September 2007

Water Plan 2050
Intergrated Water Cycle Management Strategy for the Central Coast

Linking Document

GOSFORD CITY COUNCIL

CENTRAL COAST

WYONG SHIRE COUNCIL

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1. GOSFORD CITY AND WYONG SHIRE COUNCILS IWCM BACKGROUND

1.1. IWCM Background

The Central Coast (comprising Gosford City and Wyong Shire Councils) continues to experience strong population growth. Current planning provides for an additional 100,000 people to move into the region over the next three decades, and longer term predictions provide for an additional 180,000 people by 2050.

In 2003, the Gosford / Wyong Councils' Water Authority – GWCWA – commenced planning to secure the Central Coast's bulk water supply needs for an initial planning period up to the year 2050. This involved a comprehensive options planning and community consultation process that led to the development of *WaterPlan 2050* (WP2050). The objective of WP2050 is to provide a safe, sustainable, and secure water supply for the Central Coast to the year 2050. To achieve its objective, WP2050 considered an extensive range of surface water and alternative supply options, from which Councils adopted their preferred option.

In October 2004, the Department of Water and Energy (DWE) – (formerly Department of Energy, Utilities, and Sustainability - DEUS) issued its guideline, for the development of Integrated Water Cycle Management (IWCM) strategy, for use by NSW water utilities, as part of the Best Practice Management Guidelines 2004. The objective of IWCM is to provide a strategic planning tool to integrate the urban water services of water supply, sewerage and stormwater management, to ensure water is utilised optimally - while considering economic, environmental and social costs and benefits.

Consequently, in 2005, each Council - as an independent Water Authority - engaged MWH Pty Ltd consultants to complete a separate IWCM strategy for each Council area. A separate Concept Study for each Council was prepared. These studies reported on the issues identified in each local government area and allowed for solutions to be listed to address these issues.

Due to the scale of the task, regional/inter-regional opportunities, differing growth/development patterns, the organisational structure of the Water Authorities, and the drought, the key stakeholders (DWE, GWCWA, and the two Councils) agreed to modify the IWCM strategy planning process for the two Councils. The modified IWCM delivery process as approved by DWE was to provide the following:

a **WP2050** report to address the regional/inter-regional bulk water supply options;

b **IWCM Sub-Plan** for each Council to deal with the local IWCM issues relevant to each Local Government Area (LGA); and

c **Linking Document** – to provide an overarching framework that links each Council's IWCM Sub-Plan and WP2050 (to be developed separately **after** completion of WP2050 and the two IWCM Sub-Plans).

This report: "WaterPlan 2050 – IWCM Strategy for the Central Coast", is the linking document. The relationship between WP2050, the IWCM Sub-Plans and the Linking Document is illustrated in **Figure 1**.

To align with the WP2050 timeframe, each IWCM Sub-Plan timeframe was extended to the year 2050. Each of these Sub-Plans focuses on identifying and assessing water efficiency and local sewerage system, stormwater, rainwater and grey-water opportunities to address issues identified at the local level for each Council. The resulting options can be applied in different zones of each LGA, for both existing and "Greenfield" sites.

As with WP2050, the IWCM Sub-Plans were prepared with input from the community and other government and non-government stakeholders through their representatives participating in a Project Reference Group (PRG).

