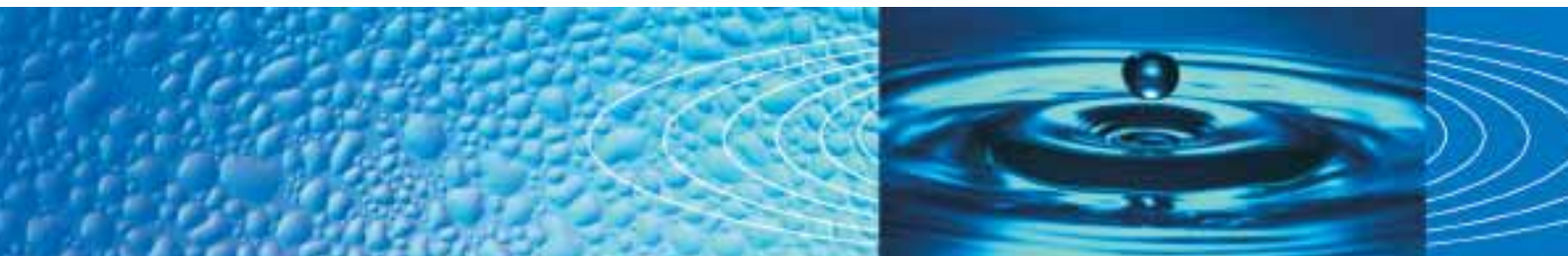


Pimpama Coomera

Waterfuture



Pimpama Coomera
Waterfuture Master Plan
March 2004



FORWARD



From the Mayor Gary J Baidon

The Gold Coast is the fastest growing region in Australia. This growth can be attributed in part to our enviable lifestyle and our relaxed culture, much of which is built around the water environment we have here on the Coast. Our world-class beaches, our rivers, and our abundance of canals ensure that we are never far from that most precious resource, water.

Facing the challenge of providing for this growth and maintaining our enviable lifestyle is something we at Council take very seriously. The recent drought experienced across the nation has reinforced the need for all Australians to change the way we value water. This makes the Gold Coast the ideal community to lead the nation in developing and implementing innovative and sustainable water management.

The Gold Coast has long been a city based around innovation, we pride ourselves on finding smarter ways of providing the services that our community needs. The Pimpama Coomera Waterfuture project is one such example of finding smarter ways of providing the basic needs of water and wastewater services to the community.

While the Pimpama Coomera region is largely undeveloped at this stage, the growth and development in the region over the next 50 years will be significant. This project is a national first, fully integrating sustainable water management principles into a region of this size.

The Pimpama Coomera Waterfuture Advisory Committee is to be commended for the comprehensive nature in which they tackled this challenge. The Master Plan outlined in this document will not only produce real water savings for the future Pimpama Coomera community but will also act as blueprint for all new development across the Gold Coast.

Gary J Baidon
Mayor, Gold Coast City



From Advisory Committee Chair Cr Daphne McDonald

The need to develop sustainable water management practices is a concept that is slowly being recognised across the entire Nation. The Pimpama Coomera Waterfuture Master Plan represents a tangible way of achieving sustainable water management here on the Gold Coast.

This Master Plan will see the introduction of recycled water and rainwater tanks into new development throughout the region. It is a culmination of 18 months of hard work and dedication to finding the most sustainable way to provide water and wastewater services to the future Pimpama Coomera community.

The community has played a vital role in the development of this Master Plan. Public Consultation provided feedback which has contributed to the decision making process of the Pimpama Coomera Waterfuture Advisory Committee, ensuring that the end result, this Master Plan, delivers environmental and economic outcomes that the community can embrace.

I would like to sincerely thank our Advisory Committee members and the Council officers involved in the project for their time and effort in the development of this Master Plan. I would also like to congratulate the Committee members and officers on the delivery of a fully integrated water management plan for the Pimpama Coomera region, one that can potentially be applied to the entire Gold Coast.

Daphne McDonald
Councillor, Division 13, Gold Coast City

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Scope of Report

Gold Coast City Council's Pimpama Coomera Waterfuture Master Plan is an integrated urban water management strategy, which will create a more sustainable community. This Master Plan is a pilot for the introduction of a more sustainable water management approach and may act as a blueprint for future development on the Gold Coast.

This Master Plan describes the objective, the selection process and the details of the Master Plan. This document is supported by a more comprehensive document, the Detailed Master Plan Report.

These documents are the culmination of the Pimpama Coomera Waterfuture Master Plan project, which has progressed over 18 months. The recommendations outlined in this report were adopted by Council at its meeting on the 19th March 2004.

To obtain a copy of the Detailed Master Plan Report, or for more information regarding the project, please contact Gold Coast Water.

Phone: 1300 366 692

Email: waterinfo@goldcoastwater.com.au

Write: PO Box 5042, GCMC Qld 9729

Web: www.goldcoastwater.com.au

1. THE MASTER PLAN AT A GLANCE

Water and wastewater services in the Pimpama Coomera region will be provided in new and more sustainable ways. This Master Plan provides the overall vision and guiding blueprint for providing these services to the community.



Above: Rainwater is captured in rainwater tanks for use in the home, as well as captured in swales reducing the amount of rainwater that runs directly into local waterways. Large quantities of treated water are no longer released into waterways; it is now treated to a high quality and used to replace drinking water for toilet flushing and garden watering.

The water cycle above shows how drinking water can be conserved and how other water sources can be beneficially used in the community.

The Pimpama Coomera Waterfuture Master Plan includes the following elements:

- › Water supplied to the house from the following water sources:
 - Rainwater – for use in bathrooms, laundries, and hot water systems.
 - Recycled water – for use in toilet flushing and external uses.
 - Drinking (potable) water – for use in the kitchen and as a trickle feed top up for the rainwater tank.
- › Improved management of stormwater through:
 - Water sensitive urban design (WSUD)
 - Rainwater tanks – which slow stormwater flows.
- › Improved wastewater systems reducing the amount of stormwater inflows by using ‘Smart Sewers’.
- › Targeted education and communication programs.

The Master Plan includes many other initiatives that will improve customer service, enhance the lifestyle of the community, and reduce the environmental impact.

This new and more sustainable method will cost about the same as the current provision of water services.

Benefits of the Master Plan

Implementation of the Master Plan will produce a variety of benefits, including:

- › Reducing the demand for drinking water by up to 84%.
- › Reducing the quantity of treated wastewater released back into the environment.
- › Reducing Greenhouse Gas Emissions.
- › Minimising the amount of stormwater entering the wastewater system.
- › Reducing the quantity of stormwater runoff to waterways.
- › Improving the quality of stormwater runoff.

These benefits will combine to result in healthier waterways and a better, more sustainable environment.

How this Master Plan is different to existing developments

The Pimpama Coomera region of the Gold Coast is largely undeveloped at present; however, this region will grow from its current population of 5,000 people to approximately 150,000 people over the next 50 years. Finding new ways of providing water and wastewater services to this region not only makes good sense; it is essential in ensuring that a more sustainable community is created.

To date, developments across the Gold Coast have been supplied with drinking water for all uses in the home. We do not need to use drinking water for many of these household uses. Toilet flushing and outdoor use are two key areas where a different source of water can be easily substituted to conserve our precious drinking water.

The Pimpama Coomera Waterfuture Master Plan has the potential to reduce the community’s use of drinking water to just 16% of that demanded by existing communities on the Gold Coast. The following pie charts compare the sources of water for typical homes in these two communities.

