

6. REGULATORY APPROACHES

6.1 Introduction

This chapter discusses regulatory approaches to securing participation in water efficiency measures or installation of devices. Different laws and regulations that have been used to reduce water use around the world are reviewed. After a screening process, those regulations applicable to Queensland are highlighted. The purpose of this chapter is to verify that all possibly relevant regulatory approaches have been considered and that the short list is indeed appropriate. Consideration is given to the method of implementing various regulations particularly with respect to the level of implementation i.e. Local, State or National.

6.1.1 Advantages of the Regulatory Approach

Water efficiency can be implemented in a variety of ways, including:

- Voluntary participation encouraged by public education
- Financial incentives, such as rebates, to enhance participation rates
- Use of *free* services, such as water audits and give-aways
- Laws and regulations, requiring participation.

Laws and regulations offer a distinct advantage to Councils, as they usually have a low overall cost of implementation to the authority. The cost burden is shifted and placed on the manufacturers, retailers and customers who must comply with the regulation. The only cost to the state or council is the cost of preparing the regulatory documents and the cost of enforcement, if any.

If the cost burden or impact on lifestyle or freedom of choice is perceived to be high, there will be resistance to adoption of the proposed regulation by elected representatives, or the regulation may become difficult to enforce. In this case costs to the state or councils are higher. It is safe to say that there will be some opposition to any new regulation. In order to become law the need for, or benefits from, the regulation must be perceived by decision-makers to be greater than the impacts on customers, manufacturers, retailers and others.

6.1.2 Scope of Regulations Considered

Virtually every end use of water could be regulated. Those end uses that involve a mechanical device, such as a toilet or clothes washer, are the easiest to regulate. Control can be exerted at the manufacturing end or the point of sale. In most cases it is feasible to only regulate manufacturing standards on a statewide or national basis. Regulation at the point of sale is also difficult at the local level and is best approached at the state level. End uses that involve customer behaviour, such as the length of time to



water the lawn or whether to turn off water while brushing teeth are impossible to regulate.

The most successful regulations are those that regulate an end use in such a way that the customer perceives no impact on lifestyle. For example, regulations on the sale of certain types of showerheads are likely to be accepted if the available conforming devices are perceived to have adequate performance. On the other hand, regulations that tell a homeowner what they can plant in their yard and how they can irrigate are likely to be strongly resisted. However regulations that instruct a homeowner what he/she can do to the structure of the building are accepted. Acceptability is subjective and somewhat arbitrary. A more highly regulated environment is likely to be tolerated where customers perceive that their sacrifices are warranted because water supply is limited and new supply development would have adverse impacts such as cost and environmental impact.

Regulations considered in this study fall into the following categories or end uses:

- Plumbing products
- Prohibited uses of water
- Inefficient uses of water
- Landscaping
- Use of greywater
- Required retrofit of buildings
- Restrictions during water shortages or peak capacity shortfalls.

Alternative regulatory approaches are considered in the Section 6.3. These are subjected to a qualitative screen and those passing were recommended for further evaluation. Recommended measures are described in more detail in Section 6.6.

6.2 Current Regulations

6.2.1 Plumbing Regulations

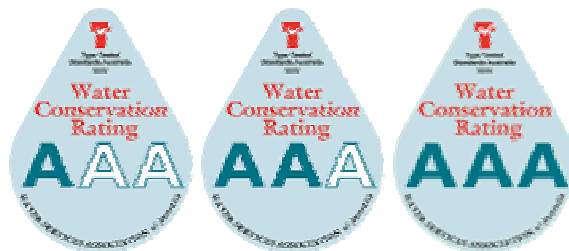
Throughout Australia, local plumbing regulations enforce the installation of 6/3 L dual-flush toilets in any new property being built. Plumbing regulations do not currently govern any other fixtures or appliances in relation to water conservation. It is at the discretion of the property owner or builder as to whether water efficient appliances or fixtures are installed.

A national committee has been convened to commence the assessment of methodologies and procedures for regulating showerheads. This committee is likely to take approximately 5 years to complete these objectives. Initially it is proposed to gain agreement on the phasing out of all showerheads with a rating less than AA.

6.2.2 Standards of Australia's Rating Scheme

In Australia, a voluntary product water conservation rating scheme exists to enable manufacturer's to assist consumers in the purchase of water using household appliances. The rating scheme allows manufacturers to indicate their products level of water efficiency. Examples of the labels that are used in this system are illustrated in **Figure 6.1**.

Figure 6.1: Designation of levels of water-use efficiency (A, AA & AAA)



Manufacturers are required to submit products for assessment to Quality Assurance Services (QAS), where products are then appropriately rated. Once the rating has been determined, manufacturers are permitted to label their product with the appropriate label as illustrated in **Figure 6.1**.

Different ratings exist for different appliances and fixtures. Specific detail of each of these ratings can be found in SAA MP64-1995. Examples of the product ratings are listed in **Table 6.1**.