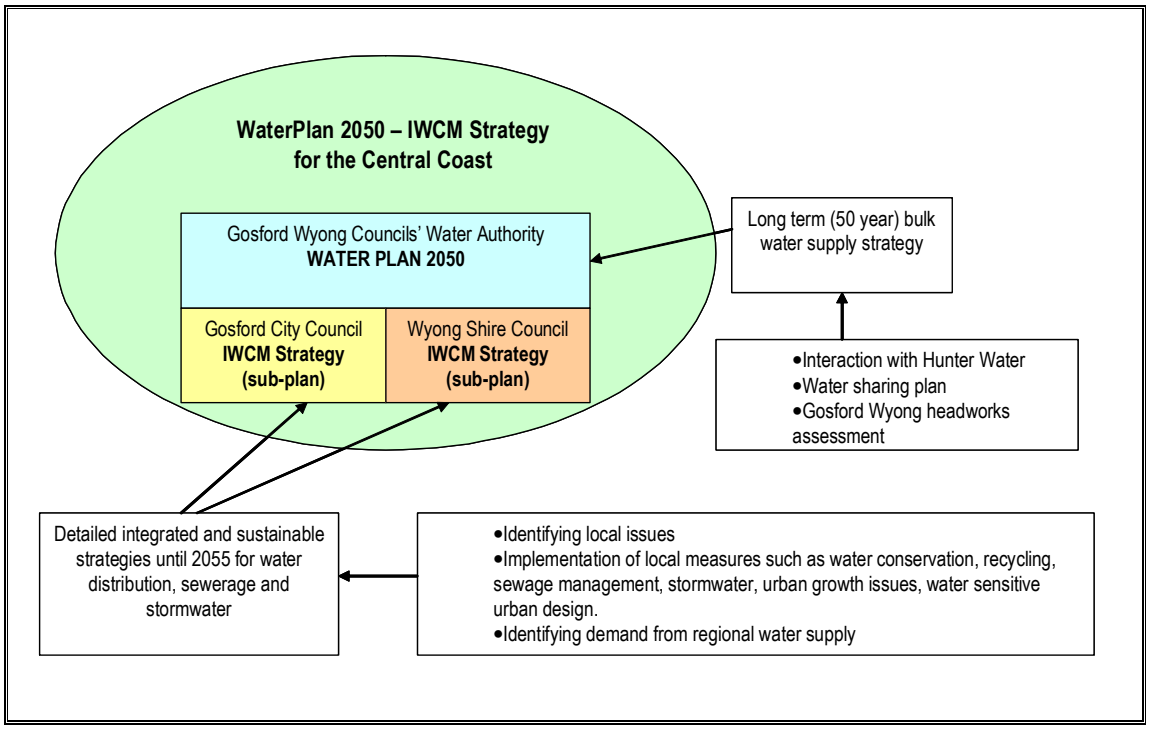

Figure 1: Integration of IWCM Sub-Plans and WaterPlan 2050

While WP2050 addressed regional and inter-regional issues, generally water supply from upstream of the Water Treatment Plant (WTP), the IWCM Sub-Plans addressed local issues, including the WTPs and the downstream distribution systems. This approach avoided duplication of effort between WP2050 and the IWCM planning process; and permitted more focussed consideration of the local IWCM issues and the regional / inter-regional opportunities. Though separate documents have been prepared for WP2050 and the IWCM Sub-Plans, there had been close collaboration in their preparation to ensure a holistic consideration of IWCM issues and full integration of solutions for the Central Coast.

WP2050 focused on both the supply and demand side of water supply. On the supply-side, it considered various sources of surface water, and bulk (or large scale) alternative water sources such as groundwater, desalinated water, stormwater and recycled water to meet the water needs of the growing population. The needs analysis included reductions in demand to be achieved through a range of demand management activities, which are to be implemented separately by the two Councils.

WP2050 community consultation involved ongoing stakeholder participation and engagement through the entire process. This was achieved via a specially constituted Community Liaison Group, which held ten consultative meetings and one field visit during 2004 and 2005.

While developing WP2050, many of the aspects of sustainably managing the region's water supply were considered, including integration with the sewerage and stormwater systems. These aspects supported many of the IWCM planning processes and objectives. The IWCM Sub-Plans detail integrated options to deliver desired outcomes. For additional details, see WP2050 Summary and Process Overview; and Sections 1.4 of WSC and 1.3 of GCC IWCM Sub-Plans.

1.2. Linking Document: WP2050 – IWCM Strategy for the Central Coast

In August 2006, the key stakeholders agreed to develop a linking document to link WP2050 and the two IWCM Sub-Plans. The content of the linking document was formulated after

several stakeholder discussions in mid 2007. Stakeholders agreed that the linking document should not duplicate the findings and recommendations in the three key supporting documents, rather, it should provide an overview of how the three documents link together to provide an Integrated Water Management Strategy for the Central Coast that can meet the region's urban water supply needs to the year 2050. Specifically, the linking document is required to address the following:

a introduce WP2050 and its key outcomes;

b introduce each Council's IWCM Sub-Plan and the key outcomes;

c provide a broad analysis of the impact on costs from introducing the initiatives in WP2050 and IWCM Sub-Plans, and how Councils set their fees and charges; and

d Explain key strategic management and conceptual relationships among GCC, WSC and GWCWA in managing WP2050-IWCM recommendations.

1.3. Central Coast Water Management

Wyong and Gosford Councils formed the GWCWA in the 1970s, to coordinate bulk water supply and to achieve regional economies of scale in partnership. The Councils have a legal agreement that allows them to share their bulk water resources and associated head-works, with each Council being responsible for managing its own distribution system.

GWCWA undertakes planning and coordination tasks on behalf of both Councils and has a Board (which includes senior council staff and elected Councillors), that makes recommendations for approval by each Council. Its responsibilities include the strategic planning of water supply head-works such as dams, weirs and major water pumping stations, and planning for drought and demand management. The Authority is not responsible for local Council matters or the distribution systems within each Council area. In essence, the Councils and GWCWA work as a partnership, with elected Councillors representing the community.

When regional issues arise, the Authority undertakes the necessary planning, coordination and development of options. The stakeholders resolve issues using a team approach in accordance with the existing legal agreement. This involves several stages of **review and consideration.** These include GWCWA staff reviews, a Technical Advisory Group (TAG) with members from GWCWA and both Councils, and the GWCWA Board, with the final decisions resting with the elected Councillors from each Council. This process works effectively and has served the Central Coast well for several decades.

For example, as part of drought management, the GWCWA coordinated the establishment of a 20-year water supply agreement, between the Hunter Water Corporation and the Central Coast Councils. The agreement provides for water transfers between the two regions, subject to availability and need, on a user pays basis. The agreement allows for water transfers, from the Hunter to the Central Coast equivalent to an annual average of 33 ML/d, and transfers from the Central Coast to the Hunter equivalent to an annual average of 30 ML/d. (See WP2050 Section 11.5 for more details). Over the past few years, each Council has also commenced implementing several of the IWCM recommendations as part of the drought management planning actions and best-practice management of its water supply.

Implementing the WP2050-IWCM recommendations requires a team effort (including Councils and key stakeholders as appropriate) and has been demonstrated to work effectively on the Central Coast. Implementation includes ongoing monitoring of outcomes to ensure correlation between forecast and actual results. This includes ongoing monitoring of population growth, water consumption and efficiency targets, as well as climate change and adoption of new improved technologies.

Currently, Gosford and Wyong Councils are addressing how further to enhance the benefits they receive through the GWCWA partnership, and have already completed an options study to build on the existing sound relationship. Additionally, the Councils and GWCWA each have a website that provides a range of information. Websites details are in the Information Section at the end of this document.

2. WATERPLAN 2050 (WP2050)

2.1. Introduction

The Central Coast (comprising Gosford City and Wyong Shire) includes many fine natural assets. The region is renowned for its coastal lakes, beaches, estuaries and rivers, as well as natural bush, farm and forest settings. These natural features, combined with the urban features, attract a large number of visitors and permanent residents from Sydney and country areas. This has resulted in a net migration to the Central Coast making it one of the fastest growing regions in NSW. The region also receives a high number of tourist visitors.

The region's current population of over 300,000 is expected to grow to more than 400,000 by 2035, and 480,000 by 2050. This will require increased housing to accommodate the growing population together with corresponding increases in commerce, industry and services.