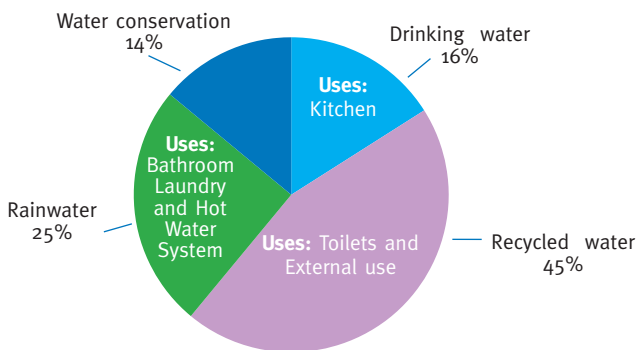
Existing Communities

Existing communities use high quality drinking water for all uses around the home.



Pimpama Coomera Communities

The Pimpama Coomera community will use different sources of water as substitutes for high quality drinking water where appropriate around the home.



Existing Communities			Pimpama Coomera Community		
Use	Water Source	% Water Used	Use	Water Source	% Water Used
Kitchen, Bathroom, Laundry, Hot Water System, and External uses.	Drinking (Potable) Water	100%	Kitchen and trickle feed supply to Rainwater Tank.	Drinking (Potable) Water	16%
			Bathroom, Laundry, Hot Water System.	Rainwater	25%
			Toilet Flushing and External uses.	Recycled Water	45%
			Water Savings through greater use of technology and education.		14%

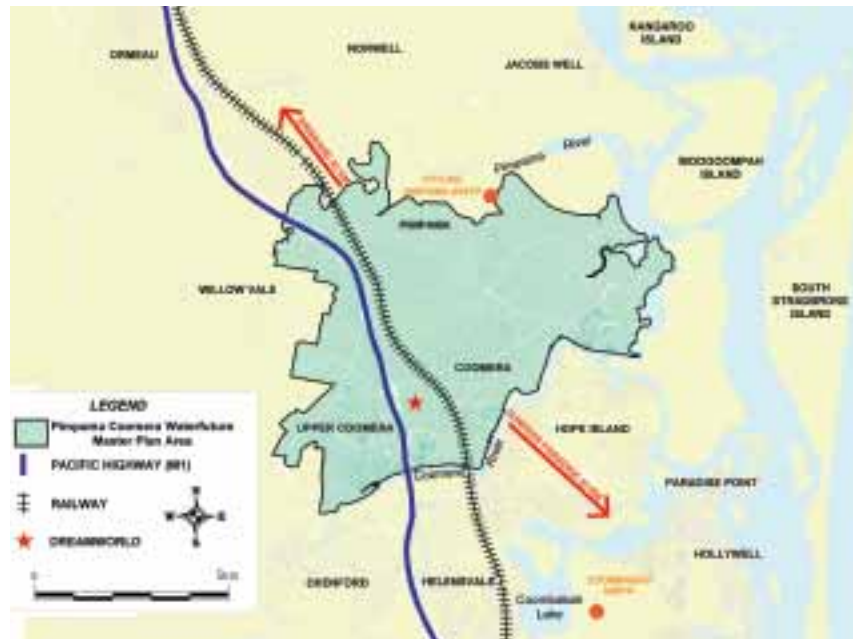
The combination of the initiatives outlined in the Master Plan will create a truly sustainable community that leads the nation in integrated urban water management.

Implementation of this Master Plan means that:

- ▶ When you flush your toilet, it will be recycled water going down the drain – not precious drinking water.
- ▶ When you water the garden, it will be recycled water feeding your plants – not precious drinking water.
- ▶ When you wash your clothes, it will be clean rainwater in the washing machine – not precious drinking water.



2. CREATING THE MASTER PLAN



Pimpama Coomera Master Plan Region

Why Develop a Master Plan?

The Gold Coast's water supply is facing pressure on several fronts. Like much of Australia, the Gold Coast has recently experienced the worst drought on record, highlighting the vulnerability of our water supplies to severe changes in climatic conditions. Adding to this, the Gold Coast population continues to grow, attracted by an enviable lifestyle centred on our beaches and waterways. A safe and secure water supply is essential to the total wellbeing of our community. There is also an increasing awareness of the health of our waterways and environment, the impact of urban water services on them, and the importance of maintaining their health into the future.

To ensure existing and future communities can continue to enjoy the Gold Coast lifestyle, we must give thorough consideration to how we use water in the future and what we do with it after use.

Gold Coast City Council (GCCC) is addressing the way that all water related services will be delivered in the community, including drinking (potable) water supply, wastewater collection and treatment, recycled water treatment and supply, rainwater and stormwater drainage. This integrated approach creates the opportunity to provide these urban water services in a way that is more environmentally sustainable, more equitable and more cost-effective to the whole community.

Council has spent 18 months developing a sustainable Waterfuture Master Plan for the Pimpama Coomera region. To ensure that the objective of the Master Plan is achieved, specific environmental, social and economic outcomes have been developed, and performance targets identified. Once the Master Plan is implemented, it is anticipated that these targets will not only be met, but also in some cases exceeded, ensuring that a more sustainable community is created.

Residents of this community will:

- › be more aware of the value of water;
- › use less water;
- › use water from a number of different sources;
- › live in a more sustainable urban environment; and
- › enjoy healthy waterways.

Why Target the Pimpama Coomera Region?

The Pimpama Coomera region lies in the northern part of Gold Coast City between the Coomera and Pimpama Rivers. The area is largely undeveloped, with a current population of approximately 5,000 residents. This region is the next major urban growth corridor on the Gold Coast, and its population is expected to reach 150,000 residents by 2056. Development is expected to be predominantly residential with some commercial and industrial development, along with public open spaces and community amenities.

Significant natural assets in the area include the Pimpama and Coomera Rivers and the conservation zones of Pimpama and Jumpinpin-Broadwater Fish Habitat areas, part of the Moreton Bay Marine Park and internationally significant RAMSAR wetlands. Water quality in the Coomera River is generally good, and in the Pimpama River generally fair, however, as the Pimpama Coomera region is urbanised it will be vital to minimise the environmental impacts of stormwater runoff and treated wastewater releases.

CREATING THE PIMPAMA COOMERA WATERFUTURE MASTER PLAN

Creating the Master Plan

In recognition of the pressures on the Gold Coast's water supplies and the rapid expansion of the Pimpama Coomera region, Council held a series of workshops with various stakeholders in mid 2002 to identify ways of providing more sustainable water services. The following flow chart details the process undertaken to develop this Master Plan.

PIMPAMA COOMERA WATERFUTURE MASTER PLAN PROCESS

Mid 2002 - Workshops held to discuss sustainability issues in the provision of water services. (Stakeholders included State Government, other Local Governments and Gold Coast City Council).

Late 2002 - Development of an Advisory Committee including representatives from resident associations, landholders and developers, environmental groups, industry associations, relevant State Government departments, and Gold Coast City Councillors. (The development of this committee was the first step in a broader community consultation and engagement process).

Early 2003 - Advisory Committee and Council established the objective for the Master Plan, and outlined the environmental, economic and social outcomes required to achieve this objective. An action plan was developed to achieve these outcomes.

