WATER AND SEWERAGE AMENDMENT REGULATIONS 2004 (No 1)

Subordinate Law SL2004-45

REGULATORY IMPACT STATEMENT

Identification of problem

Below average annual rainfall over the ACT's municipal water supply catchments during the last 2 years has caused significant reduction in water storage levels in the major dams that the ACT relies upon (Googong dam in NSW and Corin, Bendorra and Cotter dams in the ACT). For the period 1 January 2004 to 15 August 2004 ACT rainfall was 121mm* compared with an expected average of 378mm*. On 1 August 2004 the combined storage of Bendora, Corin and Gogong dams was 44.4%* of full capacity. *Source: *Stage 3 mandatory water restrictions for ACT and Queanbeyan* by ACT Government and ACTEW Corp, of September 2004.

The lack of rainfall across the ACT has caused an increase in the amount of water the ACT community would normally desire to use to irrigate domestic gardens and grass. The size of that community continues to rapidly grow, both in terms of geographical area occupied by new suburbs, and in population number. Canberra's population now exceeds 313 000, with more than 120 000 residential buildings spread across about 90 developed residential suburbs. In the coming few years that number is planned to increase to near 100 residential suburbs in total, with the expansion of development in Gungahlin district.

Those factors combine to pose a risk that in the long-term demand for dam-stored water will exceed the amount stored, particularly given a scenario of ongoing poor rainfall. Water usage across the city is currently being curbed by strict water restrictions. (See Utilities (Water Restrictions) Declaration 2004 (No 3), Notifiable instrument N12004-318, made under the *Utilities (Water Restrictions) Regulations 2002*, reg 8 (imposition of Water Restrictions). The stage 3 water restriction regime aims at reducing normal demand for water by 40%. Source: *Stage 3 mandatory water restrictions for ACT and Queanbeyan* by ACT Government and ACTEW Corp, of September 2004.

The low water supply problem could ultimately be addressed at the macro level by constructing new storage dam(s), and or pipelines from existing dams or rivers. Such construction cannot be achieved in the short term as site analysis, design, and construction typically takes several years for such significant engineering projects.

A disadvantage for the ACT community is that the cost of construction of dams and pipelines and their infrastructure, needed to alleviate the potential problem of low water supply storage levels, is significant. Such costs are usually ultimately passed on to the community through water supply charges. Estimates of the cost of options for new pipelines or dams range from $67.7 million to $153.8 million (in year 2012 dollars), (source: page ii of *Options for the next ACT water source* by Technical & Consulting Services Branch, ActewAGL Water Division, of April 2004).

The problem of potentially insufficient water supply to meet long-term demands, in a worst-case scenario, could also be somewhat alleviated at a more micro level, through reducing some of the demand for dam-stored water in and around new residences.

A significant portion of ACT water consumption is accounted for by domestic water use, both inside homes and in irrigating domestic gardens and grass. That is due to the ACT not having extensive manufacturing or agricultural industries that are large water users, but yet it has a large urbanised and populated areas.

The major water use areas in the residential situation include personal showering and bathing, irrigation of domestic gardens and grass, laundering and toilet flushing.

Recent amendments to the *Water and Sewerage Act 2001* were intended to reduce demand for dam-stored water by reducing the maximum water flow that certain new domestic taps and showers can produce. (See Water and Sewerage Amendment Bill 2004, presented 13 May 2004). Those amendments do not, however, address reduction of dam-stored water use in clothes washing machines, toilet flushing or irrigation, each of which place significant demands on dam storage given that the ACT has more than 120 000 residential buildings, all with 1 or more toilets and most with gardens or grass areas.

Reducing the maximum flow of taps serving washing machines, toilets and irrigation will have virtually no impact on dam-stored water demand, as filling clothes washing machines and toilet cisterns and irrigating land all require fixed volumes of water regardless of the flow rate that water is supplied at.