The objective of WP2050 is to provide a safe, sustainable, and secure water supply for the Central Coast. To achieve this objective, the WP2050 planning process considered an extensive range of surface water and alternative supply options, and produced a WP2050 options report (Reference D), the structure of which is addressed in the next section. The options included improved harvesting of surface water, and other bulk supply options such as groundwater, water recycling, rainwater tanks, stormwater harvesting, desalination, demand management, and transferring water from neighbouring Hunter Region.

The WP2050 options report resulted in the adopted "WaterPlan 2050 - A long-term water supply strategy for the Central Coast" which was adopted by both Councils in August 2007 (Reference C). The adopted *WaterPlan 2050* strategy consists of the key recommendations of WP2050 options report. It comprises three key action areas: enhancing the existing water supply system, using water more efficiently, and accessing additional sources of water. The strategy also incorporates a monitoring and review process, with ongoing analysis to respond to changing circumstances.

The WP2050 planning process included extensive consultation with the key stakeholders including the community, government, and non-government organisations. The options considered align well with the 2004 Best-Practice Management of Water Supply and Sewerage Guidelines, as issued by the NSW State Government. The WP2050 options report considered ten water supply options plus three sub-options.

2.2. WP2050 options report - (Reference D) *document structure*

The first few Chapters of the WP2050 options report address the background, approach, saving water and projections of future water demands. Section 6.4 in WP2050 options report acknowledges that achieving further reductions in per capita consumption through water efficiency programs, when significant gains have already been achieved in this area, will become increasingly more difficult. Additional supply will therefore be necessary.

Chapters 7 and 8 address the environment, system modelling and analysis. Chapter 9 details the Future Water Sources, and Chapter 10 addresses the Formulation of Augmentation Options. A detailed description of each option is provided in Chapter 11; and Chapter 12 provides an assessment of Augmentation Options.

Chapter 13 addresses the Development of Strategies including adaptive management, augmentation strategies and a comparison of strategies to assist with selecting the most appropriate strategy. Community Consultation is addressed in Chapter 14, and this includes results of feedback from the community.

Chapter 15 provides the recommended strategy. The preferred strategy is essentially an adaptive management approach to manage future uncertainties and risks, including changes in water supply and demand, population growth, climate change and technological progress.

2.3. Forecasting and Risks

As WP2050 is a long-term strategy, there are risks and uncertainties relating to forecasting. The key risks include variations in population growth rates, uncertainty in water consumption forecasts, yields declining due to climate change and changes in legislation. Some uncertainties relate to consumer water-use behaviour in the future, community acceptance, regulatory requirements, policy changes, technological innovation and future energy costs. To minimise adverse effects from such uncertainties, ongoing monitoring and reviews will be essential, and these already form part of the Councils' operational plans, which will incorporate targeted monitoring for WP2050 purposes.

Using an adaptable strategy helps to overcome identified risks. The strategy allows for both reducing per capita demand and enhancing or increasing supply. The planned measures include reducing demand to achieve a 14% reduction by 2050 (Sections 5.8 and 6.5), and increasing supply from 34.3 GL per year in 2001, to 46.6 GL per year in 2050 (Section 6.5), by adopting several staged actions. Some of these actions have already been completed as part of the drought management measures.

The preferred strategy enables the gradual introduction of medium and long-term actions to enhance the Central Coast region's water supply. A cost-benefit analysis that considers environmental, social and economic issues aids decision-making, and points to appropriate actions to achieve WP2050 objectives.

2.4. Key Outcomes

A key outcome from WP2050 options report is an adaptable strategy that builds on the Base Case, with staged water supply increases, as illustrated in **Figure 2** at the end of this section. WP2050 Sections 10.1 and 2.3 provide details of the Base Case (see appendix A), which includes already completed or underway system enhancements such as enhancing system storage and pumping capacity, and the drought contingency permanent works - Hunter transfer system. The adaptable strategy includes using water efficiently, system enhancements and future augmentation as detailed in the following sections.

2.4.1. Using water efficiently

Using water efficiently is based on water conservation and supply substitution with recycled effluent and stormwater, incorporating the appropriate IWCM Sub-Plan outcomes applicable in each Council area. This involves applying a range of water conservation and demand management measures as reflected in each of the Council's IWCM Sub-Plans. In addition, use of alternative water sources like recycled water and stormwater with varying levels of integration should help each Council achieve their water efficiency objectives. However, as important as these measures are, they are insufficient to provide a secure supply for the growing population; and therefore, securing additional water supplies is necessary. (See WP2050 Section 15.2 for more details.)

2.4.2. Enhancing the existing water supply system

From the ten options considered, Option 6 – Lower Wyong River to Mangrove Creek Dam (MCD) transfer system (see WP2050 Section 15.2) is considered to best meet the WP2050 objectives. This option includes the following:

a A new higher-capacity pumping station on the lower Wyong River Weir, and duplication of the pipeline to Mardi Dam;

b A new pumping station at Mardi Dam with a new pipeline from Mardi to MCD and associated works; and

c Increasing the storage capacity of MCD by raising the spillway gates.

The new pumping station on lower Wyong River will increase water harvesting from Wyong River during medium to high flows, for temporary storage in the nearby Mardi Dam before

pumping it through to the much larger Mangrove Creek Dam. This approach enables improved environmental flows by limiting water extraction during low river flows. Additionally, this transfer system will lead to the quickest recovery of the total dam storage.

The proposed Mardi to Mangrove pipelines and pump stations are planned for completion by the end of 2010, at an estimated project cost of $80M. In Sep 2007, the Federal Government committed to fund this project with an $80M grant.

The original concept for Mangrove Creek Dam provided for the future installation of spillway gates to increase the dam storage from 190 GL to 230 GL. The installation of this cost effective measure is triggered when dam storage reaches about 70% capacity.