Early 2003 - Advisory Committee adopted a "Multi Criteria Assessment" evaluation methodology to compare options for the Master Plan. This methodology allows comparison of options across a range of environmental, social and economic criteria.

Early 2003 - Initiatives were identified and assessed by the Advisory Committee. Forty initiatives were considered and 24 were used to develop options.

Mid 2003 - Options were developed and assessed.

Mid 2003 - Community Consultation Phase. Five options were launched in August 2003 marking the start of a series of shopping centre displays and focus group sessions. The feedback from these displays and focus groups was used in the final decision making process.

Late 2003 - Preferred option chosen by Advisory Committee.

Early 2004 - Master Plan documented

Early 2004 onward - Master Plan Implementation

Multi Criteria Assessment - assesses options across a range of environmental, social and economic factors. Options were checked to ensure that minimum requirements, such as public health and service standards, were being met. Options were then compared using a variety of technical, environmental, financial and social assessments. Decision Support Tools used included:

- Non Cost Score
- Cost
- Value for money
- Risk assessment
- Indirect consequences
- Community Consultation responses.

Option Development - The Advisory Committee formed 10 options by combining various initiatives. Initial screening narrowed the number of options to 7. High-level assessment further reduced this to only 5 options. These 5 options were taken to the community for comment.

The feedback from the Community Consultation process, combined with a detailed assessment, allowed the Advisory Committee to select a preferred option.



Above: Pimpama Coomera Waterfuture Masterplan Advisory Committee

RECOMMENDATION

The Advisory Committee recommends that Council:

1. Adopts the following objective as the basis for the Pimpama Coomera Waterfuture Master Plan:
 - To ensure more sustainable urban use and protection of the region's water resources, with sustainability being measured on a whole of life basis via a balance of environmental, social and economic outcomes.
2. Adopts the following tangible outcomes, which support the project objective and are used to develop performance targets:
 - a. Environmental Outcomes
 - Improve waterway health;
 - Reduce greenhouse gas emissions;
 - Minimise eco-system impact of urban water infrastructure;
 - Minimise the impact of treatment by-products.
 - b. Social Outcomes
 - Ensure fit for purpose water quality;
 - Improve service reliability to customers;
 - Improve satisfaction of customers expectations;
 - Enhance amenity;
 - Minimise flood damage;
 - Improve Occupational Health & Safety outcomes.
 - c. Economic Outcomes
 - Reduce whole of life costs of service delivery.
3. Adopts the following key targets as the basis for assessing the performance of the Master Plan in the long-term, relative to the Business as Usual case.

Key Aspects of Integrated System	Performance Targets
Reduction in use of drinking (potable) water.	75% minimum, to 258 L/ET/day
Reduction of infiltration and inflow into wastewater systems.	50% minimum
Quantity of recycled water used.	80% minimum
Quantity of treated wastewater released to Pimpama River.	12.5ML/day maximum
Reduction in amount of nitrogen and phosphorus released in treated water to the Pimpama River.	50% minimum
Reduction in quantity of stormwater runoff.	10% minimum
Reduction in greenhouse gas emissions.	20% minimum

3. THE PIMPAMA COOMERA WATERFUTURE MASTERPLAN

In the past, water, wastewater and stormwater services were developed independently of each other. Water supply systems have been designed to ensure a secure and ample supply of high quality drinking water to meet all water needs, regardless of whether drinking water is actually required. Wastewater systems have been designed with the capacity to quickly remove all household discharges, including a significant allowance for stormwater inflow, while stormwater systems aimed to transport rainfall runoff as quickly as possible to the nearest creek system with minimal treatment enroute. While this approach ensured safe and reliable water services, it did not recognise their impact on the environment.

This Master Plan explores the opportunities for integration of water services in urban water management. For example, inclusion of rainwater tanks reduces the demand for drinking water and also reduces stormwater flows. Similarly, using recycled water reduces the need for drinking water and reduces the release of treated water to rivers and the Broadwater.

THE INTEGRATED URBAN WATER MASTER PLAN

This Master Plan considers the various elements of the urban water cycle and combines them to create a fully integrated system. The key elements and how they work are:

- ▶ **Rainwater tanks:** used to collect rainwater from rooves for household use. The rainwater tank will also be used to slow roof runoff to reduce stormwater flows;
- ▶ **Drinking (potable) water:** provided to the house for drinking and cooking, and also as a trickle supply to the rainwater tank to ensure it does not run dry;
- ▶ **The wastewater system:** constructed to ensure less stormwater enters the system, reducing the amount of wastewater transported to the treatment plant and ultimately reducing the amount of wastewater requiring treatment;
- ▶ Most of the treated wastewater will then be put through further treatment and disinfection processes, including membrane filters, to produce very high quality (Class A+¹)
- ▶ **Recycled Water** for use within the community. Excess recycled water will be pumped underground into an aquifer, where it will be stored until required. When recovered from the aquifer, the recycled water will be re-disinfected before being pumped into the recycled water system. Excess treated water that cannot be recycled or pumped to the aquifer storage will be released to the Pimpama River via wetlands;
- ▶ **Stormwater** runoff will be treated within the community using various measures, including swales, bio-retention devices, wetlands and basins, resulting in less pollution of the waterways and improved amenity.

In addition to these key elements, the Master Plan also includes the following benefits:

- ▶ **Energy savings** - it will use less energy to operate, reducing greenhouse gas emissions;



