Success through Partnership

JWP

Kempsey Shire Council

Macleay Water Integrated Water Cycle Management Strategy Summary Report

FINAL

2005

Kempsey Shire Council

Macleay Water Integrated Water Cycle Management Strategy Summary Report

FINAL

2005

John Wilson and Partners Pty Ltd
ABN: 85 011 022 503
Level 5, 189 Miller Street
North Sydney, NSW, 2060
Telephone: 02 8923 1555
Facsimile: 02 9460 1866
E-mail: g.azar@jwp.com.au

Document Control					
Revision	Author	Reviewer	Approved for Issue		
			Name	Signature	Date
Rev 0	W. Choy	E. Pryor	E. Pryor		7/10/05

Scope of this Summary Report

The water supply and sewerage business unit of Kempsey Shire Council, Macleay Water, has prepared an Integrated Water Cycle Management (IWCM) Strategy to ensure best-practice management of its water supply, sewerage and stormwater systems. This plan has been prepared with the assistance of the NSW Department of Energy, Utilities and Sustainability (DEUS). This plan is consistent with the Department's *Integrated Water Cycle Management Guidelines for Local Water Utilities*, 2004.

This Summary Report outlines the project objectives, investigation processes, options investigated and the final IWCM strategy adopted by Kempsey Shire Council. Additional information is given in various background reports prepared for the project. These reports include:

- DHI (2003), Kempsey Integrated Water Cycle Management Bulk Water Supply – WATHNET.
- Ecoseal (2003), Kempsey Local Government Area - Groundwater Assessment Sherwood Borefield (Sherwood Borefield Model Development, Calibration and Scenarios).
- Ecoseal (2003), Kempsey Local Government Area - Groundwater Assessment Coastal Borefields (Model Development, Calibration and Scenarios at Crescent Head, Hat Head and South West Rocks).
- JWP (2005), Macleay Water Integrated Water Cycle Management Strategy – Effluent Management Study.
- JWP (2005), Macleay Water Integrated Water Cycle Management Strategy – Financial Modelling.
- JWP (2005), Macleay Water Integrated Water Cycle Management Strategy – Scenario Building and Triple Bottom Line Assessment.
- JWP (2005), Macleay Water Integrated Water Cycle Management Strategy – Stakeholder Consultation.
- MWH (2003), Kempsey Shire Council Integrated Water Cycle Plan Historical Demand Analysis and Water and Wastewater Forecasting Report.
- NSW Deptartment of Commerce (2004) Task 6 Bulk Distribution Analysis Kempsey Integrated Water Cycle Management Draft.
- NSW Department of Land and Water Conservation (2002), Kempsey Integrated Water Cycle Management Concept Study.

For more project information, please contact:

Contact: Macleay Water

Phone: 02 6566 3200

Email: ksc@kempsey.nsw.gov.au

Web: www.kempsey.nsw.gov.au

JWP

Integrated Water Cycle Management

As the Kempsey Shire Council local water utility, Macleay Water has been continually planning its water and sewerage business activities. In 2002, Macleay Water committed to developing an Integrated Water Cycle Management (IWCM) strategy for the delivery of urban water services (including water supply, sewerage and stormwater) in the Kempsey Shire.

IWCM is an approach to the management of urban water services that aims to maximise the benefit derived from the available water resources. IWCM encourages the evaluation of opportunities across urban water services e.g. the potential of a rainwater tank to replace demands on a reticulated water supply and to assist in the management of stormwater. This approach allows potential savings in capital and on-going operating costs to be identified. IWCM also integrates the provision of urban water services with the management of the catchment and the available water resources.

An IWCM plan considers issues such as:

- The future **urban** water service needs of towns and the expectations of customers;
- The availability of **water resources** including alternative water sources such as rainwater, effluent and stormwater; and
- The impact of town water use on other water users in the **catchment** including the environment and future generations.

The IWCM strategy sets out a list of actions to be put in place to manage the water cycle issues identified.

Water Cycle Issues Facing Macleay Water

In 2002 DEUS prepared an IWCM Concept Study. The purpose of the IWCM Concept Study was to scope the extent of investigation work to be undertaken in the development of the IWCM strategy. This was done in consultation with key stakeholders by examining and documenting the water cycle issues that require management (or improved management).

A brief summary of some of the identified issues, categorised as catchment, water resource and urban issues is shown in **Table 1**.

Table 1: Concept Study Water Cycle Issues.