The key risk with the lower Wyong River to Mangrove Creek Dam transfer system is obtaining an appropriate access licence to extract more water from the Wyong River during medium to high flows. Access licences are to be issued by the Department of Water and Energy, once the Water Sharing Plan (WSP) for the Central Coast has been finalised. GWCWA is undertaking an environmental flow study on the environmental impact of the proposed water extractions, to be completed by Dec 2007. The results of this study will be considered in the development of the WSP, and the subsequent issuing of the revised water licences.

2.4.3. Future Augmentation

WP2050 provides a water supply strategy that is both flexible and adaptable, and aims to counter future uncertainties and risk (more details are in WP2050 Section 15.2). The strategy allows staged future augmentation to increase water supply as and when necessary.

The strategy requires regular monitoring to compare actual system results with projections, and making adjustments. Currently, four potential second stage augmentation options would compliment the proposed system enhancements. These may be introduced if required, and include the following:

a Tillegra Dam (Option 1 – subject to Hunter Water and State Government);

b permanent desalination (Option 7);

c environmental flow substitution (Option 9); and

d indirect potable reuse (Option 10).

These measures seek to address any future changes that may arise, including climate change impacts, variations in population growth, and variations in water usage to those currently predicted. These actions would be triggered in the event that there is a significant variance in either the predicted demand or supply levels to the extent that a future supply / demand imbalance is anticipated. In such an event, GWCWA in partnership with stakeholders would review the supply and demand balance, determine if there is significant variance and consequently, identify solutions that could be put in place.

2.4.4. Implementation

Water Sharing Plans (WSP) provide a key input to meeting urban water needs; and both Councils continue to be responsible for meeting the requirements of the WSP. WSPs aim to protect the health of streams and rivers, while allowing equitable sharing of available water between water users such as agriculture and urban use. WP2050 addresses the WSP (for details see WP2050 index and Sections 3.1, 4.1.3, 4.2, 7.2 7.3, 7.4, 8.2, and 9.7).

WP2050 options in an IWCM strategy, involve diversifying water sources so that the Central Coast is not simply dependent on a single dam or water source. Surface water in recent times has **become more vulnerable** to rainfall variability and potentially climate change. This reduces the overall risk of being dependant on a single water source. Having a diversified source reduces the overall risk of a single water source not meeting consumptive demand.

The diversified water source options include greater use of recycled water for non-potable purposes, inter-basin transfers, ground water, stormwater and desalinated water - if required.

Additionally, on-going demand management seeks to reduce demand on the urban water supply system. The Councils will use a flexible and adaptive management approach that takes into account new technologies and approaches as they evolve, as a basis for contingency planning. This seeks to use available technology and education to conserve water and reduce demand.

Staging the proposed water supply augmentation works will ensure that supply always exceeds demand beyond 2010 when the Base Case actions are completed. **Figure 2** below, illustrates the water supply actions in the adopted WP2050 strategy. The yield (pink) line indicates the increase in yield with each augmentation; while the water demand band (dotted and bounded by two blue lines) indicates the estimated range in annual demand between average and dry years. Increased uptake of alternative water sources by the community, eg rainwater tanks, may flatten the demand band, but this is unlikely based on system modelling. The augmented system design seeks to ensure that, from the year 2011 onwards, the reliable yield exceeds demand.

The Figure illustrates the staged implementation of WP2050 water supply measures, to gradually increase and secure the Central Coast's water supply. The cost of each augmentation stage is: $76M for Base Case (see Appendix A), $80M for transfer system which is to be funded by a Federal grant, and $6M for spillway gates. Additional details are available in WP2050 Chapter 15.

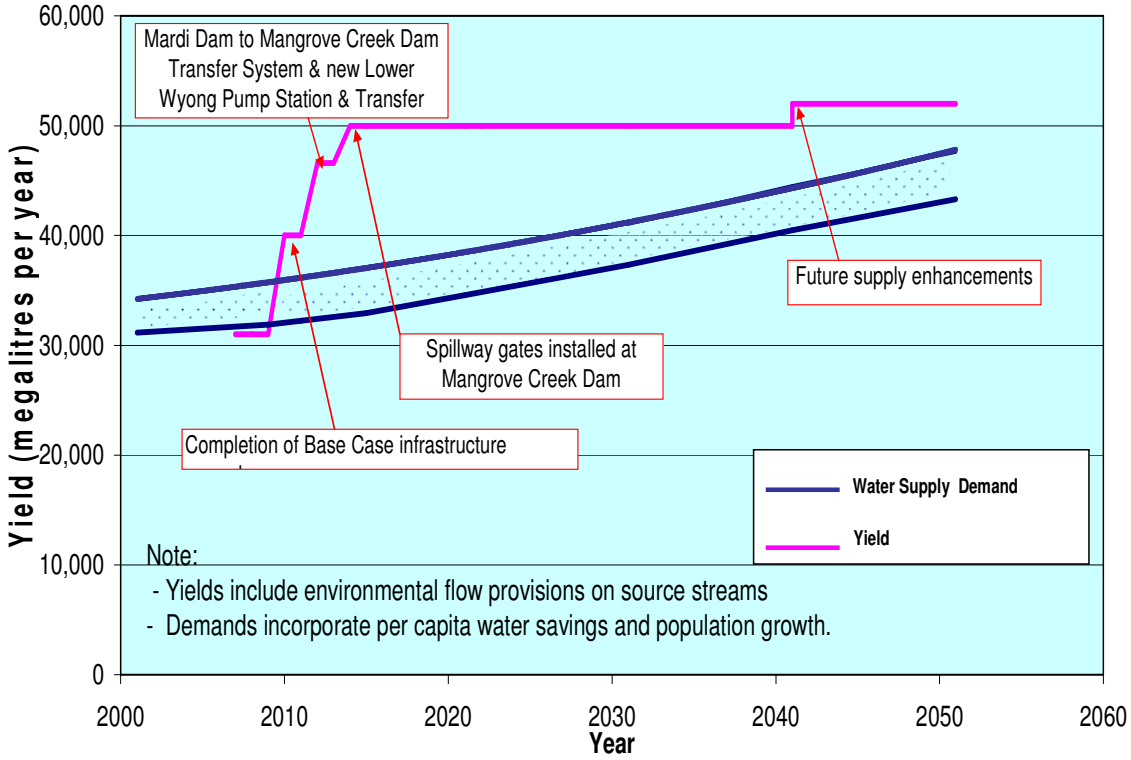

Figure 2 - Staged Water Demand and Supply Increases (WP2050 figure 15.1)