Above: Example of water sensitive urban design

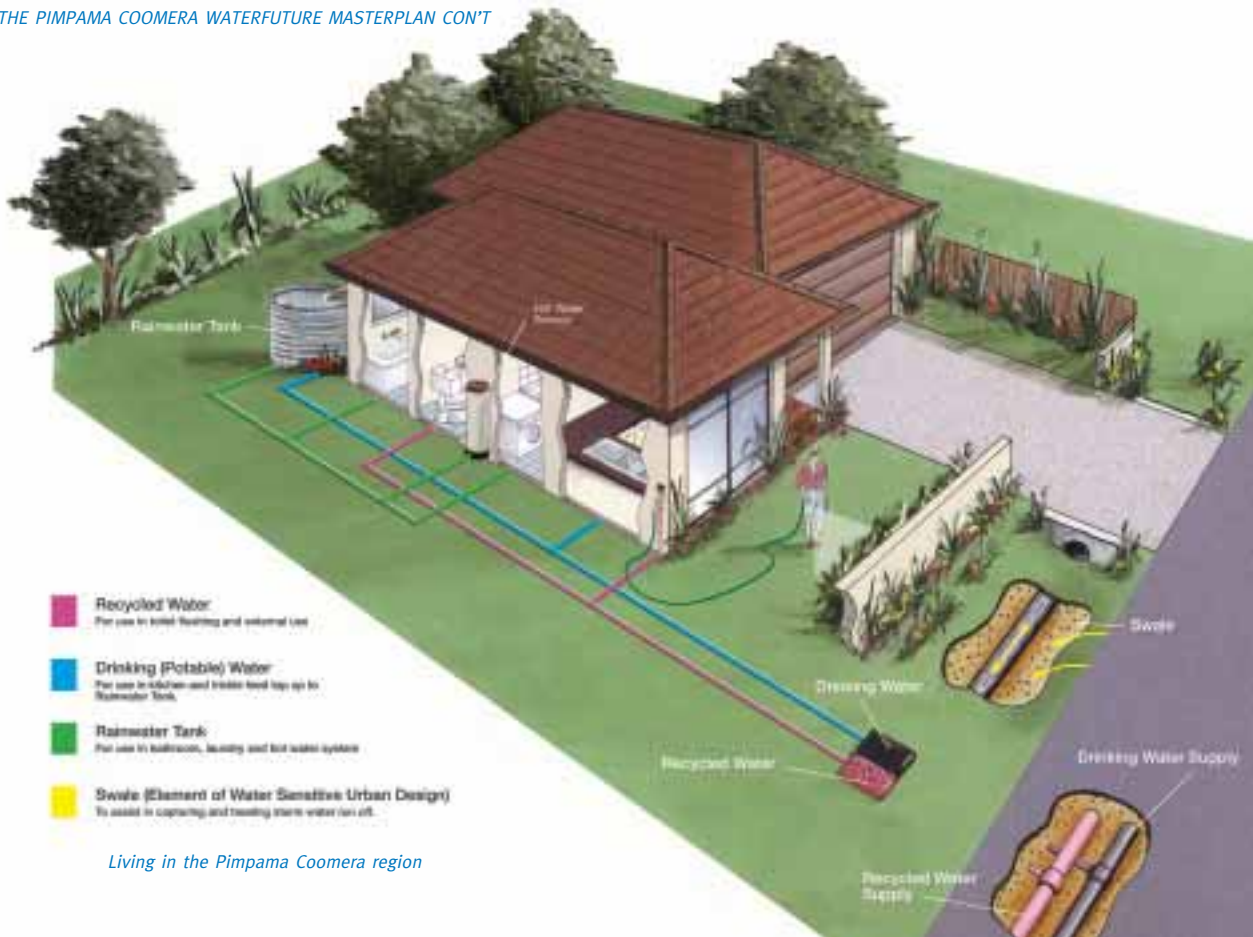
- ▶ **Water conservation** - including selection of water efficient products and enhanced education programs;
- ▶ **Improved landscape practices;**
- ▶ **Pressure and leak management** - will reduce water usage;
- ▶ **Improved construction and system monitoring** - to produce a more reliable system with reduced service interruptions.

The Master Plan identifies three key sources of water – Rainwater, Recycled water, and Drinking water. The following table outlines their appropriate uses:

Water Source	Appropriate use
Rainwater	To be used in the laundry, bathroom and hot water system, with one tap external to the house for appropriate uses
Class A+ recycled water	To be used for toilet flushing, garden water, external maintenance and fire fighting.
Drinking (potable) water	To be used in the kitchen's cold water tap and as backup for the rainwater tank to ensure it cannot run dry.

This integrated approach will create a more sustainable community by significantly reducing: the amount of drinking water used, treated wastewater released and stormwater flow to waterways. In addition, the need for new regional water sources will be deferred, while the level of service and the lifestyle of our customers will be improved.

¹ Class A+ is defined in the Queensland Guidelines for the Safe use of Recycled Water Technical draft review and defines the water quality requirements for urban reuse including a 5 log reduction in viruses and protozoa.



The full benefit of the Master Plan will only be achieved if it is applied on a large scale. This will provide Council certainty in planning and will also ensure that the standards of service expected by the community are achieved.

Costs

Under the Master Plan, water services will be delivered to the community in a different manner. Drinking water, wastewater and stormwater services will all be delivered on a smaller scale. In addition a new recycled water and rainwater service will be provided.

The Master Plan has been costed and compared with the cost of providing existing services. When considering the total costs, including dam construction, street pipe laying and house plumbing, the costs are about the same. The reason for this is that the saving achieved by smaller pipes for drinking water, wastewater and stormwater, offsets the increased costs for the new services. How the community can share in the total cost is still being investigated to ensure fairness.

Performance Targets

The Master Plan was developed to achieve specific performance targets measured against a set of project outcomes. The implementation of the Master Plan in the long-term is anticipated to perform better than the targets, as shown in the following table.

Key Aspects of Integrated System	Performance Targets	Anticipated Performance
Reduction in use of drinking (potable) water.	75% minimum, to 258 L/ET ² /day	84%, to 165 L/ET/day
Reduction of infiltration and inflow into wastewater systems.	50% minimum	50%
Quantity of recycled water used.	80% minimum	86%
Quantity of treated wastewater released to Pimpama River.	12.5ML ³ /day maximum	3.6ML/day
Reduction in amount of nitrogen and phosphorus released in treated wastewater to the Pimpama River.	50% minimum	50%
Reduction in quantity of stormwater runoff.	10% minimum	17%
Reduction in greenhouse gas emissions.	20% minimum	30%

The Master Plan is an innovative strategy for urban water services. Fully implemented in the Pimpama Coomera region, it has the potential to make a substantial contribution to a sustainable Waterfuture for the Gold Coast.

This Master Plan will be continually reviewed to allow for new innovation. Ongoing communication with the development industry and the broader community will also ensure that the performance of the implemented initiatives is maximised through greater understanding, and any opportunities to improve or supplement these initiatives are investigated.

²ET – equivalent tenement
³ML – megalitres

RECOMMENDATION

The Advisory Committee recommends that Council:

- 4. Adopts the concept of an integrated approach to the provision of urban water services, which will ensure more sustainable use and protection of the region's water resources for the benefit of the community, the environment and the City.*
- 5. Adopts in principle the concept of using water of appropriate quality from different sources for specific uses. Water from the following sources will be used for the purposes specified below, subject to the resolution of the issues identified for further consideration:*
 - a. Rainwater for laundries, bathrooms and hot water systems, plus one external residential tap;*
 - b. Class A+ recycled water for toilet flushing, landscape and garden watering, fire fighting and external maintenance;*
 - c. Drinking (potable) water for cold water supply to kitchens and as a backup supply to rainwater tank systems.*
- 6. Adopts in principle the concept of provision of rainwater tanks on all new development with the primary function of supplying water for the specified uses and the secondary function of attenuating roof water runoff, subject to the resolution of issues identified for further consideration.*
- 7. Adopts the concept of an urban recycled water system incorporating aquifer storage and recovery, with a back-up supply from the Coombabah Treatment Plant.*
- 8. Ensures that Water Sensitive Urban Design principles, as discussed in Council's Stormwater Quality Management Guidelines, are used to achieve the water quality objectives and performance criteria for the Pimpama and Coomera Rivers.*
- 9. Adopts the concept of releasing excess treated water to the Pimpama River Estuary, subject to the outcomes of the Pimpama River Estuary Ecological Study.*
- 10. Adopts the concept of reduced infiltration wastewater systems.*
- 11. Implements a comprehensive water conservation strategy to reduce water demands across the full range of water uses.*
- 12. Encourages the reduction of greenhouse gas emissions in the provision of water services.*
- 13. Acknowledges that broad scale implementation of the Master Plan initiatives is essential for the full environmental, social and economic benefits of the Master Plan to be realised.*
- 14. Ensures continued innovation by undertaking ongoing review of the Master Plan.*

RAINWATER TANK SYSTEMS

Rainwater tank systems are a key part of the integrated Master Plan. The primary function of the rainwater tank system will be the collection of rainwater for use in the laundry, bathroom and hot water system. The tank will be reasonably large, say 10,000 litres for detached domestic dwellings, with the top of the tank used to slow stormwater runoff. A backup trickle feed from the drinking (potable) water system will ensure that there is always water available. The rainwater will flow into the tank through various screening systems and be pumped into the house by a small pressure pump.