Table 6.1: Appliance Rating Criteria

Appliance	Water Conservation Rating		
	A	AA	AAA
Shower heads (litres per minute)	> 12 and ≤ 15	> 9 and ≤ 12	≤ 9
Dishwashing Machines (litres per program)	> 24 and ≤ 32	> 18 and ≤ 24	≤ 18
Clothes Washing Machine (litres per dry kg. of clothes)	> 28 and ≤ 34	> 22 and ≤ 28	≤ 22
Urinal flushing mechanisms	Demand driven only	Conscious operation e.g. manual	Smart demand operation
Water Tap Outlets (litres per minute)	> 12 and ≤ 15	> 9 and ≤ 12	≤ 9

The current system of classification is under review by a WSSA/Industry committee due to changes in technologies associated with water efficient devices. One of the initiatives which is nearing completion is the revision of the efficiency rating system which is to be revamped to a AAAAA system similar to the *5 star* energy rating system. The new system will also include rating for additional devices such as flow controllers and irrigation devices as well as recognition of non-rated water efficient devices such as composting toilets.



6.2.3 Local Standards

In the communities surveyed for this study there are currently no local laws or Development Control Plan regulations which control the installation of water using appliances. Some of the authorities are considering the use of regulations to ban the use of *fill and dump* urinals in the non-residential sector.

In other parts of Queensland (e.g. Caboolture) and in some parts of NSW, local laws have been implemented to require the installation of efficient showerheads and tap flow controllers in new residential dwellings and flush controllers on urinals in non-residential buildings.

6.2.4 Restrictions

Water restrictions are a form of regulation that has been enforced in Queensland communities in the past due to water shortages. In Maroochy Shire, between 1985 and 1991, restrictions varying from slight to severe were set in place because of low dam levels and negligible rainfall. Since the completion of the Baroon Pocket Dam and the installation of water meters, restrictions have not been necessary to control water use.

Partial restrictions have been in place in Toowoomba including the use of regulated sprinkler hours since 1996. Although this form of restriction does not necessarily result in the reduction of average demand it can reduce the peak period demand when combined with odds-evens watering regulation, as is the case in Toowoomba.

6.3 Alternative Approaches

6.3.1 Long List of Regulations

The various regulations that may be applicable to the state are described briefly in **Table 6.2**. It is presumed that the reader has some familiarity with end uses of water, most likely from personal experience, and some familiarity with the array of water efficient devices, fixtures, measures etc. that might be regulated into common use.

Table 6.2: Long List of Common Regulatory Approaches

Category/End Use	Specific Fixtures or Measures	Regulatory Approach
Plumbing Fixtures	Toilets	Require 6/3 toilet for new installations and retrofits
	Showerheads	Require 9 litres / minute for new installations and retrofits
	Controlled Flush Urinals	Prohibit <i>dump and fill</i> type urinals; reduce flow rate to 4 litres per flush
	Waterless Urinals	Regulate the use of waterless urinals. Prohibit <i>dump and fill</i> types.
	Washing Machines	Require efficient models at point of sale
	Tap Flow Control	Require flow control or aeration to achieve 9 litres / minute in new construction



Category/End Use	Specific Fixtures or Measures	Regulatory Approach
Plumbing Fixtures (continued)	New home points program	Require new homes to have an AAA rating to get a Permit. Homes are scored on a point system with use of water efficient fixtures and appliances earning points, along with water efficient landscaping
Prohibited Uses of Water	Gutter flooding	No runoff from irrigation off the property or into the street permitted
	Fountains / Pools	All fountains must recirculate water, all pools must recirculate and filter the pool water
	Water softeners	Prohibit sale of softeners that regenerate on a timer
Inefficient Water Uses	Car washes	All car washes must recycle water
	Air Conditioning (Cooling towers)	Limit blowdown to water of a specified TDS Concentration (to increase cycles of concentration). Control air conditioning losses.
Landscaping	Public areas	No turf in street medians and public areas, plants must be from an approved list (WaterWise landscaping)
	Multi-family, Non-residential	Landscape code to regulate planting, using either a water budget approach or turf limits (say < 25% of area)
	Display homes	Model homes in new subdivisions must be landscaped with a low water use theme (WaterWise landscaping)
	Rain sensors or moisture sensors	Automatic irrigation systems must be equipped with either a rain or moisture sensor
Water Reuse	Greywater reuse	Greywater may be used for landscape irrigation but only in an approved manner (water must be filtered and irrigation done with buried underground drip system only)
	Greywater Retrofit	Provide plumbing to new housing to enable greywater systems to be readily retrofitted in future.
	Dual water system (New Homes)	Dual reticulation (potable water and reclaimed water) in new housing areas.
	Reclaimed Water / Stormwater Reuse	New golf courses (within new housing developments or where recycled water is available) must use reclaimed water or stormwater for irrigation
Property Retrofit	Retrofit-on-resale	All existing properties must be brought up to current code upon transfer of ownership
	Public buildings	All owned and leased public building space must be brought up to current code within specified time period
	New development	New development must retrofit (or pay to retrofit) a specified number of older properties to receive a building permit
	Sub-metering	Sub-metering of multi-family properties is required, so that all tenants pay for water use
Discretionary Use of Water	Landscape Irrigation	During droughts or other treatment plant capacity shortfalls, landscape irrigation is restricted (method of irrigation, time of day, day of week, etc.)



6.4 Screening of Approaches

The long list of measures presented in **Table 6.2** is comprehensive and may be applicable to various areas of Queensland. A qualitative screen was used to eliminate those measures that clearly do not apply to the water use situation in the region. The following criteria are used to screen the measures:

- *Service Area Match* – Does the measure have applicability to the local situation? For example, if there are few cooling towers, is it worth having a regulation?
- *Prior Record of Success* – Has this approach been used successfully elsewhere? Novel approaches will be more difficult to implement.
- *Ease of Implementation* – Does the regulation require a national law to be effective? Will there be considerable local opposition?