Note: the lower blue demand line is for average years and the upper blue demand line is for dry years. Both lines are on the basis of no water restrictions. While the Councils' existing and proposed demand management initiatives reduce the per capita demand, the large

increase in population is such that other augmentation sources are required. The projected trends shown in Figure 2 will be monitored against demand reductions achieved through the existing and proposed demand management initiatives, demand offsets from introducing other augmentation sources, and other crucial influences such as water sharing plan rules, climate change, etc. .

The next two sections address the IWCM strategy outcomes for Gosford City and Wyong Shire respectively.

3. GOSFORD IWCM STRATEGY

3.1. Introduction

The GCC IWCM study and strategy development addresses Gosford City's local water, sewerage and stormwater services issues. It focused on identifying Gosford's issues from the WTP through to the distribution and collection system for water supply, and sewerage and stormwater services, and included water conservation and source substitution measures.

Gosford's IWCM Sub-Plan provided several scenarios to address Gosford's water, sewerage and stormwater services issues. Gosford's preferred option, (which is currently underway) will fulfil the need to reduce the per capita demand as required by WP2050. As part of its management of the three water related services, GCC is now implementing many of the measures that present sound contemporary practice for the management of water, sewerage and stormwater services.

Council's demand management and water conservations measures are designed to suit Gosford's specific needs. Of significant benefit to GCC is the adoption of Development Control Plan (DCP) 165 Water Cycle Management in March 2007. The DCP requires developers to produce a Stormwater Management Plan for their development site, which considers reduced stormwater discharge, stormwater quality, natural watercourses, flooding, sedimentation and erosion control, and maintenance.

Additionally, commercial and industrial sites (that are exempt from BASIX) must demonstrate best practice water conservation through recycling, water reuse and reducing mains water consumption. The DCP encourages the use of rainwater and stormwater as a resource by encouraging retention and reuse, rather than the traditional detention and release. It also provides a framework to recognise and encourage innovation, such as requiring separate black and grey-water drainage to an accessible point outside the building envelope, which allows the future installation of private grey-water treatment systems.

Other measures that Gosford has undertaken to reduce consumption and encourage water efficiency include monitoring the effectiveness of its water distribution and sewage collection systems to ensure optimum efficiency. This includes pressure reduction, leakage detection and a rapid response program. Council has improved its own water efficiency by auditing over 4000 Council properties and provided alternative water supplies such as rainwater, recycled water, grey-water and groundwater to many public facilities.

Planned measures include undertaking water recycling for watering open spaces such as golf courses and playing fields, dust suppression in construction activities and other uses that do not need potable water. To promote water savings, Council also provides rebates for water efficient showers and taps, and rebates for rainwater tanks, grey-water treatment systems and water efficient washing machines.

Council, through actions initiated due to the current drought, has a tried and proven drought management plan to deal with drought conditions.

Gosford's consistent performance is acknowledged by the Department of Water and Energy, which for the past three years has included Gosford as being in the top ten utilities for water supply services.

3.2. Key Outcomes

The key outcome from Gosford's IWCM strategy is the adoption of scenario 1 as detailed in the following **Table 2-10**, from the GCC IWCM sub-plan.

On the basis of current GCC planning, scenario 1 provides the optimum results for Gosford, while the other scenarios provide the means for GCC to increase the intensity of its water management options should the need arise to do so.

Gosford Council is already implementing many of the recommended IWCM actions as part of its water business best practice management. As such, the IWCM process has served to confirm Council's direction and priorities.

Table 2-10: Adopted IWCM Scenarios

Water Management Option	Traditional Scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Sewage Collection and Treatment					
Improved STP treatment				✓	✓✓
Improved trade waste management		✓	✓	✓	✓
Infiltration and inflow reduction program		✓	✓	✓	✓
Sewerage backlog and extension	✓	✓	✓	✓	✓✓
Smart sewers (low inflow and infiltration)			✓	✓	✓
Conservation					
Government Initiated Programs (WELS & BASIX)	WELS	✓	✓	✓	✓
Community IWCM education		✓	✓✓	✓✓	✓✓
Fixture retrofits and rebates		✓	✓✓	✓✓	✓✓
Rainwater tanks in new developments		✓	✓	✓	✓✓
Enhanced pricing			✓	✓	✓✓
High water user audits		✓	✓	✓	✓
Leakage reduction program	✓	✓✓	✓✓✓	✓✓✓	✓✓✓
Source Substitution					
Stormwater harvesting and reuse			✓	✓✓	✓✓
Promotion of on-site greywater recycling		✓	✓	✓	✓
Recycled water use through a "third pipe" system			✓	✓✓	✓✓✓
Urban stormwater					
Current initiatives		✓	✓	✓	✓
Water Sensitive Urban Design DCPs		✓	✓	✓	✓
Current flood mitigation works in key areas	✓	✓	✓	✓	✓
Catchment					
Current catchment initiatives		✓	✓	✓	✓
Improved catchment activities			✓	✓	✓
Improved monitoring, legislation, system efficiency, design and funding			✓	✓	✓

Note: Increasing number of ticks represents an increasing intensity and application of the water management option.