Two methods of reducing the amount of dam-stored water that is required for use in domestic laundering and toilet flushing and domestic land irrigation is to use rainwater caught on the premises or reuse relatively unsoiled water that has already been used for another purpose and would have been otherwise discarded into the sewerage network ("grey water"). Both methods are becoming increasingly popular with conscientious sectors of the ACT community. Taken on a more wide-spread scale those methods can positively impact on the potential problems mentioned above in relation to dam water storage verses long-term demand. They can lessen the impact of water restrictions by allowing irrigation of gardens and grass at a greater level than allowed under current water restrictions.

Unfortunately, it can be the case that the cost of acquiring and installing the required pipework and fittings into a residence, is sometimes large enough to act as a disincentive to homeowners who are otherwise keen to participate in those water conservation methods.

The problem of the cost of building the pipework and fittings into residences, however, generally only arises where that is done retrospectively. That is, cutting into finished walls, floors or ceilings of completed residences to install extra drains to carry grey water independent of the more septic sewage from toilets etc, or to install rainwater pipework to serve a laundry or toilet, can be sufficiently expensive and disruptive to make that work unfeasible for many home owners. Conversely, building in those kinds of pipework during the construction of the residence can, in many cases, be done at negligible extra cost to plumber's charges for installing the

building's other plumbing and drainage. Figures in relation to those costs are stated further below under "impact analysis".

Many new ACT residences are built by speculative builders, where market forces often dictate that aspects of the building must be constructed at minimal cost, including pipework, to achieve a minimum cost product (the finished building). That contributes to the fact that the ACT residential market has failed to provide residences with plumbing and drainage suitable for connection of rainwater or grey water pipes.

Need for Government intervention

The potential problems mentioned above in relation to dam water storage verses long-term demand indicate there are clear benefits to the community if Government intervenes in the provision of plumbing and drainage into new residential building work to facilitate rainwater and grey water use. Conversely, if Government fails to intervene, market forces will continue to dictate that plumbing and drainage to most new houses must be minimalist to achieve minimal cost.

That failure will continue to effectively prevent many householders that are keen to use rainwater and grey water in domestic applications, from conveniently doing so. The cost of retrospectively reticulating pipework into many buildings is simply prohibitively expensive in many cases. Whereas, Government intervention during building construction can achieve building-in the necessary pipework at negligible cost in many cases. Cost estimates are set out under "impact analysis" further below.

In summary, Government intervention can address a market failure at negligible cost to produce a significant community benefit.

Objectives of Government intervention

The objective of relevant Government intervention in this matter would be to remove the barriers that prevents new homeowners from making convenient use of rainwater and grey water in their day to day routines.

The main contributing factors to that barrier are—

- ❖ the lack of an ability to simply turn on a tap inside a house to make use of rainwater as an alternative to dam-stored water; and

- ❖ the lack of separation of sewerage drains to allow grey water to be kept separate from more septic sewage, so it can be reused.

The mechanism causing the barrier is the cost of labour and materials needed to retrospectively install plumbing and drainage in new residences to achieve the above-mentioned convenience and separation.

The barrier can be effectively removed by ensuring the relevant plumbing and drainage is built into new residences at the time of building construction, when the cost of the additional pipework and associated labour is negligible or small. That can

only be feasibly achieved by Government regulation, in the current residential construction market.

Current regulation and policy

Plumbing and drainage work in the ACT is regulated by the *Water and Sewerage Act 2000* and its regulations. Those laws rely on the technical provisions for plumbing and drainage work set out in Australian and New Zealand Standard AS/NZS 3500—National Plumbing and Drainage.

Those laws and standard do not require the above-mentioned additional pipework to be built into buildings.

In April 2004 the ACT Government published *Think water, act water*, a strategy for sustainable resource management in the ACT. Page 20 states—

> New plumbing practice notes will be introduced to:
>
> • require separation, in new houses, of washing machine and bathroom drainage from the remainder of the wastewater system to enable future reuse
>
> • require separation, in new houses, of the water supply to toilets and washing machines to enable future rainwater use.

Such plumbing practice notes require corresponding provisions to be made in law to make their content enforceable. Without such legal force they can be used to educate, but their requirements cannot be taken as being mandatory.

Options

It is not expected that non-regulatory options will be successful in achieving desired outcomes. The ACT residential construction and plumbing industries are not captive for the purposes of persuading by education etc, in that it is not wholly ACT-based. Membership of the ACT market comprises some ACT based licensees and some who seek transitory work from surrounding NSW from time to time. Non-regulatory methods of achieving outcomes for the sector would require ongoing effort by Government to ensure the message was driven home to those people entering the ACT market.