Measures are rated as high, medium, or low compliance with the criteria. Results of the screening are shown later in **Table 6.3**.

6.5 Results of Evaluation

6.5.1 Description of Possible Regulations

The following discussion amplifies the measure screening and selection process:

- *Plumbing Fixtures*

Regulating these fixtures is common and easy to implement, as long as the fixtures are available at retail outlets and do not cost significantly more than conventional fixtures. Regulation through the building approval process is the easiest to implement. Regulation at the manufacturing end is not possible at a local level and regulation at point of sale is difficult, but not impossible. The latter would control natural replacements and retrofitting.

Continually flushing urinals are not believed to be prevalent in areas with user pays in place and therefore would not be regulated. On the other hand, urinal flushing frequencies and flow rates could be regulated along with the toilets (6/3 versus 9/4½) for new construction.

Regulating showerheads and taps is possible but more difficult to verify because manufacturers often comply by supplying a flow restrictor loose in the box for later installation by the owner. The experience in Rous County Council, New South Wales, is that with a reasonable approach to marketing showerheads, such a regulation can be successful.

Another way to ensure the installation of efficient fixtures is to develop and implement a points system for new development. New buildings would have to earn a certain number of points to get building approval. This is an excellent way to get the latest plumbing fixtures and appliances installed as well as efficient landscaping and irrigation systems.



➤ *Prohibited Uses of Water*

These regulations are common and some Councils may already have such a regulation. If not in place, these are simple to draft and implement. Enforcement however can be labour intensive. Each Council would tailor the regulation to their area, including gutter flooding (irrigation overflow) and other end uses, such as fountains, or car washes as appropriate.

➤ *Inefficient Water Use*

One inefficient use of water could be evaporative type air conditioning and cooling towers. Homes can be economically cooled, in dry climates such as Emerald, with evaporative air conditioners. Large commercial spaces are most economically cooled with cooling towers. They are commonly found on hotels and office buildings.

Evaporative air conditioners often have water continuously running into the pan and overflowing onto the ground (through a hose). Recirculation pumps or level gauges can be added to reduce water use.

Most cooling towers are maintained by chemical companies who supply chemicals, such as sulphuric acid and biocides, to control the circulating water quality and to minimise corrosion and fouling by salts and algae. Water is usually added continuously to replace evaporation loss and to the lower the level of Total Dissolved Solids (TDS) in the circulating water. The water drained from the tank is called *blowdown*. Increasing the TDS in the water will reduce blowdown and make-up water volumes needed. This should not be done without careful chemical management, which can be expensive. Poorly maintained cooling towers tend to use a excessive volumes of make up water. In most areas of Queensland it is believed that there are not enough cooling towers to consider regulation, however education may be required for large commercial operators.

➤ *Landscaping*

Many communities in water shortage areas regulate new landscaping in areas other than single family properties. Regulating the content and design of new non-residential property landscapes as well as new multi-family landscapes, seems to be acceptable in water short areas. Public footpaths and median strips are controlled by Councils and can easily be regulated. Multi-family and commercial property is more difficult, but commonly done. Some resistance from property owners can be expected. Regulations on display homes are less common and have an unknown effectiveness. It would only make sense where subdivisions with display homes are commonplace.

Regulations requiring rain sensors or moisture sensors on automatic irrigation systems have been implemented in a few American cities. These work with an irrigation controller and/or solenoid valves. The extent of automatic systems in Queensland is thought to be minimal, however acceptance is increasing. At present this measure would achieve little water use reduction. As the market penetration of automatic systems increase in the future, these measures can be revisited. It is well documented that conversion of a manual irrigation system to an automatic system, at least on single family homes, involves an *increase* in irrigation water use. This is because irrigation is much more convenient with an automatic system.



➤ *Water Reuse*

Two sources of water are available for reuse – greywater and reclaimed water, which relate to wastewater effluent or stormwater respectively.

- *Greywater Reuse*

Greywater is defined as all drainage water from the house with the exception of blackwater from the toilet. Because greywater contains bacteria and viruses it is a health risk unless handled properly. Regulations can specify how to reuse greywater successfully. Greywater systems are expensive and their use is rare, except in areas of chronic water shortages and rural areas, as a method of disposal of waste. Regulations, where they exist, are generally related more to the protection of public health, than demand management. The use of greywater systems is prohibited in Queensland sewerred areas. In non-sewerred areas, disinfection and sub-surface disposal is required, however their use in such situations is often not enforced. On the other hand the use of Greywater Diversion Devices may be allowed if the water is to be used immediately and applied through a subsoil drain.

Greywater systems have been available in the United States for a number of years and have been available in California since 1992 (subject to approval). In Australia it is estimated that 60-70% of all household wastewater is greywater and available for reuse. In a recent study by the City of San Diego, California the added cost of a greywater system ranged from \$1,000 to \$6,000 (AUD). The annual operation and maintenance costs are at least \$240 (AUD) per year. Usually the savings in the water and sewer bill (sewer bill reduction would be nil at present in Queensland) are offset by the annual operation and maintenance cost of the system. Very few of these systems have been installed in California. Similarly in Australia proprietary systems have not been successful and have disappeared from the marketplace. With such a limited market, there is no place that homeowners can buy a complete system. Instead, they must fashion their system from various “off-the-shelf” components. Although some reduction of water and sewer connection fees can be given for installation of such a system, there is no guarantee that the system would not be abandoned in the future. Due to the potential of this occurring, no reduction in fees is being used in California.