3.3. Recommendation

It is recommended that GCC implement all identified options included in its preferred IWCM scenario and continue to monitor system performance against planning estimates. Effective liaison with the GWCWA and DWE is required, and needs to include reporting of anticipated supply-demand imbalance and review of its IWCM Sub Plan to allow for adjustments as necessary.

4. WYONG IWCM STRATEGY

4.1. Introduction

The WSC IWCM study and strategy development addresses Wyong's local water, sewerage and stormwater services issues. It focused on identifying Wyong's issues from the WTP through to the distribution and collection system for water supply, and sewerage and stormwater services, and included water conservation and source substitution measures.

Wyong Council's IWCM served to highlight the efficacy of Wyong's actions in dealing with the worst drought on record. The IWCM process confirmed the measures that Council had already commenced or is planning to implement. These include various demand management measures, drought management actions and site-specific integration of water supply, sewage recycling, and stormwater harvesting based on development location and type.

For example, Wyong Council's demand management and water conservations measures were tailored to suit different zones such as existing or green-field sites, with appropriate strategies for residential, commercial, government and industrial areas. Council's preferred options, (currently underway) will enable reduction of the per capita demand as required by WP2050. Of significant benefit for new residential areas is Council's implementation of BASIX[1], through Council's Development Control Planning (DCP) process, thereby reducing water demand by 40%.

Other measures that Wyong is already undertaking include sewage recycling for watering open spaces such as golf courses and playing fields, dust suppression in construction activities and other uses that do not need potable water. To promote water savings, Council also provides rebates for water efficient showers and taps, and rebates for rainwater tanks, greywater treatment systems and water efficient washing machines.

Together with a comprehensive range of demand management measures Wyong has the distinction of having one of the lowest averages of household water consumption in NSW. Council also monitors the performance of its water distribution and sewage collection systems to ensure efficient operations, through leakage detection program and a rapid response to water main breaks to minimise water loss. Wyong Council, through actions initiated due to the current drought, has a tried and proven drought management plan to deal with drought conditions.

Wyong Council's strong performance is acknowledged by the Department of Water and Energy, which for the past three years has included Wyong as being in the top ten utilities for both water supply and sewerage services. Only two out of 126 Councils in NSW have achieved such excellent results, further highlighting Wyong Council's effective management of its water and sewerage services.

4.2. Key Outcomes

The key measures listed in Wyong's IWCM strategy include the following (many of these require maintenance of existing measures or implementation of proposed actions):

a Continue demand management and water conservation measures, including the following:

1 BASIX for new residential accounts,

2 the rebate measures eg rainwater tanks and efficient washing machines,

[1] BASIX – Building Sustainability Index – which is a State Government planning measure for new residential development, which is designed to reduce demand on town water by 40%.

3 water efficient devices retrofit programs,

4 community rainwater tanks for general use in open space areas

5 landscaping and native planting controls,

6 community education, and

7 better water pricing for all accounts to promote water conservation.

b Pursue water use substitution including the following:

1 stormwater harvesting / reuse where appropriate in new and existing developments at a local level to balance water supply and stormwater requirements;

2 stormwater harvesting at catchment scale, where appropriate; and

3 rainwater tank rebates for existing residential developments.

c Pursue active water supply system leak detection and repair.

d Continue wastewater system infiltration and inflow reduction program.

e Continue to implement best-practice trade waste management.

f Urban stormwater management actions including the following:

1 stormwater treatment ponds/wetlands for existing areas,

2 water sensitive urban design for new developments,

3 retrofit water sensitive urban design to key areas where appropriate,

4 enhanced erosion controls during and after construction, and

5 gross pollutant traps.

g Flooding management measures include the following:

1 flood mitigation works in key areas,

2 detention basins with low flow release,

3 traditional detention basins for new developments, and

4 on-site detention in new development areas.

h On-site wastewater treatment systems – improve on-site systems on a catchment wide basis, when it is not practical to connect to reticulation system.

WSC is already implementing many of the recommended IWCM actions as part of its water business best practice management. As such, the IWCM process has served to confirm Council's direction and priorities.

4.3. Recommendation

The recommendations for Wyong Council are as follows:

It is recommended that WSC implement all identified options included in its preferred IWCM scenario and continue to monitor system performance against planning estimates. Effective liaison with the GWCWA and DWE is required and needs to include reporting of anticipated supply-demand imbalance and review of its IWCM Sub Plan to allow for adjustments as necessary.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

5.1.1. Impact on Rates and Charges

Implementation Costs

The costs of some of the WP2050-IWCM actions are already included in the Independent Pricing and Regulatory Tribunal (IPART) determinations, but others are yet to be included. The cost of implementing the WP2050 later actions should result in only modest increases in fees and charges over the next few years for Gosford and Wyong. Any increase will be subject to a cost-benefit analysis and an IPART determination.

The preferred actions detailed in the IWCM Sub-Plans represent cost effective measures that achieve the targeted demand reductions, which should, in conjunction with the cost effective supply enhancements identified in WP2050, meet the long-term WP2050-IWCM objectives. Securing the water supply, enhanced environmental performance, social acceptance of options, and cost effectiveness of the actions have been central to the development of the preferred WP2050-IWCM actions.

Based on current planning, increased fees and charges are not seen as a significant issue for implementing WP2050-IWCM actions. The future issues are anticipated to touch more on environmental impacts and social acceptance of options rather than on prohibitive costs. For additional details on costs, refer to the WP2050 options report, Chapters 10 and 11, and the Table - Options summary analysis, at the end of the report. Also, see the IWCM Sub-Plans, Table 2-7 at pages 29-30 of GCC's IWCM Sub-Plan, and Table 2-6 at pages 31-32 of WSC's IWCM Sub-Plan.