Further, the nature of the work of that market sector sees tradespeople focusing their daily routines of achieving deadlines on work sites, with little capacity to be persuaded to depart from those routines unless required to do so by law or contract.

Therefore there is no feasible option other than to regulate to require extra pipework to be built-in during residential building construction.

There are 2 options on the extent of such regulation for achieving the above-mentioned objective of removing the barriers to convenient domestic use of rainwater and grey water in new residences—

1. regulation of all new house construction; or

2. regulation of new house construction only where there are likely to be significant net benefits.

Option 1

Option 1 covers making provisions in law requiring the relevant rainwater and grey water pipes and fittings to be installed into all new residential construction at the stage when the building's other pipework is being installed.

The best vehicle for such regulation is the *Water and Sewerage Regulations 2001*. Those regulations currently contain the technical requirements for installing plumbing and drainage pipework and fittings into buildings generally.

Those regulations were recently amended as a consequence of the passing of the Water and Sewerage Amendment Bill 2004, presented 13 May 2004, to require certain taps and showers in new residences to have a specified water efficiency, to conserve dam-stored water. The making of further amendment to those regulations, to require the installation of rainwater and grey water pipework, would compliment those recent amendments.

Option 2

Option 2 essentially relies on making the same provisions in law as option 1, but providing that the grey water drainage provisions only apply where impact analysis suggests the regulation is likely to produce significant net economic benefits. The rainwater provisions remain in both options 1 and 2, as the cost of provisions of rainwater pipework is insignificant in all buildings during construction, according the ACT Planning and Land Authority research.

Broad constraints on options

Option 1

There are virtually no constraints upon option 1. The ACT Government currently is the sole provider of inspection/certification services for plumbing and drainage work. Such inspection and certification is mandatory under the *Water and Sewerage Act 2000*. Making amendments to those regulations, which have the effect of requiring installation of rainwater and grey water pipes etc in new residential building work will form merely another aspect of the work that Government currently regulates through inspection and certification. Any failure by industry to comply will be able to be dealt with under new offence provisions or under licence disciplinary action under the *Construction Occupations (Licensing) Act 2004*. That Act allows for such disciplinary action to be taken against licensed plumbers and drainers on grounds of failure to comply with that what that Act refers to as "operational Acts". It specifies at s 16 (What is an operational Act?) that the *Water and Sewerage Act 2000* is an operational Act.

Option 2

Option 2 is constrained by the limits of how effectively industry can easily identify where the proposed mandatory system applies and where it does not, ie: which new residential work requires the additional pipework etc and which does not. It is unlikely option 2 would be acceptable to industry if it burdened industry with having to determine if or not the law applies on the basis of a complex, case by case, analysis. To be successful option 2 needs to clearly define in law, which kinds of new residential building work are subject to the requirements and which are not, and the two kinds need to be clearly discernable form each other.

Impact analysis

Affected parties

Providing additional rainwater and grey water pipework etc in new residential building work effects mainly—

- builders building house additions and new houses;
- plumbers installing water supply plumbing or sanitary plumbing in house additions and new houses;
- drainers installing sanitary drainage in house additions and new houses;
- the area of Government that inspects and certifies plumbing and drainage work (ACT Building, Electrical and Plumbing Control);
- those members of the community that purchase new houses or acquire house additions containing wet area rooms; and
- those members of the community who desire to use rainwater and grey water for domestic purposes.

Impacts

The main expected economic cost/benefit impacts of providing additional rainwater and grey water pipework etc are difficult to accurately assess due to the fact that the full benefits are not realised unless a grey water reuse system and rain water supply system is connected to the building using the built-in extra pipework.

Current community rates of acquiring grey water systems and rain water tanks are low, (estimated by ACT Planning and Land Authority as <10% of total new residences), partly due to the lack of convenient connection to suitable pipework in residences.

Requiring grey water and rainwater pipework to be built-into new residential building work is expected to increase that rate, particularly if mandatory water restrictions continue and the cost of acquiring water tanks and grey water systems reduces with increase in consumer demand.