Greywater systems can be installed with new homes or retrofitted into older homes. New homes represent an opportunity to be plumbed for future use of greywater. This makes use of greywater in the future less expensive than attempting to retrofit the home, typically with the plumbing buried under a slab foundation. Retrofitting of greywater systems can be extremely costly compared with the benefits received and is therefore unlikely. The more likely case is retrofitting during time of harsh water restrictions so that landscaping can be kept alive. Installation in new homes would be motivated by lack of an adequate water supply. These systems are more likely to be found in areas of self-



supplied water systems, such as rural and rural residential areas, rather than in an area served by potable water schemes.

- *Reclaimed Water / Stormwater Reuse*

Reclaimed water may be defined as sewage effluent treated to a level where it may be safely reused for irrigating large landscapes like parks and golf courses as well as for industrial and construction activities. It also includes the reuse of collected stormwater. Stormwater reuse is examined in detail in the publication “Stormwater Recycling Background Study” undertaken as part of the Queensland Water Recycling Strategy in 1999. From a water conservation perspective the use of reclaimed water needs to be focussed on replacement of potable water use i.e. beneficial reuse. Regulations can require the use of reclaimed water for irrigation of golf courses and other urban landscapes, provided the reclaimed water is available in the proximity, and quantity and quality needed.

- *Property Retrofit*

Retrofit-on-resale has been implemented in a few large cities in the US. It is unpopular with the real estate community and takes time to sell the concept. Real estate companies object to any regulation that slows down or complicates the sale of property. In Queensland the change of ownership notification could be used to require properties to be brought up to code at the change of the name on the water account.

Permits for new development may be tied to retrofitting old buildings. In one community in California, which has severe water shortages, the developer must retrofit or pay the City to retrofit 10 older homes to get a development permit. This is in effect similar to collecting Developer Contributions for the implementation of water efficiency program initiatives.

In some communities sub-metering of multi-unit dwellings is required for all new buildings. Studies have shown this can reduce the building water use by 20% as the high users are no longer subsidised by other tenants. Metering in older unit complexes is difficult and expensive and therefore there is no sense in attempting to regulate this area. This approach is therefore only applicable to new development and has been implemented in a number of Queensland Local Governments such as Maroochy Shire.

- *Discretionary Use of Water (Restrictions)*

During droughts or water shortage, restrictions are often placed on customers. They usually focus on reducing landscape irrigation by limiting how water can be applied or when it can be used. All councils may implement such regulations during water shortages under the Local Government Act.

6.5.2 Final Short List of Regulations

In summary, 25 different regulatory measures were considered. Twelve were eliminated, and 13 passed to the next evaluation phase. The primary reasons for

elimination were that certain measures were not applicable to Queensland, too difficult to implement or have a poor track record.

Table 6.3 outlines the details of the screening of the possible regulations.

Table 6.3: Screening of Regulatory Measures

Category or End Use	Measure	Evaluation Criteria			Pass? Yes / No
		Service Area Match	Prior Record of Success	Ease of Implementation	
Plumbing Fixtures	Toilets	High	High	Medium	Yes
	Showerheads	High	Medium	Medium	Yes
	Controlled Flush Urinals	Medium	Medium	Medium	Yes
	Waterless Urinals	Medium	Medium	Medium	Yes
	Tap Flow Control	High	High	Medium	Yes
	Washing machines	High	Low	Low	No
	New home points program	Medium	Medium	Low	No
Prohibited Uses of Water	Wasteful Garden Watering ⁶	High	Medium	Medium	Yes
	Fountains / Pools	Low	Low	Low	No
	Water softeners	Low	Low	Low	No
Inefficient Water Uses	Car washes	Medium	Medium	Medium	Yes
	Air conditioning (Cooling towers)	Low	Low	Medium	No
Landscaping	Public Areas	High	Medium	High	Yes
	Multi-family, Non-residential	High	Medium	Low	Yes
	Display homes	Medium	Medium	Low	No
	Rain sensors or moisture sensors	Low	Low	Medium	No
Water Reuse	Greywater reuse	Medium	Low	Low	No
	Greywater retrofit	Medium	Low	Low	No
	Dual water system (New Homes)	Medium	Low	Low	No
	Reclaimed Water / Stormwater Reuse	High	Medium	High	Yes
Property Retrofit	Retrofit-on-resale	Medium	Low	Low	No
	Public buildings	High	Medium	High	Yes
	New development	Medium	Low	Low	No
	Sub-metering	Medium	Low	Low	Yes
Discretionary Use of Water	Landscape irrigation	High	High	Medium	Yes

6.6 Description of Measures for Further Evaluation

The following regulatory measures were passed to the next phase of the evaluation process. This included another qualitative screen where these measures were rated against different criteria along with other non-regulatory measures and selected measures subjected to a benefit/cost analysis.

➤ *Plumbing Fixtures - Toilets*

In Queensland as in other states the manufacturers, plumbing codes and Australian standards regulate the flush volumes for toilets. As only dual flush

⁶ Also known as *gutter flooding* in the US – this is when water from garden watering or sprinklers flow out into the street. This form of water wastage is actually policed by some counties in the US, and the property owner can incur a fine.



toilets are manufactured, flush volumes are generally set at 6/3. This can, however, be changed by a plumber to a 9/4½ L flush during installation, if there are plumbing problems or a cistern is being retrofitted to an existing pedestal. The supply of water efficient toilets therefore requires no further regulation except to ensure that plumbing inspectors test the flush settings for 6/3 L during the approval process.

