a local theatre group commenced a program of short plays with a water conservation message at local primary schools. Hunter Water has provided funding for the play to be performed at 30 schools. Initial feedback has also been positive.

- **Indoor/Outdoor metering** – Hunter Water re-established the indoor/outdoor metering project in 2005 to monitor outdoor water consumption trends, including variations with climate and location. Approximately 300 customers will participate in the program and as part of the recruitment process for the project, customers are being surveyed to develop a profile of water use habits and demographic information about the household. This

information, which will be periodically updated, will provide important background information for any future analysis of data from the program. The program will involve the installation of new water meters that can be read remotely. The use of this new technology could have wider applications in the future eg provide better information on the daily water usage profiles of customers, and for customers that currently have meters that are in places that are hard to read or present an occupational health and safety risk. It is proposed that Hunter Water will be retrieving data by the end of 2006.

- **Cleaner Production** – The IWRP not only involves itself in residential projects but also in improving non residential water efficiency. A major project in which Hunter Water is a partner is the Newcastle and Hunter Cleaner Production Project. The Corporation has contributed \$60,000 funding and in-kind support since the project began in October 2003. Companies make a small financial contribution and receive a \$10,000 package that includes an energy, water and waste assessment and the development of a Cleaner Production plan by an environmental consultant. The program offers the commercial sector a chance to improve their environmental profile and increase profits.
- **Water Conservation Rating and Labelling** – Hunter Water supports various national water conservation rating and labelling schemes such as the 5-A rating scheme formerly conducted by WSAA, the Water Efficiency Labelling and Standards (WELS) scheme (which replaced the 5-A scheme from 1 July 2006) and the Smart Approved WaterMark Program.

It is estimated that the WELS scheme will cut domestic water use by 5% and also deliver substantial energy savings and greenhouse gas abatement. Nearly half the water savings will come from more efficient washing machines, about 25% from showers and 22% from toilets.

The Smart Approved WaterMark Program was launched in late 2004 and is designed to reduce water consumption in outdoor use by recognising products, services and organisations with a demonstrated commitment to water efficiency

- **Water Sensitive Urban Design** – Hunter Water has an ongoing association with two water sensitive urban design projects, one with the University of Newcastle and the other with Newcastle City Council.

The Corporation provided funding to the University of Newcastle Urban Water Research Group for five PhD projects.

Hunter Water also continues to collect information regarding the benefits of rainwater tanks from the Kotara Roof to Creek Project. The project was a joint initiative between Hunter Water, Newcastle City Council, the Stormwater Trust and the University of Newcastle. Under this project, rainwater tanks were retrofitted to 16 residential houses. The research to date indicates that 13 of the tanks have been successfully used to harvest rainwater for significant portions of time over the past 2 years. Of these houses, each harvested an average 35 kilolitres of rainwater per year, which made up around 20% of their total water consumption over the 2 years.

Water efficiency measures were also incorporated in Hunter Water's new head office, including a 100,000 litre rainwater tank. The rainwater is used for toilet flushing and irrigation of minor landscaped areas around the building. Early results suggest that consumption of potable water reduces by over 50% when rainwater is available from the storage tank. The rainwater tank also acts as a buffer to reduce stormwater flows from the site and all taps and shower heads in the amenities are provided with low flow fittings.

- **Residential consumption program** – Hunter Water analysed household consumption on a location basis and conducted a six month trial campaign between December 2003 and May 2004 to assess the impact of different promotional campaigns on water usage and awareness. Analysis of the survey results indicated that there is no clear evidence that the various targeted campaigns had an effect on the average water consumption across the suburb. Due to the lack of appreciable benefits the program was not continued.

Leakage and Real Losses

In addition to demand reduction initiatives described above, specific programs have been developed for water conservation through improved operations and maintenance processes of Hunter Water's water delivery system.

The IWRP target for annual water savings from leakage reduction measures is 625 megalitres per year. The actual levels of water saved due to water loss minimisation strategies since the implementation of the IWRP has gradually increased to levels that are well above this target. Estimated levels of water savings over 2005/06 were 1,174 megalitres. This was achieved through the following strategies:

- **Water service replacement program** – Hunter Water is progressively replacing the small diameter galvanised iron pipes that were previously used to connect the watermain to the customer's water meter. Many of these galvanised services have now reached the end of their serviceable life and are deteriorating to the point where they are a source of leakage. Hunter Water has continued to replace these services, despite being the responsibility of the property owner. The program would have resulted in savings of about 150 megalitres in 2005/06 and is relatively cost effective and addresses a very visible form of leakage. Future expenditure on this program and savings in water are expected to reduce with the reduction in the remaining galvanised services
- **Watermain replacement program** – this program targets watermains that have a history of breaks and leaks. The estimated savings are about 20 megalitres per year at a cost of around \$3 million.
- **Active leak control** – aims to assess the level of leakage, generally through flow monitoring and leads to the development of a targeted approach for leak detection. Leaks will occur in any system as pipes age and begin to fail. Without an active leakage strategy the majority of these leaks gradually worsen to a point where they typically are reported by the public. Active leakage control aims to identify leaks before they would normally be reported. Some leaks may not be visible, and might never be reported, such as leaks that drain to the stormwater system or waterways. The estimated savings were around 730 megalitres during 2005/06.
- **Leak detection** – leak detection surveys using the latest technology commenced on a trial basis in 2002/03. Based on the success of previous years' leak detection work, the leak detection program was expanded in 2005/06, with 570km of watermains surveyed in Newcastle and surrounding suburbs. This study identified over 100 leaks which were repaired. The program cost was \$100,000 excluding repairs and saved approximately 400 megalitres of water.
- **Pressure management** – aims to reduce water loss from leaks that are difficult to locate and generally are very small. An area was selected in Windale for creation of a separate water supply zone for a pressure management trial. Flow monitoring in the zone commenced in December 2003 and a pressure reducing valve was installed and the reduction of pressure in the zone commenced in late December 2004. Results so far have confirmed a significant reduction in the night flow, and therefore the amount of leakage in the zone. The estimated reduction in water loss is around 4 megalitres per year. An analysis of the cost effectiveness of pressure management has identified that there is potential for a favourable benefit/cost ratio for zones of around 1000 customers and larger. A further pressure management trial is also being investigated.