The implementation of rainwater tanks will significantly reduce the demand on the drinking water system, resulting in a reduction in the capacity of the drinking water system including the size of the pipe work.

The secondary function of the rainwater tanks will be to reduce the overall runoff volume and the peak flow rate of stormwater. Reducing the runoff volume will improve the efficiency of water quality treatment devices, such as swales etc, while reducing the peak flow rate will result in smaller and less expensive stormwater systems. It will also reduce the environmental impact on downstream waterways by reducing erosion.

To realise the benefits from rainwater tanks, the tanks must be implemented on a large scale. Consequently, it is proposed that all new houses and businesses throughout the region install rainwater tanks.



Above: Artist's impression of rainwater tank

Further Considerations

Rainwater systems have been investigated in some detail and adopted in principle as part of the Master Plan. However, there remain a number of significant issues that need to be considered in further detail before this initiative can be implemented. These are briefly outlined below.

- › Establishment of an appropriate **Regulatory Framework** to provide the authority to ensure the installation and use of rainwater tanks.
- › Confirmation of the **Optimum Size** of rainwater tanks for various situations, including the volume set aside for storage and household use, and the volume set aside for the reduction of stormwater flows.
- › Development of procedures to ensure that the **Stormwater Attenuation Benefits** of rainwater tanks are fully incorporated into the design of the stormwater drainage system and water quality treatment devices.
- › Consideration of **Amenity Issues** such as appearance, location and noise generation to minimise the risk of detrimental impacts.
- › Development of installation standards and operating and maintenance procedures to ensure effective **Mosquito Control**.
- › Confirmation of who will take **Responsibility for Costs** of installation of rainwater systems and appropriate mechanisms to assist customers to meet the costs.
- › Development of procedures to guarantee minimum standards of **Maintenance and Monitoring**.

RECOMMENDATION

The Advisory Committee recommends that Council:

15. Acknowledges the importance of rainwater tanks in achieving the objectives of the Master Plan and works as a matter of urgency with key stakeholders to address the issues identified for further consideration.
16. Amends relevant Council Policies to include the impact of rainwater tanks on stormwater infrastructure and to define how these impacts should be incorporated into the design of new stormwater systems.

RECYCLED WATER

An urban recycled water system is also a key part of the integrated Master Plan. By providing an alternative source of high quality water for specific purposes, the need for drinking (potable) water to be brought into the region will be reduced. Consequently the capacity and cost of the drinking water supply will also be reduced. By using recycled water the volume of treated wastewater released to the Pimpama River will be significantly reduced. Recycled water will also be used for fire-fighting purposes.

Very high quality recycled water (Class A+⁴) will be supplied in the Pimpama Coomera region. A pressurised network similar to the drinking water system will provide recycled water to each household for toilet flushing, garden watering and external maintenance. Recycled water will also be provided to commercial, industrial and community facilities for similar uses, as well as for irrigation of open space and fire fighting.

A purpose-built facility will treat the recycled water to a very high standard using various filtration techniques, including micro-filtration. Recycled water will then be disinfected before being pumped into the reticulation system. When the amount of water treated is greater than the demand, the recycled water will be pumped underground into an aquifer storage system, which is located to the north of the Pimpama River. When required, the recycled water will be withdrawn and re-disinfected before being pumped back into the recycled water system. If required during summer peak demand periods, additional recycled water, treated in a new purpose-built facility, will be pumped from the neighbouring Coombabah area, which has the capacity to accommodate this requirement.



Further Considerations

The recycled water system has been investigated and adopted as part of the Master Plan. There are existing precedents for the design and operation of recycled water treatment and urban distribution systems, both in Australia and overseas.

Within new developments in the region, recycled water pipes and the associated plumbing are already being constructed alongside traditional drinking water systems. There remain a number of issues, however, that need to be further investigated and resolved before this initiative can be fully implemented. These are briefly outlined below:

- › Continue to work with key stakeholders and the community to **ensure understanding** of recycled water and the health implications and risks of using recycled water.
- › Confirmation of the feasibility of an **Aquifer Storage and Recovery** system in the region.
- › Negotiation of **EPA Approvals** for the proposed recycled water system.
- › Satisfaction of all **Statutory Requirements**, including environmental impact assessment, health impact assessment, use of recycled water for fire-fighting, recycled water safety plans and 3rd party agreements.
- › Development of appropriate recycled water **Pricing** that encourages reuse while also conserving resources.

RECOMMENDATION

The Advisory Committee recommends that Council:

17. *Conditions the provision of recycled water infrastructure for all new development in the Pimpama Coomera Region.*
18. *Continues discussions with key stakeholder groups including the Queensland Fire and Rescue Service, and regulatory agencies to reach agreement on the uses of recycled water.*
19. *Continues to investigate the viability of an Aquifer Storage and Recovery (ASR) scheme in the Pimpama Coastal Plain to provide seasonal storage of recycled water.*
20. *Continues the implementation of the Northern Wastewater Strategy and the Reclaimed Water Scheme.*



⁴Class A+ is defined in the Queensland Guidelines for the Safe Use of Recycled Water Technical Draft review and defines the water quality requirements for urban reuse including a 5 log reduction in viruses and protozoa.

WATER SENSITIVE URBAN DESIGN

Water Sensitive Urban Design (WSUD) is an approach to urban stormwater planning and design that embodies the principles of Environmentally Sustainable Development. WSUD is an environmentally sensitive means of reducing the amount of pollutants in stormwater discharges to levels that contribute to the achievement of identified water quality objectives for waterways. Studies undertaken during the development of the Master Plan, and research undertaken in other areas of Australia, indicate that WSUD is the best method of achieving these objectives. WSUD can be built into the urban landscape, resulting in treatment devices that enhance a community's visual appeal. Best practice land-use planning concepts are used to ensure the development layout maximises the opportunities for implementing WSUD. The physical measures that treat runoff, such as swales and bio-retention systems are used in a series, or treatment train, to achieve the relevant water quantity and quality objectives. These treatment measures are normally placed "at or near source" as it is usually easier and more cost effective to control pollution at its source.

Water Sensitive Urban Design (WSUD) will be used to ensure developments meet Water Quality Objectives for the Pimpama and Coomera Rivers.

Further Considerations

Information on the philosophy, application and design of WSUD is included in Council's Stormwater Quality Management Guidelines.



Above: Swale

WSUD has been applied in a number of developments throughout the Gold Coast; however, a number of issues need to be investigated to enable the benefits of this initiative to be fully realised, including;

- › Specific **Water Quality Objectives** have not been set for the Pimpama or Coomera Rivers and consequently interim objectives apply. Catchment-specific water quality objectives need to be set for both rivers to ensure their environmental values are protected.
It is noted that the Coomera River Catchment Environmental Inventory Study is in progress and this will establish water quality objectives for the Coomera River.
- › Completion of a Pimpama River **Catchment Management Study** will determine the most appropriate manner to manage pollutant sources from both within the Pimpama Coomera Master Plan area and the relatively large areas planned for urban development outside the area.
- › **Performance Criteria** need to be set for water that flows into both the Pimpama and Coomera Rivers. These criteria will be based on the sustainable pollutant loads that can be released into the receiving waters, whilst meeting the water quality objectives of the receiving water.
- › The draft **Stormwater Quality Management Guidelines** provide a high level overview of integrated urban water cycle management, Council's broad water quality objectives and stormwater treatment techniques. Currently they provide little detailed design information on the various WSUD elements. The guidelines need to be updated to assist with the design and implementation of WSUD and to ensure WSUD is applied in a manner that is consistent with Council's objectives and policies.
- › **Demonstration** that WSUD successfully and economically meets the catchment specific water quality objectives.