The above-mentioned factors create significant uncertainty about some cost contributors to a cost/benefit analysis of option 1 and option 2. Set out further below is a sensitivity analysis that examines several cost/benefit scenarios. The figures are for a year of operation of the proposed reforms, based on relevant historical data for the 2003/2004 fiscal year, and are not discounted. Table 1 below provides a tabular summary of maximum realisable costs and benefits.

The analysis considers the following factors—

1. Non-economic benefits relate to personal satisfaction from the ability to conveniently use non dam-stored water, particularly during water restrictions but also at other times, to irrigate domestic gardens and grass. They are in themselves significant enough to warrant Government regulation, but are not quantifiable from an economic point of view. The money saved in substituting "free" rainwater and grey water for purchased municipal network supplied water is insignificant, particularly given the costs of providing rainwater tanks and grey water systems. Those economic costs are not taken account of here as they are considered to be offset by the personal (non-economic) benefit of being able to irrigate with grey water.

2. Cost estimates in relation to providing additional pipework are based on industry consultation and research by ACT Planning and Land Authority conducted in mid 2004, involving several ACT plumbing and drainage contractors.

3. That research and consultation indicated that in relation to single storey residential construction, including new houses and house extensions, the cost of providing the additional pipework for grey water and rainwater use would in most cases be negligible. In most cases the expectation is that the plumber and drainer would not charge extra for the insignificant extra pipe and labour. That is due to fact that the residential plumbing industry generally operates on a subcontracted trade basis where "average" projects are charged in a lump sum, rather than by pipework metres. That is, the plumbing cost is often dictated by the size of residential building and number of wet area rooms it contains rather than the length of pipework needed.

   Typically, average 3 bedroom ensuite houses are charged at a "standard lump sum rate", often regardless of the internal arrangement of the rooms in the building. Adjustments to that sum are generally made for things such as being unable to obtain excavator access, so excavation by hand is needed, or where rocky ground is encountered or very long lengths of excavation are needed to pipe around a large obstacle.

   Providing the required extra rainwater and grey water pipework in most cases will require less than 5† metres of extra sanitary drainage pipework and less than 2† metres additional water supply pipework. Providing such minor additional lengths of pipework are usually not grounds for varying lump sum prices where the extra work is part of the original scope of work, rather than a variation to a contract.

The size of building directly affects the plumbing lump sum cost, however. In particular, upper floors of 2-storey residences with wet-areas rooms upstairs attract a premium cost over single storey buildings. That is due to the need to install vertical sanitary plumbing (plumbing stacks), and the fact that hydraulic design of upper floors is often more complex than for ground storey hydraulics. Upper floor sanitary drainage is often contained within the narrow space between the underside of the upper floor and the ceiling of the lower floor below. That narrow area limits the lengths of sanitary drainage pipework that can be installed so as it continues to adequately drain under gravity.

4. Provision of separated grey water sanitary drainage for upper floors of residences would therefore often require significant duplication of upper floor pipework and duplication of plumbing stacks. According to the above-mentioned research and liaison, the plumbing industry would charge around an additional $2000† to provide separate grey water sanitary drainage to the upper floor of a residence where the upper floor contained a bathroom and ensuite etc, and the work was done during construction of the building.

5. The estimated total number of buildings to which the additional plumbing would need to apply is 1600† per year, including new residential construction and extensions to residences, where the extension contains a wet-area room. The 1600 comprises 1200† standard houses, including dual occupancy houses, 200† townhouses and 100† house extensions.

6. Of that 1600 number, indicatively around 600† are 2 storey and 1000† are single storey.

7. The estimated cost of retrofitting rainwater and grey water pipework to residential buildings is in the order of $1000† per single storey building and around $2000† for upper floors of 2 storey buildings (that is similar to the cost of providing the pipework during construction, rather than retrofitting as the drainage is accessible from the floor below).

(†Figures from ACT Planning and Land Authority research and plumbing and drainage industry consultation in mid 2004).