➤ *Plumbing Fixtures – Showerheads*

Based on the results of the benefit/cost analysis (refer to Section 8) there are substantial benefits to be gained through the regulation of showerheads. Even with \$10 to \$20 rebates the benefits are considerable. One of the strategies recommended in the Australian Greenhouse Office's guidelines is to implement water efficient showerheads to reduce electricity consumption and hence the emission of greenhouse gases in Australia. Considering that Queensland is required to achieve large greenhouse gas reductions in future it is believed that regulation of shower flow is a highly beneficial response to the issue.

For showerheads and other devices and appliances there are currently no water flow standards. A national water conservation rating system exists that classifies showerheads, taps, dishwashers, clothes washers as well as toilets, according to specified water use performance criteria. Appliances are rated A, AA, or AAA depending on the maximum flow rate or volume per use. Although modelled after a similar system for energy rating for appliances, the water conservation rating system is not in widespread use. Such a scheme assists the customer in making an informed decision but, since it is not mandatory, cannot be relied upon for generating water savings. The national committee investigating the regulation of showerheads is at present attempting to prevent the manufacturing of showers with a rating of less than AA in Australia. It is estimated that the formulation and agreement process to take the standard to AAA rating will take approximately five years. In the intervening period it may be possible to regulate showerheads at a local level to gain acceptance by the community prior to full regulation.

➤ *Plumbing Fixtures – Tap Flow Control*

The control of flow for kitchen, bathroom basin and laundry basin taps is possible using a range of fittings. Most of these fittings are low in cost and relatively effective in reducing water waste during activities that are not normally volume related, such as rinsing and hand cleansing. Fittings used to achieve reductions relating to tap use are the installation of tap washers which act as orifice plates to reduce the flow, the use of tap aerators and the installation of more sophisticated interconnected devices which provide an integrated whole of building approach to flow reduction. The latter approach is expensive and normally only cost effective in large commercial complexes. In addition, the technology required for this alternative limits the competition and therefore it is not suited to regulation.

A regulation relating to tap flow control is understood to be in force in Caboolture Shire. Such a regulation would be primarily applied to new development and may be extended to replacement devices.



➤ *Plumbing Fixtures – Urinals (Controlled Flush and Waterless)*

The use of either manually or automatically (infrared) control of urinals is a legitimate water saving approach. Cost effective water savings have been proven through studies including the Merrimac School project and various water audits of commercial premises including those involving hospitals, caravan parks, public toilets, hotels and the like. The regulation of urinals is being considered in a number of Queensland communities. Installation and replacement rates are not expected to be high except in areas such as Maroochy Shire where there is significant development in the commercial sector. The willingness to pay in this sector may be higher than in other sectors, however there is no sense regulating for infrared controllers if the volume reduced manual flushing system is adequate. Such a regulation would therefore be aimed at need to banning the inefficient “fill and dump” type urinals, and should provide the installer with a choice of flush control types.

Over recent years, waterless urinals have been proven to be a water-conserving alternative to the water flush urinals. These urinals require the periodic replacement of cartridges and are most applicable to high traffic areas where cleaning can be provided on a daily basis. These units have been trialed at a number of locations in northern NSW and found to be an acceptable alternative to water based systems.

➤ *Prohibited and Inefficient Uses of Water*

Many countries have a water waste regulation that prohibits activities that are an obvious waste of water, such as allowing runoff from over irrigation of landscaping. In some cases these also include other prohibited uses such as:

- Non-recirculating decorative fountains or other water features
- Swimming pools without surface skimmers (where overflow goes directly to waste)
- Water softeners that regenerate by a time clock
- Non-recycling car washes
- “Gutter flooding” resulting from excessive garden watering
- Once through cooling water systems.

From the above list, regulating car washes, gutter flooding and cooling systems are the only uses expected to produce water savings in some areas of Queensland. These types of restrictions are almost always in place during water shortages and represent the baseline condition. They are then easily amended to implement water restrictions during droughts.

Waste of water regulations are usually passed with little opposition. In the broader context, they have public education value so customers know that actions they take to reduce their water use are part of an overall community effort. Enforcement of waste of water regulations is easy for new construction and can be handled through the building approval process. Enforcement of zero runoff from landscape irrigation is usually only done during water



shortages because of a lack of manpower. Unmetered communities are usually more vigorous with their enforcement, since this is the only conservation option many of them have. Enforcement of such a program can be done with low-cost temporary staff (university students) and would depend on where this program fits into the overall conservation program.

➤ *Landscaping*

Many communities have used requirements for efficient landscaping and irrigation system design to minimise the impact of new development on water supply. Interestingly, in Queensland there are guidelines for landscaping in most Town Planning Schemes and Development Control Plans, however these guidelines suggest landscaping layouts and acceptable planting, but often do not address water efficiency aspects.

Such requirements can be applied to the park and median strip areas in single family home developments, multi-family and commercial development, and public areas and private recreation areas. Applying stringent requirements to public parks also helps secure cooperation with regulation requirements by setting a good example.

WaterWise landscaping involves the following basic principals:

- Proper design
- Soil improvement
- Use of mulches
- Reduction of turf areas
- Zoning of irrigation systems on the basis of water requirements
- Selection of low-water demand plants
- Attentive maintenance.