Funding

Both Councils have commenced implementing some of the recommendations made in WP2050, and in each of their IWCM strategies. As aforementioned, these actions will affect Councils' future fees and charges for water, sewerage and stormwater services. The Federal Government has announced that it will contribute $80M for building the pipeline form the lower Wyong River to Mangrove Creek Dam. This will make a significant contribution to reducing the impact on the fees and charges for the Central Coast residents, as this is the most expensive item of the planned actions. The IWCM Sub-Plans and the WP2050 options report have provided estimated costs for the various options.

IPART

Wyong and Gosford Councils are independent water authorities, and IPART regulates their fees and charges through the IPART determination process. At each determination, each Council is required to recommend and justify its proposed fees and charges. The IPART reporting process involves several months of planning, reviews and inspections of Council's systems for water and sewerage management, as well as long-term financial planning and modelling. At each determination, each Council is required to recommend and justify its proposed fees and charges. As such, each Council may influence, but does not set its fees and charges, as IPART has that responsibility and authority. The IPART process promotes accountability in Councils as both parties aim to set a fair price structure for its products and services.

IPART ensures that Councils only charge what is necessary to provide the required water supply services. Should conditions change i.e. fresh water become scarce, it will be necessary to review available water supply options and these are likely to result in changed end of pipe prices depending on a preferred option to address any supply shortage. However, as indicated above, it is promising that even the most expensive options of desalination and

recycling schemes are not envisaged to cause a significant increase in the current cost of water. Based on current planning, it is not recommended to change the existing pricing system.

5.1.2. WP2050-IWCM Conclusions

Collectively, the WP2050 options report and adopted strategy, plus the two IWCM Sub-Plans provide well-considered solutions that will secure the Central Coast's water supply to the year 2050, while ensuring the most beneficial social, economic and environmental outcomes.

In support of the need to facilitate the development of Water Sharing Plans for several of its catchments, the WP2050-IWCM planning process was aligned with the goal of improved environmental health of affected rivers and streams. Environmentally sustainable water supply options and keeping demand at reasonable levels were major considerations for WP2050, while water conservation was a major consideration for the two IWCM Sub-Plans.

Long-term planning to the year 2050, required considerable modelling; and, prediction of population growth, water usage patterns, rainfall trends and system yields. The preferred strategy allow for variations in these factors. This linking document and the IWCM review process include provisions to address most eventualities, to ensure the Central Coast has a secure water supply that satisfies triple bottom line criteria identified by its local communities.

The Base Case system yield is 40 GL/ annum. The additional 180,000 people, planned to move to the Central Coast over the next four to five decades, requires that the system yield increase to 47 GL/ annum. This is being met by reducing system-wide (i.e. residential, commercial, industrial and unaccounted for water) average per capita demand, from 329 L/person/day in 2001, to 282 in 2050. As important as these measures are, they are insufficient to provide a secure supply for the growing population; and therefore, securing additional water supplies is necessary. WP2050 achieves this by several staged water supply increases from diverse sources.

Deviations from projected targets shall provide a trigger for review, and the implementation of appropriate actions to ensure continued water supply security. This will include demand management and drought management measures on the demand side; and already identified alternative water supply options to increase supply if required. Required actions shall be implemented as a team effort involving key stakeholders (eg DWE and Councils) and the public, and be subject to cost-benefit analysis and an IPART determination.

The WP2050 strategy involves diversifying water sources so that the Central Coast has a range of geographically spread and supply types from which to draw its water. In order to diversify water source options, proposals include greater use of recycled water for non-potable purposes, inter-basin transfers, ground water, desalinated water and stormwater.

GWCWA and both Councils will be responsible for monitoring outcomes and initiating contingency measures as required. Additionally, the Councils' IWCM strategies seek to enhance management of demand, stormwater and sewerage systems to reduce demand on the urban water supply. This has resulted in an adaptive management approach that takes into account new technologies and approaches as they evolve. The outcome is the creation of a sustainable and secure water supply for the Central Coast out to the year 2050.

5.2. Recommendations

In addition to the recommendations in the reference documents, the linking document makes the following recommendations

a **Setting Fees and Charges** – No changes are required to the current system for setting water services fees and charges as these are regulated by IPART.

b **Review and Monitoring Arrangement** – Councils and GWCWA continue to monitor the water supply and demand balance, population growth, average

residential water usage, and other key factors that may influence Councils' water supply systems, against projected targets, and propose adjustments as required.

c **Management of Risks and Contingencies** – Councils review WP2050 and their separate IWCM strategies in six years (or sooner in the event of significant unexpected events that require an earlier review), with a view to ensuring that the plans remain relevant; and if necessary adjust the plans to reflect prevailing conditions.

APPENDIX A – WP2050 BASE CASE

The following is an extract from WP2050 options report – July 2007 (see section 2.3) to identify the water supply system Base Case.

"2.3 THE EXISTING WATER SUPPLY SYSTEM

2.3.1 Implementation of the 1985 Headworks Strategy

Stages A1 to A4 of the adopted 1985 strategy were completed in the late 1980's and represent the existing system (refer *Report on Investigations for Water Supply to the Gosford Wyong Region*[1]).

Stage A5 was deferred because the demand on the system has been lower than predicted (currently 33 GL/a) due to:

- lower population growth than was predicted in 1985;
- a progressive reduction in average annual residential and total consumption of water; and,
- lower peak day water demands than were predicted.

Stage B work has also been deferred because the demand on the system has been lower than predicted and Mangrove Creek Dam filled rapidly to over 70% during significant wet weather events during the late 1980s and 1990.

The 7-year drought commencing 1935 was the critical drought used in modelling and system analysis of the schemes and options investigated in 1985. This was the worst drought on record at the time.