RECOMMENDATION

The Advisory Committee recommends that Council:

21. Undertakes a catchment management study of the Pimpama River catchment to assess waterway health, identify appropriate catchment specific water quality objectives and stormwater performance criteria and determine the most appropriate way of managing diffuse pollutant sources.
22. Undertakes appropriate studies to establish catchment specific performance criteria for the Coomera River.
23. Ensures that development within the Master Plan area complies with the generic performance criteria set out in Council's Stormwater Quality Management Guidelines until catchment specific criteria are adopted for the Pimpama River and Coomera River.
24. Develops and incorporates detailed Water Sensitive Urban Design (WSUD) guidelines into the Stormwater Quality Management Guidelines.
25. Monitors early WSUD installations to optimise performance, confirm maintenance requirements and refine design guidelines.

WASTEWATER

The wastewater collection system will be designed as a reduced infiltration, or 'smart sewer', wastewater system. The major advantage of this initiative is that the volume of wastewater collected will be lower than normal, reducing the size and cost of the wastewater system. In addition, reducing the need to access the wastewater system will enhance occupational safety. Stormwater inflow and groundwater infiltration will be reduced by using modern materials and construction methods, reducing the number of manholes, replacing manholes with maintenance shafts and preventing stormwater inflow to household overflow relief gullies (ORGs). It is envisaged that the wastewater systems will ultimately be designed for a peak flow of three times Average Dry Weather Flow (ADWF), reduced from the current standard of five times ADWF. Initially, an interim design standard of four times ADWF will be adopted until monitoring confirms that the lower design criteria are acceptable. The 'smart sewer' concept will generally be implemented as the reduced infiltration gravity sewer (RIGS), however, vacuum and low-pressure sewerage systems may be utilised in appropriate situations.

Wastewater will be transferred to a new wastewater treatment plant at Kerkin Road, Pimpama. The plant will incorporate advanced biological treatment processes including nutrient removal, media filtration and disinfection. The treated water from the plant will be suitable for further treatment for reuse, or for release into the Pimpama River estuary via the wetland. Treating wastewater uses a significant amount of energy and produces most of the wastewater system greenhouse gas emissions. Consequently, a process that captures the gases from anaerobic digestion and converts them into electricity for use on-site will be considered.

Prior to the completion of environmental assessments for the Pimpama River Estuary, and subsequent receipt of EPA approval for release into the estuary, treated water may be transferred to an alternative release point.

Further Considerations

Reduced infiltration wastewater systems, or 'smart sewers' are currently being implemented under interim guidelines within the region, however there remain some issues that need to be investigated and resolved including:

- Monitoring to **prove the performance** of the reduced infiltration gravity system (RIGS).
- Confirmation of the **Capacity of the Pimpama River Estuary** to accept treated wastewater releases.
- Negotiation of **EPA Approvals** for the wastewater system including expected licence conditions that will apply.
- Satisfaction of all **Statutory Requirements**, including environmental impact assessment and risk management assessment.
- Completion of further investigations into the generation of **Greenhouse Gases** in the wastewater treatment process.

RECOMMENDATION

The Advisory Committee recommends that Council:

26. *Conditions the provision of reduced infiltration wastewater systems in all new development in the Pimpama Coomera Region.*
27. *Continues developing the concept of reduced infiltration wastewater systems.*
28. *Monitors the performance of these systems to ensure that they operate in accordance with their design intent and to refine design criteria.*
29. *Encourages the further investigation of wastewater treatment processes that reduce emission of greenhouse gases, and reduce electricity consumption.*



Above: Example of raised overflow relief gully (ORG)



DRINKING (POTABLE) WATER

A primary focus of the Master Plan is to reduce the pressure on the City's water supply systems by managing demand and providing alternative water sources. The benefits of this are a lower cost system that will meet the needs of future generations. It will also use less energy and produce less greenhouse gas emissions.

Drinking water will be provided for two main purposes: to supply water for drinking and cooking (via the kitchen) and as a backup supply to the rainwater tanks. A separate connection to the rainwater tank will top up the water level by trickle feed if it falls below a minimum level eg. 20% full. This will substantially reduce the demand on the drinking water supply. The trickle feed supply to rainwater tanks significantly reduces peak demand rates and therefore the pipe sizes required.

Traditionally, where fire-fighting flows are provided from the drinking water system, the minimum reticulation pipe size is usually determined by minimum fire flow requirements. In the Pimpama Coomera Region, fire-fighting capacity will not be provided in the drinking water system, thereby reducing the size and cost of the system.

Further Considerations

The design of drinking water systems is well understood and documented. However, in the context of this integrated water system approach, there are a number of issues associated with other services that may impact on the design of the drinking water system. The issues requiring investigation and resolution include:

- › All issues associated with the adoption of **Rainwater Tanks** (refer to section *Rainwater Tank Systems*).
- › All issues associated with the provision of a **Recycled Water Supply** (refer to section *Recycled Water*).
- › Confirmation of the methodology for **Sizing Small Diameter Reticulation Pipe Systems** that do not include fire-fighting capacity.

WATER CONSERVATION

Conservation of water resources is essential for a sustainable Waterfuture. Every household uses water in different ways. Water conservation in the Pimpama Coomera community will primarily be achieved by reducing the amount of drinking water used. This will reduce the demand on the City's bulk water sources (such as the Hinze Dam) and water treatment systems. It will also reduce the volume of wastewater to be collected and therefore the capacity and cost of treating that wastewater.

In addition to the use of rainwater and recycled water for appropriate uses around the home, the Master Plan will conserve drinking water through the implementation of various initiatives including broad scale adoption of:

- › water efficient technologies;
- › community education;
- › installation of water saving devices;
- › system pressure management and leakage management;
- › water conservation plans; and
- › pricing.

Further Considerations

The issues requiring investigation and resolution include:

- › Identification of appropriate areas within the Pimpama Coomera region where **System Pressure Management** can be implemented.
- › Identification of the requirement for site specific **Water Management Plans**.
- › Finalisation of Council's **Water Conservation Strategy**.
- › Development of appropriate **Water Tariffs**.



RECOMMENDATION

The Advisory Committee recommends that Council:

30. *Ensures the installation of water efficient permanent fixtures in all new homes and businesses.*
31. *Encourages the inclusion of water efficient appliances in all new homes and businesses.*
32. *Continues delivery of water conservation education and awareness programs.*
33. *Continues to investigate tariffs and incentive based pricing mechanisms to improve water use efficiency.*
34. *Investigates the feasibility of managing pressure in its water supply networks as part of an integrated water conservation strategy.*
35. *Considers in consultation with the development community a policy that addresses the requirement for, and suitability of, site-specific water conservation plans for new development.*





LANDSCAPING POLICY

Landscapes can vary widely, as does the amount of water used to develop and maintain them. A large proportion of the water currently used on the Gold Coast goes into gardens and lawns. Better landscape design, which includes plant and grass selection, garden layout, irrigation management and garden maintenance, will reduce the amount of water required to maintain these gardens. Drought tolerant plants and turf can be used, subsurface irrigation can be installed, and surface mulching and inclusion of organic material in the soil can be undertaken to reduce evaporation and improve the retention of water near the plant roots.