Timed irrigation to reduce evaporation may also increase water efficiency. Adherence to these principals often reduces labour, fuel, and chemical costs as well as water use.

Landscape irrigation efficiency typically ranges from 50 to 80%. In other words, 20 to 50% of the water applied to landscaping evaporates, percolates past the root zones, or runs off before it can be used by plants. Careful irrigation system design can reduce losses.

Some states in the US such as California and Florida have landscape codes that apply statewide. Communities can either develop their own code or the state code will apply to all new development except individual single family properties. Arizona encourages similar requirements and most cities there have landscape codes. Some communities, such as Marin County in California, have focused on prohibiting difficult to irrigate narrow strips of turf. Other cities, such as Austin, where soil conditions are poor, have focused on requiring imported topsoil and soil quality improvement on all properties.



Initial resistance to landscape codes may be high, but an aggressive campaign can be used to convince the public that WaterWise landscapes are an attractive alternative to grass oriented landscapes. Also WaterWise landscaping does not mean zero grass, it usually means less grass and a low water use variety of grass. To this end, WaterWise landscaping demonstration gardens are helpful.

The best approach is to review what others have done and then form a committee to develop a landscape code that is practical for the area. The committee should consist of representatives of local developers, building and landscape contractors, landscape architects, nurseries, irrigation specialists, and turf suppliers. Their participation in the development of regulations will ensure that the code is practical and can be supported, thereby minimising enforcement costs. An education campaign targeted at all groups that would participate in the implementation should be conducted so that the design process is automatic. In Queensland it would be helpful, but not critical, that the requirements of the implementation process be the same statewide, so as to minimise confusion by developers. If this is not practical, then the State could produce a model code and encourage or require the Councils to develop a regulation or use the State model regulations. In California, a law was passed wherein the state was directed to develop a model regulation by a certain date. If the Council did not develop it's own regulation by the deadline then the State's model regulation applied in that jurisdiction.

➤ *Water Reuse –Reclaimed Water/Stormwater Reuse*

The use of reclaimed water falls into two categories – sewage effluent and stormwater. For the implementation of reclaimed water schemes to be water conserving from an urban perspective, the use of the water must reduce or replace the use of potable water. Such schemes would involve the replacement of irrigation of golf courses, parks and gardens with reclaimed water or the reuse of water for industrial purposes.

➤ *Property Retrofit*

Retrofitting of properties can take any number of shapes and regulations with the different approaches may be appropriate.

- ***Retrofitting Plumbing Fixtures upon Transfer of Ownership.*** Enacting regulations requiring all plumbing fixtures in a home or establishment to be retrofitted with newer low-flow devices upon transfer of ownership is another method of achieving water conservation. The costs of the retrofit would be the responsibility of the buyer of the property. This is commonly referred to as “retrofit upon resale”. At present there are no Australian authorities that have enforced such a regulation. Three water utilities in the US have regulations requiring retrofit upon resale; they are the City of San Diego, the City of Los Angeles and the North Marin Water District.

One of the most difficult problems with requiring that all plumbing fixtures be retrofitted upon resale of the building is the potential impact on the real estate market. The municipalities that voluntarily enacted the regulation have stressed the amount of work required to gain approval from the real estate sector.



- ***Public Building Retrofit.*** Retrofit of publicly owned and leased buildings is easy to implement compared to privately owned buildings. The councils can specify how these buildings should be retrofitted and set a deadline. The City of San Francisco passed a regulation in March 1999 that gave city departments five years to completely retrofit the buildings that they occupied. The regulation was part of an overall environmental regulation that covered energy and solid waste. By allowing five years to complete the work, there was no need for the water department to fund the retrofit. In Queensland, such a regulation may be applied to Council assets, with an additional program to upgrade public housing and state / federal buildings. In most cases there are a limited number of buildings for retrofitting and therefore the appropriate approach would be through inter-departmental agreements rather than regulations.
- ***Retrofit for New Development.*** Communities with limited water supply have sometimes implemented programs that require that new development leave a “zero footprint” or involve “AAA” rated homes. Such measures can be carried out by retrofitting older homes to generate capacity for a new home or making the new development much more water efficient than current code requires. Some examples are offered below:
 - ***Offset program - Morro Bay, California.*** Because of limited groundwater supply, this coastal community resorted to a system of retrofitting older buildings to create capacity for new buildings. New single family homes would have to retrofit between 11 and 20 older residences, depending on existing plumbing, to create the water supply to build one new home. The total cost for such retrofits was \$6,000 to \$12,000 (AUS). Multi-family and commercial buildings had a separate schedule of requirements. Such a program could be implemented as part of the developer charges for new development.
 - ***Point System - Boulder, Colorado.*** The City of Boulder uses a points system to encourage water and energy efficiency in new development. Potential house builders are required to earn twenty “resource conservation option points” assigned to a list of options in order to get a building permit. For example, use of low-flow taps and showerheads earns one point and efficient insulation earns two points. The measure has been in-place since the early 1980’s and was intended to reduce fossil fuel use, with water conservation as a secondary goal. Builders, realtors, and other interested parties in the community participated actively in the design of the regulations, which was widely supported in this liberal, environmentally conscious university community. The point values are loosely based on the energy savings payback for each option. City inspectors check that the options in the building permit are in place before issue a certificate of occupancy.
 - ***Landscape Point System - Indian River County, Florida.*** This county passed a regulation controlling landscape installation in multi-lot developments in 1990. The regulations require developers to



accumulate a certain number of points from a list of options which include soil moisture sensors for irrigation systems, separate irrigation zones, use of low water use plants, and reduced turf area. The regulations were developed with the cooperation of professional groups and individual businesses representing developers, landscape architects, horticulturists, and irrigation specialists. The regulation passed without political opposition and there have been no problems in enforcement or implementation.