Table 1—Maximum realisable cost benefits—detailed summary

Affected party	**Cost**	**Benefit (includes 100% realisation of potential benefits)**
Business (builders, plumbers and drainers)	Nil as costs are passed on to the builder's client (the community) in the form of increases in building contract sums or house prices.	Nil
Government	Nil (public education negated through temporary reassignment of resources allocated for such tasks).	Nil
Community	Option 1; 1600 buildings of which 1000 @ nil cost and 600 @ $2000= $1.2M pa. Option 2; 1000 buildings @ nil cost pa.	Option 1 negates need to retrofit 1000 buildings @ $1000 + 600 buildings @ $2000 = ∑$2.2M. Option 2 negates need to retrofit 1000 buildings @ $1000 = $1M.

Sensitivity analysis

The tables below present cost/benefit analysis results for different scenarios of realisation of potential benefits. Whilst the built-in rainwater and grey water pipework remains unconnected to a rainwater supply and unconnected to a grey water reuse system, they provide no realised tangible benefit other than the potential to facilitate those connections and thereby then make for connivent use of rainwater and grey water. That potential benefit will remain for the economic life of the building.

Table 2 refects maximum benefits including realisation of 100% of potential benefits. It is an unrealistic scenario as 100% take-up of provision of water tanks and grey water reuse systems is improbable, unless made mandatory by future law. It is provided for comparison purposes.

Table 3 excludes unrealised potential benefits (ie; excludes cases where no water tank or grey water system is connected to pipework) but includes a 20% rate of realisation of potential benefits (20% of relevant buildings have a rainwater tank or grey water system connected to the additional pipework). The 20% rate represents an expected long-term rate of voluntary connection.

Table 4 excludes potential benefits and assumes nil realisation of potential benefits in that no connections are made to the additional pipework. It is an unrealistic scenario in that it assumes nobody makes use of the additional pipework in that no rainwater tank or grey water system is ever connected to any building containing the additional pipework. It is provide for comparison purposes.

Table 2—includes 100% realisation of potential benefits (unrealistic scenario)

Sector	**Option 1**			**Option 2**		
	Expected costs	*Expected benefits (100% potential benefit realisation)*	*Net Benefit/ (Cost)*	*Expected costs*	*Expected benefits (100% potential benefit realisation)*	*Net Benefit/ (Cost)*
Community	$1.2M pa	$2.2M pa	$1M pa	Nil	$1M pa	$1M pa
Business	Nil	Nil	Nil	Nil	Nil	Nil
Government	Nil	Nil	Nil	Nil	Nil	Nil

Table 3—includes a 20% rate of realisation of potential benefits but excludes all unrealised potential benefits (realistic scenario)

Sector	**Option 1**			**Option 2**		
	Expected costs	*Expected benefits (20% potential benefit realisation)*	*Net Benefit/ (Cost)*	*Expected costs*	*Expected benefits (20% potential benefit realisation)*	*Net Benefit/ (Cost)*
Community	$1.2M pa	$0.44M pa	($0.76M) pa	Nil	$0.2M pa	$0.2M pa
Business	Nil	Nil	Nil	Nil	Nil	Nil
Government	Nil	Nil	Nil	Nil	Nil	Nil

Table 4— excludes potential benefits and assumes nil realisation of potential benefits (unrealistic scenario)

Sector	**Option 1**			**Option 2**		
	Expected costs	*Expected benefits (0% potential benefit realisation)*	*Net Benefit/ (Cost)*	*Expected costs*	*Expected benefits (0% potential benefit realisation)*	*Net Benefit/ (Cost)*
Community	$1.2M pa	Nil	($1.2M) pa	Nil	Nil	Nil
Business	Nil	Nil	Nil	Nil	Nil	Nil
Government	Nil	Nil	Nil	Nil	Nil	Nil

A comparison of tables 2 to 4 above indicates that regardless of the rate of realisation of potential benefits, provided that rate is not zero, option 2 always produces positive economic benefits. Whereas, the potential benefits expected to be produced by option 1 require a rate of realisation of potential benefits of somewhere in excess of 20%. At a rate below that figure, for option 1 the net effect of regulation is expected to produce costs rather than benefits.

That realisation of benefits refers to connecting a rainwater tank and grey water reuse system to the additional pipework required to be built-in to new residential building work.