Council has a Landscape Strategy that guides developers and the community on improved design. This strategy will be revised to ensure that it addresses appropriate aspects and encourages sustainable landscaping practices.

RECOMMENDATION

The Advisory Committee recommends that Council:

- 36. Reviews in consultation with relevant stakeholders the Landscape Strategy to incorporate sustainability, water conservation and Water Sensitive Urban Design principles as key elements.*

INFRASTRUCTURE DELIVERY, SYSTEM OPERATION AND MONITORING

The quality of the infrastructure installed is vital to the success of this Master Plan. Improving the way assets are delivered will reduce system losses from pressure mains in the long-term, eliminate the risk of cross-connections and reduce infiltration and inflow into wastewater systems. Traditional water and wastewater systems are designed to cope with any small inaccuracies in design or construction. Under the Master Plan, the capacity of the systems will be optimised and any excess capacity reduced.

A further key aspect is the need for an appropriate approach to long-term operation and monitoring of the various assets. The Master Plan introduces a number of additional assets that are not present in existing systems, including a recycled water system, dual plumbing systems, Water Sensitive Urban Design facilities, and rainwater systems. In addition, it increases the responsibility of individual householders with respect to operation and maintenance of some of the key assets, primarily rainwater tanks.

Improving operations, monitoring systems and procedures will:

- › maximise the effective life of assets, such as water sensitive urban stormwater design facilities and rainwater tank systems;
- › protect public health through effective mosquito control;
- › reduce long-term operating and maintenance costs;
- › reduce unnecessary environmental damage and social disruption; and
- › provide reliable data for future system planning and design.

Infrastructure delivery systems and procedures will be implemented to ensure the quality of the design, workmanship and installation so that the assets perform as intended over the long-term. Similarly, appropriate operation and maintenance will ensure that the systems operate in accordance with their design intent. System monitoring will ensure that adequate and appropriate performance data is available as a basis for on-going system design and operations.

Continuously improved procedures, and possibly additional staff and resources, will need to be implemented to ensure that all new work complies fully with design and installation standards, that the new systems are operated as intended, and that all necessary monitoring data is collected.

Further Considerations

Council already has systems and procedures in place to ensure the quality control of asset delivery and is well experienced with the operation and maintenance of drinking water and wastewater systems. However, it does not have equivalent experience with recycled water systems, rainwater tanks and Water Sensitive Urban Design. In addition, it is likely that current approaches to system monitoring and data collection will require augmentation to meet the needs of the new systems.



Consequently these systems and procedures need to be reviewed, and if necessary, modified, to accommodate the more stringent requirements of the Pimpama Coomera Waterfuture Master Plan, including:

- › Continuous improvement of Council's **Development Compliance Processes** to ensure adequate quality control.
- › Development of **Appropriate Guidelines and Procedures** for operation and maintenance of all water services, particularly including inspection and maintenance of rainwater tanks and internal household plumbing.
- › Determination of an appropriate and cost-effective **Monitoring Strategy**.
- › Confirmation of the Resourcing requirements to provide the necessary level of supervision, operations and monitoring.

RECOMMENDATION

The Advisory Committee recommends that Council:

37. *Completes in consultation with relevant stakeholders a review of development compliance and asset handover processes to ensure that the objectives of the Master Plan are met.*
38. *Recognises the additional complexity of this Master Plan and that as a consequence there may be a requirement for Council to increase staff and resources over and above the Business as Usual situation.*
39. *Endorses best practice construction techniques to reduce environmental damage and social disruption.*

FURTHER RESEARCH

This Master Plan will change the way urban water services are provided in the community. Many of the initiatives included in the Master Plan are either new ideas or existing ideas applied to a new situation. As a result, research of these ideas is required to prove that they will achieve satisfactory results. To address this issue, a research program concentrating on components of the Master Plan is being established in partnership with the Griffith University Centre for Coastal Management. The objective of this program is to identify the gaps in knowledge and investigate the issues that are important to implementing the Master Plan.

Gold Coast Water will manage this program in association with a Research Program Leader from Griffith University.

The following areas have been identified for inclusion within the research program. The list is neither exhaustive, nor detailed, and will be expanded throughout the implementation of this initiative.

- › Rainwater tanks – hydraulics, water quality, health risks;
- › Recycled water - health risks, social perceptions, treatment processes;
- › Water conservation – consumer behaviour;
- › WSUD – Swale, bio-retention filter and wetland issues;
- › Reduced Infiltration Gravity Sewers (RIGS) – Inflow and infiltration sources, systems capability;
- › Alternative wastewater treatment processes.

RECOMMENDATION

The Advisory Committee recommends that Council:

40. Supports targeted research activities into urban water management initiatives in collaboration with the Griffith Centre for Coastal Management and other relevant providers.



4. IMPLEMENTATION OF THE MASTERPLAN

BROAD OVERVIEW OF IMPLEMENTATION PLAN

To ensure we achieve the maximum benefits from this Master Plan it is essential that a comprehensive Implementation Plan be established. This plan identifies the key activities that need to be completed and prioritises the order in which they should be approached.

As the Master Plan is a progressive plan, some elements can be implemented immediately, such as the installation of dual reticulation, while other elements need further investigation. The Implementation Plan has therefore been split into two areas.

The first area is Planning, which primarily involves the consideration of regulatory, institutional, technical, and community engagement issues. Many of these issues need further investigation before some elements of the Master Plan can be implemented.

The second area is Infrastructure Provision, which will focus on the actual implementation of the Master Plan elements.

The **Planning** stage of the Implementation Plan will consider all of the issues outlined in the "Further Considerations" sections throughout this Master Plan, as well as specifically targeting the following issues:

- ▶ revision of **Council Policies and Regulations**, including Council's Planning Scheme to extend the application of recycled water to other land uses;
- ▶ completion of relevant **Health Impact Assessments**;
- ▶ further **Community and Stakeholder Engagement**;
- ▶ revision of **Council Policies and Regulations**, including Council's Planning Scheme, to include provision for mandatory rainwater tanks, and Water Sensitive Urban Design;
- ▶ revision of relevant **Council Business and Operational Systems**;
- ▶ preparation/revision of numerous water infrastructure **Planning Reports**;
- ▶ preparation of various **Technical/Feasibility Reports**, including the concept design of the Pimpama Wastewater Treatment Plant (WWTP), the Recycled Water Treatment Plant, the Pimpama-Coomabah Recycled Water Transfer pipeline and the Aquifer Storage and Recovery system;
- ▶ revision of Council's **Infrastructure Charges**.

The **Community Engagement** activities are also part of the Planning stage of the Implementation Plan, and a crucial component of it. To ensure we achieve the maximum benefits from the initiatives being implemented, the community needs to be aware of the changes and fully understand the benefits of these changes. Council needs to be responsive to community concerns and attitudes as implementation progresses. It is important that the communication activities assist Council in working with the community to achieve the Pimpama Coomera Waterfuture Master Plan's objective.

The communication and consultation strategy will specifically target the general community and potential residents about the Master Plan and the associated timelines for implementation.