The key to success in all of these regulatory approaches to new development is the flexibility for developers to choose from a range of alternatives for meeting the goals of water efficiency.

➤ *Retrofit of Properties - Sub-metering*

Metering of water has been shown in some cases to reduce water usage by 20% to 40% (Cleaner Water Through Conservation, pg. 33, US EPA, April 1995). The reasoning for this is that people tend to use less water when they have to pay for the volume of water used.

For purposes of this report, sub-metering is defined as the use of sub-meters downstream of a master meter in a multiple-unit-housing complex to monitor individual dwelling units' water usage. Under this arrangement, the water utility's responsibility usually ends at the master meter, and only the master meter is billed, even though each unit of the complex would have a water sub-meter to monitor that dwelling unit's water usage. The owner/landlord of the complex is therefore responsible for the billing of individual tenants. This definition of "sub-metering" is contrasted with "direct metering", which is defined as the installation of individual meters for direct billing of individual dwelling units by the water utility. Under this arrangement, the water utility is responsible for each dwelling unit's meter(s). In either sub-metering or direct billing, residents see the direct relationship between water use and the bill they receive, and conservation is encouraged. A regulation to ensure that sub-metering is implemented in new construction has been implemented in some Queensland communities such as Maroochy Water where the direct metering approach has been adopted.

➤ *Discretionary Use of Water (Restrictions).*

Most areas of the world have experienced a water shortage at one time or another. This has caused them to implement some sort of water restriction program. During times of water shortage regulations to restrict the use of water are developed quickly, because by the time the water shortage is critical, drastic action is required. The key to gradual phase in of water restrictions is appropriate trigger levels that accurately describe the seriousness of the situation, and do so in time for effective action. Trigger levels based on falling groundwater or reservoir levels are usually most effective.

The typical drought restriction regulation will follow some set objectives such as shown in Table 6.4.

Table 6.4: Summary of Restriction Levels

Phase	Target Reduction (%)	Action
I	5	Voluntary
II	10-15	Moderate Restrictions
III	15-20	More Severe Restrictions
IV	25-35	Water Rationing

The regulations should be developed during non-drought periods and be part of a *drought management plan*. In times of need, restrictions can be implemented without having to start from the justification stage and without going directly to Level III or IV. When water restrictions are part of an overall water supply management plan, the issue is usually how often different levels of shortage will be tolerated. The higher the frequency the lower the need for new supplies.

A recent Community Survey in New South Wales found that 83% of respondents would tolerate restrictions and 70% would tolerate them every year. What was not surveyed was the response to varying levels of water restrictions and the level of sacrifice needed to comply. The respondents most likely felt that the restrictions being contemplated were not unduly harsh. This does indicate that imposing restrictions on occasion to meet future water needs is acceptable and that supply need not be large enough to avoid all possible shortages.

Another approach to water restrictions is to implement regulated hours of sprinkling and odds/evens sprinkler days. Such an approach is in place in Toowoomba and was implemented to reduce the peak load on the treatment plant.

6.7 Regulations Summary

A summary of the shortlisted Regulatory Measures based on the results of the screening process is given in **Table 6.5**.

Table 6.5: Summary of Shortlisted Measures

Regulatory Measures	Regulation Option
Plumbing Fixtures	Toilets Showerheads Tap Flow Control Controlled Flush Urinals Waterless Urinals
Prohibited Uses of Water	Wasteful Garden Watering
Inefficient Water Uses	Car Washes
Landscaping	Public Areas Non-residential Development



Regulatory Measures	Regulation Option
Water Reuse	Reclaimed Water / Stormwater Reuse
Property Retrofit	Public Buildings Sub-metering
Discretionary Use of Water	Landscape Irrigation (Restrictions)

Recent surveys have indicated that a regulatory approach to the control of plumbing fixtures would be acceptable to customers. Wholesale and retail outlets have not been surveyed and some resistance may be encountered from retailers and plumbers. As stated previously, the regulation concept has been successful in areas such as Rous County, particularly in Lismore.

The logical starting point for Queensland councils is the mandating of dual flush toilets at 6/3 L (not 9/4.5 L), low flow showerheads and tap flow control in all new Class 1 and 2 construction, including refurbishing where a permit or approval is needed. Such a regulation would be expanded in future to cover point of sale and possibly other types of buildings. This initial implementation could be undertaken through a simple regulation or through conditions of planning approval. Enforcement would be the responsibility of plumbing inspectors.

Implementation of such regulations at a local scale should be undertaken in conjunction with a public relations campaign and more importantly with the cooperation of retailers. Local plumbing suppliers and hardware stores need to be an integral part of the program.

This approach at a local level will commence the process of changing public perception regarding the use of water efficient showerheads. At present an aversion to the use of low flow showerheads exists as a result of the use of inferior products in the past. The effectiveness and comfort levels of the more recent designs need to be demonstrated to customers. Benefits can then be communicated more effectively. Following public acceptance of water efficient showerheads at a local level, manufacturers may be less reticent to change their designs.