Summary of impact analysis and sensitivity analysis outcomes

Community benefits such as being able to conveniently irrigate grass and gardens with the daily water generated from showers, laundries and baths etc, particularly during periods of mandatory water restrictions, are personally substantial and significant, but difficult to quantify. The economic net benefits per household are somewhat insignificant when compared to personal benefits obtainable in other ways.

There is substantial uncertainty about how many buildings affected by the proposed new regulations will ever have their mandated pipework connected to a rainwater tank or grey water reuse system. Without mandating such connection, rates in the short to medium term are likely to be around their current rate (<10%), but may rise to up around 20% of cases in the long term, particularly if the proposed regulations mentioned below are made.

The above sensitivity analysis indicates that even if 20% of affected premises are connected to grey water reuse systems, the expected costs of requiring the relevant pipework to be built into 2 storey houses will not produce sufficient benefits to offset that cost. In fact, at that 20% connection rate, costs outweigh benefits by around $760 000 per year across all relevant new construction work.

Further, the sensitivity analysis provides the details of parameters that can be used to make option 2 more specific. Option 2 refers to housing "where impact analysis suggests the regulation is likely to produce significant net economic benefits". The analysis indicates that those significant net economic benefits are likely to not occur in relation to installing grey water pipework to the upper floors of multistorey houses, during construction. The analysis therefore suggests that option 2 can be taken as referring specifically to circumstances of installing rainwater and grey water pipework only in the ground storey of relevant houses and house extensions.

Conclusion

Option 2 is more preferable than option 1 as option 1 is likely to produce net costs to the community that outweigh the corresponding benefits. That net cost is in the expected to be in the order of around $760 000 per year. Whereas option 2 is likely to produce economic benefits of $200 000 per year, net.

Both options 1 and 2 are expected to produce significant non-economic benefits though the personal satisfaction of knowing that water used for daily showering or bathing can be conveniently used for domestic land irrigation. Option 1 does so in around 600 cases per year more than option 1 (600 x upper floors of 2-storey buildings), but the costs of doing so in those 600 cases make option 2 less economically feasible than option 1. In any case option 2 requires the additional grey water pipework to be installed in the ground storey of 2 storey buildings, where there are grey water fixtures in the ground storey.

Recommendation

It is recommended that amendments be made to the *Water and Sewerage Regulations 2001* to require additional rainwater and grey water pipework etc to be installed in

new house building work, including house additional containing wet area rooms, during construction. The grey water requirement should not apply to upper storeys of buildings. The new provisions should set out all relevant technical requirements, including reliance on technical standards where appropriate, and establish offences in relation to contraventions.

That recommendation is based on the assumption that—

- the current housing construction market has failed to deliver housing products that make for convenient low-cost later connection of rainwater supplies or for connivent reuse of grey water, in and around the residence; and

- that market failure is deterring many homeowners from making more use of rainwater and grey water than would be the case if residences where provided with pipework that made that kind of use more convenient; and

- requiring such pipework to be installed during construction of residences will be of insignificant extra cost, and will allow many more homeowners to install, and make wider use of, water tanks and grey water systems.

- The requirements will be of insignificant or nil overall cost to industry and the community.

Implementation

Implementation of the recommendation will require education of the building and plumbing industry, by way of plumbing notes, which explain the relevant legal and technical requirements. Government plumbing inspectors will require training in the requirements. Those matters will not require additional funding as ACT Building, Electrical and Plumbing Control have an ongoing, funded, role of providing such information and training.

The new regulations should have a delayed commencement of at least 3 months to allow industry to adjust its work that is already afoot, and to be educated on requirements.

Cost impacts on industry will be negligible or nil, particularly in the medium and long term as providing the additional pipework soon becomes the "norm" rather than a "new requirement".

Review

The effectiveness of the proposed regulations will be able to be measured on each occasion the Government inspects plumbing and drainage work. Most work requires such inspection. Later connection of a rainwater tank or grey water reuse system will require notification to Government in the form of a permit for the work under existing arrangements. Government is entitled to inspect those installations under the existing provisions of the *Water and Sewerage Act 2001.*