These initiatives are reflected in Hunter Water's Infrastructure Leakage Index (ILI) which is consistently rated in the excellent to good/fair range. Further information on the ILI is provided below.

Recycled Water

Hunter Water set a stretch target within the Environmental Management Plan (EMP) of 13% reuse by 2007. It was acknowledged in the IWRP that this is a stretch target and is largely dependent on the market, for example Hunter Water can investigate and promote a number of initiatives however increases in recycling are generally always influenced by whether external parties are prepared to participate in using the product.

Since 2002/03 the level of reuse has hovered between 9% and 7.5% of dry weather flows. During 2005/06, Hunter Water reused about 7.5% of average dry weather flows from its wastewater treatment plants. Approximately 2,545 megalitres of recycled water was used directly from the treatment plants, while an additional 1,510 megalitres was estimated to have been reused for irrigation from creeks immediately downstream of the effluent discharge.

While Hunter Water has maintained a relatively constant level of reuse, there are a number of opportunities being pursued which take some years to deliver eg third pipe system at Thornton North and a recycled water scheme at Kooragang Island. A \$500,000 recycled water study is almost complete which will identify other potential recycling opportunities for consideration in reviewing the IWRP.

3 INFRASTRUCTURE LEAKAGE INDEX

Water losses within the distribution system are identified as part of the periodic water balance conducted by Hunter Water. A water balance is required so that the unidentified real loss, or leakage level, can be estimated. It is important to note that unaccounted for water can occur from maintenance activities and such as scouring mains, cleaning reservoirs and from watermain breaks etc. The estimated water loss from different supply zones can then be used to prioritise work in order to maximise gains from water loss control methods.

The current operating licence requires Hunter Water to report water losses according to the definitions and methodology of the International Water Association (IWA). The product of the IWA methodology is a measure of losses known as the Infrastructure Leakage Index (ILI). Hunter Water supports use of the ILI to measure losses as it is now nationally and internationally accepted as the standard measure for leakage. The new National Water Initiative benchmarking indicators also use ILI to measure water losses from urban supply systems.

The ILI is the ratio of the current annual volume of real losses (CARL) to the unavoidable annual real losses (UARL) ie a measure of how current actual losses (leakage) compare with the theoretical lowest possible level of leakage that could be achieved by a particular water supply system.

$$ILI = \frac{CARL}{UARL}$$

The calculation takes account of factors such as length of main, number of connections, connection density, operating pressure, meter errors, fire fighting use etc. The ILI is expressed as the ratio of actual losses compared to the theoretical lowest level of losses for the system. An ILI of 1.0 therefore means that current losses are equal to the best achievable result for a particular system. The IWA methodology rates ILI in 3 bands

- 1 to 1.5 Excellent
- 1.5 to 3.5 Good
- Above 3.5 Below average

Being a ratio, the ILI has no units and thus facilitates comparisons between countries that use different measurement units (U.S., metric or imperial). Leakage management practitioners around the world acknowledge that real losses will always exist – even in new and well managed systems. It is simply a question of how high these unavoidable losses will be.

The complex initial components of the UARL formula were converted to a practical user-friendly tool for assessing a lowest limit for the annual volume of real losses that are technically achievable at the current operating pressure regime, with world's "best practice" for speed and quality of repairs, active leakage control, and construction, maintenance and renewals management. The assessment requires the number of service connections, the length of mains, the location of the customer meter relative to the street/property boundary, and the average operating pressure.

$$UARL \text{ (litres/day)} = (18 \times L_m + 0.8 \times N_c + 25 \times L_p) \times P$$

Where, L_m = mains length (km)
 N_c = number of service connections
 L_p = total length of private pipe, property boundary to customer meter (km)
 P = average pressure (m).

WSAA is publishing the ILI of their members on an annual basis. It is also used internationally:

- In New Zealand it was introduced in 2001 and is currently being used by many water utilities throughout the country
- In South Africa the ILI is well accepted and used by many utilities. It is soon to be implemented as the key performance indicator for assessing water losses by the regulator throughout the country
- In Italy (by the "water loss user group")
- In North America (by the AWWA water loss control committee)
- By members of the International Water Association water loss task force in their working environment.

Hunter Water had an ILI of 1.31 for the 12 months period December 2004 to December 2005, which is better than the mean result across the authorities that publish performance indicators and is in the excellent range. This result is a significant improvement over the last year and continues the downward trend over the previous financial years. It is considered that this reduction is attributed to improved leakage management.

The latest result reported for the quarter ending April 2006 has seen a move from the excellent range to the interface between excellent and good/fair. Hunter Water is continuing to install flow metering devices across the system as well as progressing the leak detection and active leakage control programs already in place. Some variation in leakage performance can be expected to occur and the further work undertaken by Hunter Water will allow the Corporation to better understand this important area.