6.7.1 Implementation Considerations

Regulations can be implemented at the local, state, or national level. Local regulations are the easiest to implement, while State regulations require a broader base of support. National regulations require extensive support and are usually preceded by state regulations.

The alternative approaches to the adoption of regulations is as follows:

- *State/National Regulations* - Regulation of plumbing fixtures and appliances would be best handled at the federal or state level. This is because such items often require the cooperation of manufacturers and the supply chain.
- *Local Regulations* - Regulation of the end uses of water not involving plumbing products in new construction, such as landscaping, or property retrofits, may be undertaken at the local level. In a similar fashion, the regulation of wasteful uses of water and discretionary uses are also best handled at the local level. These can be especially effective during a water shortage or other emergency.



- *Innovative Local Approaches* – Local councils that want to regulate plumbing fixtures and appliances, in the absence of or until state/national regulations are passed, have a number of options. They can work with wholesalers and retailers to use the AAA rating scheme. This will be difficult where fixtures of high quality are not available at a reasonable cost. For example, finding high quality low flow showerheads in stores is often difficult. Customers are unlikely to buy inferior products, even if they are AAA rated. In this case it may be better to attach stickers to the showerhead that list the flow rating in litres/minute. Showerhead rebate programs can then be used to promote these products. Eventually, if there is sufficient demand, retailers will stock high quality products and manufacturers will produce them. In cases where good quality products are readily available the use of the AAA rating system is likely to be more effective. Posting of the AAA stickers on toilets, showerheads and washing machines is likely to have an impact on customer decisions. The rapid acceptance of the 6/3 L dual flush toilet is evidence that when good products are available, and advertised as being water efficient, customers will accept and buy them.

6.7.2 National Competition Policy Considerations

The implementation of regulations relating to the installation of plumbing fittings at a local level requires consideration of the implications of the National Competition Policy. Regulatory review was considered part of the Hilmer report on competition policy. Of particular relevance to this exercise is the principle adopted by COAG in February 1994 that states - *Proposals for new regulation that have the potential to restrict competition should include evidence that the competitive effects of the regulation have been considered, that benefits outweigh the likely costs, and that the restriction is no more restrictive than necessary in the public interest.* (Principles and Guidelines for National Standard Setting and Regulatory Action by Ministerial Councils and Standard-setting Bodies, endorsed by COAG April 1995, Amended by COAG November 1997, Council of Australian Governments, November 1997).

To enable a local regulation to be acceptable to COAG the authority would need to be able to demonstrate the following:

- A “net public benefit” of the regulation would need to be proven. Benefits may be financial, environmental etc, but should be an overall community benefit not only a benefit to the authority.
- Proof that there is no “relationship” between the suppliers that may have influenced the policy. The policy would state the standards of performance that would be acceptable rather than named brands.
- Proof that the regulation was not anti-competitive or restrictive in nature. This would mean that there are no barriers to any supplier entering the market, and that no barriers to entry were involved.

It should be noted that the authority would be open to challenge on these issues and therefore full justification should be available prior to adopting such a regulation. At a local level it is difficult to enforce the regulation except for the case of new dwellings or retrofits requiring plumbing inspection. It is not possible to locally regulate the sale of



non-complying showerheads and therefore the likelihood of challenge is low. It would however be advisable for any local government considering regulations to consult a practicing Trade Practices/Competition Policy legal professional prior to adoption.

6.8 Summary of Findings

The review of regulations undertaken in this section of the study concludes the following:

- The following are shortlisted for further consideration by communities:
 - Plumbing Fixtures (Showerheads, toilets, tap flow control and urinals - controlled flush and waterless)
 - Prohibited uses of water (Gutter flooding)
 - Inefficient water use (Car washes)
 - Landscaping (Public areas, Non-residential development)
 - Water Reuse (Reclaimed Water / Stormwater Reuse)
 - Property Retrofit (Public buildings, Sub-metering)
 - Discretionary Use of Water (Restrictions)
- Assessment of the alternatives for implementation of regulations concluded that:
 - Local Regulations are best aimed at uses of water such as landscaping, retrofitting and restrictions. Toilet and urinal flush settings could also be controlled at a local level.
 - National Regulations are preferable for plumbing fixtures such as showerheads. The time taken to develop and implement national regulations is up to five years.
 - Implementation of plumbing fixture regulations can be successfully implemented at a local level through working with local retailers and promoting the use of AAA units.
- With respect to the implementation of regulations the following comments relating to the National Competition Policy should be considered:
 - If local regulations are to be implemented at a local level for plumbing fixtures, it is necessary to be able to clearly demonstrate the public benefit and to ensure that the action is not anti-competitive.
 - The advice of a Trade Practices / Competition Policy lawyer should be sought prior to adopting such a regulation.

Recommendations relating to the implementation of regulations as part of water efficiency in Queensland are as follow:

- The state government continue to pursue National Standards with respect to the regulation of plumbing fixtures. Particular attention should be given to the national regulation of showerheads.



- In the interim period, regulation of showerheads and other devices should be adopted at a local level. Local governments that adopt such regulations should:
 - undertake analysis to determine the public benefit.
 - co-ordinate such regulations with the local retailers.
 - educate the community on the benefits of the regulation, through a planned promotional campaign.
- Water reuse opportunities should be considered in all communities, particularly those with reasonable benefits through the possible delay of capital works.