The current drought, dating from 1993 is now the worst on record, with below average rainfall occurring in 13 of the 15 years (up to and including 2006 – refer Section 2.3.5). It has led to a draw-down of Mangrove Creek Dam to less than 13% (January 2007) and has advanced the need to reappraise the 1985 Headworks Strategy.

2.3.2 Interim Upgrade Works

The GWCWA has adopted the following interim upgrade works to improve the performance of the existing headworks by:

- Upgrading the existing lower Wyong River pumping station by improving the intake pipe work and providing an additional transfer main. This work will increase the transfer capacity from 72 to 125 ML/d. The programmed completion date is November 2007;
- Constructing a new transfer system from Mardi Dam to Mardi WTP increasing the capacity from 100 ML/d (existing) to 240 ML/d. The programmed completion date is January 2009;
- Constructing a new 160 ML/d Mardi high lift pumping station that will enable water transfers from Wyong (via Tuggerah No. 2 reservoir) to Gosford via the Gosford/Wyong trunk main. The programmed completion date is January 2009;
- Raising the storage capacity of Mardi Dam from 7.4 GL to 8.8 G L. The programmed completion date is October 2008;
- Upgrading Mooney Dam pumping station to 60 ML/d. It is proposed to undertake this upgrade when there is sufficient total storage to enable the pump station to be off-line during construction.

2.3.3 Drought Contingency Works

The Central Coast is currently experiencing the worst drought since records began in 1896. This has resulted in the system storage declining to approximately 13% of capacity (January 2007). The GWCWA and Gosford and Wyong Councils have prepared and are implementing a drought contingency plan to maintain supply. The plan includes:

- Water saving measures including:
  - ✓ introduction of water restrictions, first introduced February 2002, currently at Level 4;
  - ✓ residential retrofit program, installing water efficient devices into households;
  - ✓ rebate program for rainwater tanks;
  - ✓ rebate program for water efficient washing machines;
  - ✓ preparation and implementation of Water Management Plans by medium to large consumers to ensure water is used efficiently and not wasted;
  - ✓ leakage reduction programs in the Councils' distributions systems.
- Development of groundwater sources (production bores) for town water purposes;
- Development of additional water sources such as groundwater, recycled water and stormwater for the irrigation (non potable) of parks and sporting facilities;
- Partial closure of the outlet valve on upper Ourimbah weir reducing environmental releases downstream and increasing water supply extractions;
- Construction of a temporary weir and 12 ML/d transfer system between Porters Creek and lower Wyong River;
- Constructing a transfer system with an equivalent annual average of 33 ML/d between the Hunter Water and the Central Coast;
- Connecting the rising main from Mangrove Creek Weir to Mooney Dam to enable the transfers of surplus water to Mooney Dam for storage;
- Funding with Hunter Water, the Balickera pre-treatment plant designed to reduce nutrient levels in flood flows extracted from the Williams River and stored in Grahamstown storage. Currently the nutrient levels are monitored and flood transfers only occur when the nutrient levels are low to reduce the risks of algal blooms in Grahamstown storage.
- Funding with Hunter Water, the upgrading of Balickera pumping station to a capacity 1.64 GL/d; the provision of 7 km of trunk main north of Morisset; and a groundwater investigation of the North Stockton and Tomago sand beds.

The last four drought contingency measures are permanent and will result in the improvement of the long-term performance of the Central Coast water supply headworks.

In addition, there are a number of other drought contingency measures being planned, for introduction if necessary, including the installation of temporary desalination plants on the coast.

2.3.4 The Base Case for Future Augmentations

The existing system (Section 2.3.1), interim upgrade works (Section 2.3.2) together with the permanent drought contingency measures (Section 2.3.3) are referred to as the *Base Case* for future augmentations in subsequent Sections of this report."

ABBREVIATIONS

INTEGRATED WATER CYCLE MANAGEMENT

Abbreviations

DCP	Development Control Plan
DECC (EPA)	NSW Department of Environment and Climate Change (formerly Environment Protection Authority)
DNR (DIPNR)	NSW Department of Natural Resources (formerly Dept. Infrastructure Planning & Natural Resources and now incorporated into DECC and DWE)
DWE	NSW Department of Water and Energy (formerly Dept. of Energy, Utilities and Sustainability)
DOP (DIPNR)	NSW Department of Planning (formerly Dept. Infrastructure Planning & Natural Resources)
DSS	Decision Support System – a combined end use and least cost planning model tool
GCC	Gosford City Council
GIS	Geographical information system
IPART	Independent Pricing and Regulatory Tribunal
IWCM	Integrated Water Cycle Management
LGA	Local government area
LWU	Local Water Utility
PRG	Project Reference Group – made up of water management stakeholders
STP	Sewage treatment plant (or wastewater treatment plant)
WELS	Water Efficiency Labelling Scheme
WMA	The *Water Management Act 2000*
WSC	Wyong Shire Council
WSUD	Water sensitive urban design
WSP	Water Sharing Plan
WTP	Water treatment plant (or water filtration plant)

REFERENCES

INTEGRATED WATER CYCLE MANAGEMENT

References:

A Department of Energy, Utilities and Sustainability (DEUS now DWE), Integrated Water Cycle management Guidelines for NSW Local Water Utilities – dated October 2004

B Department of Energy, Utilities and Sustainability (DEUS now DWE), Best-Practice Management of Water Supply and Sewerage, Guidelines – dated May 2004

C WaterPlan 2050 - A long-term water supply strategy for the Central Coast – Adopted August 2007 (adopted by Gosford and Wyong Councils in August 2007)

D WaterPlan 2050 - options report, by GWCWA, July 2007

E GCC IWCM Sub-Plan, by MWH, July 2007

F IWCM Study GCC scope of works V4, 2 August 2005

G WSC IWCM Sub-Plan, by MWH, August 2007

H WSC IWCM Study scope of works V5, 14 July 2005

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WP2050-IWCM Linking Document

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