The activities will aim to engage the community through a variety of mediums including informational brochures, community forums, broad scale media campaigns, newsletters, signage, and community presentations. In addition to these activities, other community engagement tools will be used in response to community needs and feedback. These communication activities will run in parallel to, and build on, the ongoing education and water conservation communications programs running in schools and the general community.



Above: Illustration showing cutaway of swale

The **Infrastructure Provision** stage of the Implementation Plan will run alongside the Planning activities. This stage involves activities that are already underway or can start immediately (Interim Activities) as well as activities that will commence once some of the issues in the Planning stage are resolved (Long-term Activities).

Interim Activities include:

- › provision of Smart Sewers to service the developing areas of the region. This includes the implementation of the wastewater system that will transfer wastewater south to the Coombabah WWTP until the Pimpama WWTP is constructed;
- › provision of water infrastructure to service the developing areas of the region and areas beyond;
- › provision of recycled water reticulation to service the developing areas of the region. The recycled water pipes will supply drinking water until Class A+ recycled water is available;
- › installation of rainwater tanks, after all outstanding issues are satisfactorily resolved; and
- › construction of urban stormwater systems using Water Sensitive Urban Design principles.



Long-term Activities include:

- › construction of Pimpama Wastewater Treatment Plant (WWTP) Stage 1, including Education Centre, in 2007;
- › construction of the Pimpama-Coombabah Recycled Water Transfer pipeline, located generally adjacent to the railway corridor, to be completed in 2007;
- › construction of Pimpama Recycled Water Treatment Plant, Stage 1 in 2007;
- › continued provision of reduced infiltration wastewater infrastructure to service the region. All systems will transfer wastewater north to the Pimpama WWTP in 2007;
- › construction of trunk recycled water infrastructure from 2005, which will supply Class A+ recycled water to the community from 2008;
- › development of the Aquifer Storage and Recovery (ASR) system in 2007, if it is proven feasible;
- › continued installation of rainwater tanks; and
- › continued construction of urban stormwater systems using Water Sensitive Urban Design principles.

To oversee this Implementation Plan the current membership of the Pimpama Coomera Waterfuture Advisory Committee will be retained, under a revised Terms of Reference, to provide a forum for ongoing stakeholder liaison during implementation of the Master Plan. The Advisory Committee will provide recommendations to Council on the following matters:

- › outcomes of the Health Impact Assessments for recycled water use and the introduction of rainwater tanks;
- › outcomes of aquifer storage and recovery investigations;
- › implementation issues concerning the introduction of other Master Plan Initiatives;
- › outcomes of interim performance reviews;
- › general project implementation oversight.



Above: Pimpama Coomera Waterfuture Advisory Committee

RECOMMENDATION

The Advisory Committee recommends that Council:

- 41. Implements the Pimpama Coomera Waterfuture Master Plan to all new development within the region, as shown in Plan 1, through appropriate statutory mechanisms.*
- 42. Considers where practicable the application of appropriate initiatives of the Master Plan to existing development within the region.*
- 43. Considers broader scale implementation of appropriate initiatives on a citywide basis, through the Gold Coast Waterfuture Project and other associated sustainability and water conservation strategies.*
- 44. Adopts in principle the implementation program detailed in the Master Plan to ensure the timely provision of infrastructure in the Pimpama Coomera region.*
- 45. Continues the operation of the Pimpama Coomera Waterfuture project team to finalise the implementation requirements of all outstanding items under this Master Plan.*
- 46. Investigates as a matter of urgency appropriate costing structures and funding options having regard, amongst other considerations, to equity.*
- 47. Continues an on-going communication and consultation program with the community and key stakeholder groups.*
- 48. Reconvenes the Pimpama Coomera Waterfuture Advisory Committee with the existing membership at required times, with meeting intervals no longer than every 3 months, to review the performance and status of the implementation of initiatives under the Master Plan.*
- 49. Receives project status reports on implementation of the Master Plan at quarterly intervals.*
- 50. Updates the Master Plan at appropriate times.*
- 51. Reviews in consultation with relevant stakeholders the Infrastructure Charges and prepares new Infrastructure Charges for other water services.*

GLOSSARY

Bio retention filter	Trenches that are filled with a soil or gravel media. The stormwater is filtered as it flows through the media and is then collected in a perforated pipe. Pollutants are removed through fine filtration, slowing the flow of water and biological uptake (bio-films attaching to the surface of the media). They are regarded as particularly efficient at removing nitrogen.
Capital cost	Cost to build and set up the infrastructure for the water services
Dual reticulation	Two separate pipe networks: one supplies drinking (potable) water and the other supplies recycled water
Ecosystem	Community of organisms interacting with each other and the physical environment
Master Plan	The overall vision and guidelines for sustainable urban water management water practices that meet the community's needs
Non-potable reuse	Use of recycled water for purposes that do not require drinkable (potable) water; for example toilet flushing and irrigation of gardens and lawns
Nutrients	Substances, including nitrogen and phosphorus, which are necessary for life and act as fertilisers to promote biological activity
Pollutants	Contaminants in water that may cause environmental degradation
Potable water	Water treated to a standard suitable for drinking and cooking
Rainwater tank	On-site storage tanks used to collect and store rainfall runoff from rooves for beneficial use
Recycled water	Highly treated wastewater suitable for use for specific purposes; for example toilet flushing and irrigation of gardens and lawns
Recycled water treatment plant	A facility that processes treated water from a wastewater treatment plant to a higher quality for reuse in the community
Reuse	The beneficial use of recycled water
Smart sewers	Wastewater pipes made from superior material and construction practices that reduce the amount of stormwater and groundwater entering the wastewater system
Stormwater	Rainfall that runs off rooves, roads and other non-permeable surfaces
Stormwater attenuation	The temporary storage and slow release of stormwater to reduce flow rates in the drainage system during and immediately after a storm event
Sustainable development	Activities that can be maintained over the long-term, while achieving a balance between the environment, the economy and society

GLOSSARY CON'T

Swale	Shallow, grassed or landscaped channels that transport stormwater. Pollutants are removed by filtering the water through the vegetation. Infiltration through the soil provides some additional treatment.
Total present value cost	Current value of future costs including capital costs and operating and maintenance costs
Wastewater	The used water from the community and/or industry. Sometimes referred to as sewage
Wastewater system	System of pipes and pumping stations that collect and transport sewage to a wastewater treatment plant. Sometimes referred to as a sewerage system
Wastewater treatment plant	A facility that treats wastewater to remove pollutants and produce treated water and biosolids
Water cycle	Continuous cycle of water movement through the environment, including the oceans, the atmosphere, surface water systems and groundwater
Water demand	Total water use requirements of an area
Water Sensitive Urban Design	Integrated management of rainwater and stormwater. Underpins the planning of urban developments and includes initiatives such as subdivision layout, rainwater tanks, grass swales, infiltration zones and stormwater harvesting.
Water supply	System of water sources (eg dams), treatment plants, pump stations, reservoirs and distribution pipes to supply potable water on demand to customers
Water quality	Physical, chemical and biological measures of water
Waterways	All streams, creeks, rivers, estuaries, inlets and harbours

ACKNOWLEDGEMENTS

Advisory Committee Membership

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UDIA Gold Coast Tweed.....	Col Dutton
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Master Plumbers Association of Queensland.....	Gavin Jackson

Former Advisory Committee Members

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Councillor Division 14.....	Cr Sue Robbins
Environment Advisory Committee.....	Doug White
UDIA Gold Coast Tweed.....	Tom Clark
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