Category and Issue	
Catchment	• Towns on the Macleay River floodplain experience periodic flooding. Flood mitigation works exacerbate the impact of floodplain acid sulphate soils on water quality. • Groundwater is an important water source however some sources have high iron, manganese and arsenic concentrations. • Water stress is evident in the capping of bore water extractions. • Hat Head, Crescent Head and South West Rocks town water bores are located within national park aquifers that support groundwater dependent ecosystems. • Nutrients from land use, septics, stormwater and effluent discharge sources have resulted in the deterioration of some waterways.
Water Resource	• Turbidity, nutrients (nitrogen and phosphorus), faecal coliforms and water salinity significantly affect the water quality for some uses. • Surface waters are generally not under stress. • The Macleay River Alluvium has been identified as being at high risk of over-extraction and land use threats. Town water supply is the biggest extractive use. • The extraction rate from the Macleay Coastal Sands is high. The aquifer is at high risk of over-extraction and contamination although relatively little is known about the water source.
Urban	• Bellbrook, Willawarrin and Stuarts Point rely on septic tanks for sewage services with the potential to contaminate waterways and groundwater sources. • PRP notices exist on Crescent Head and West Kempsey sewage treatment plants (STP). • Water resources are becoming critical for some service areas. • The level of residential water consumption for Kempsey Shire is high compared with the NSW state wide median consumption.

To manage the issues identified, suitable potential management options were investigated.

Scenario Building Approach and Data

Consistent with the methodology, in developing the IWCM strategy, options to manage the on-going provision of urban water services were assessed in a two part process:

- Step 1: Coarse screening: a preliminary assessment of feasible options to identify those options which were technically feasible for each locality within the Macleay Water service area given the prevailing characteristics. This assessment was initially undertaken by DEUS and completed at a

workshop held between Macleay Water, DEUS and the NSW Department of Commerce; and

- Step 2: Fine screening: a detailed assessment of those options which passed the coarse screen including consideration of economic, social and environmental factors. This process is documented in the Scenario Building and Triple Bottom Line Assessment report (JWP 2005). Complementary options that passed the fine screen were bundled together as scenarios.

To assist in the fine screening process, a series of investigation studies were undertaken. These studies were designed to further investigate the water cycle issues raised by stakeholders and to assess the viability of options to manage these issues. These studies included:

- An historical demand analysis and water and wastewater forecast;
- A surface water bulk supply assessment;
- A bulk supply assessment of the two main groundwater sources within the service area;
- A bulk distribution analysis; and
- An effluent management study.

Copies of each of these studies, including a presentation of analysis methods and results, are presented in the final strategy documents.

Macleay Water IWCMS Scenarios

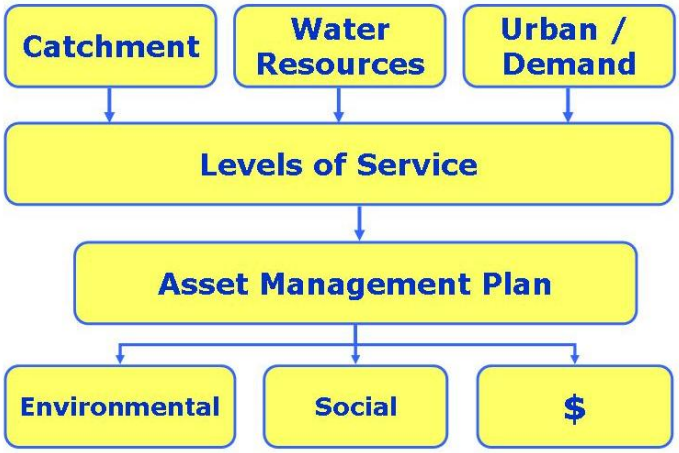
Drawing on the results of the investigation studies, five water cycle management scenarios were developed. These scenarios included:

- A 'do nothing' solution; a baseline scenario;
- A traditional solution: where all three urban water supply services are managed separately; and
- Three integrated solutions: the integrated solutions involve an increasing movement towards the combined management of the urban water cycle (water supply, sewage treatment and stormwater) services.

To identify a preferred scenario for implementation, each scenario was assessed against a set of triple bottom line (TBL - economic, environmental and social) criteria developed in consultation with stakeholders. Based on their performance against these criteria, the scenarios were ranked in order of preference for implementation.

The process of developing and assessing a scenario is illustrated in **Figure 1.**

Figure 1: Developing and Assessing a Scenario.



As part of the community consultation efforts that were undertaken to develop the strategy, the inputs of the project reference group (made up of representatives from local organisations), government agencies and Macleay Water staff were utilised to refine a set of assessment criteria originally developed by DEUS.

The criteria developed are set out in **Table 2**.

Table 2: Triple Bottom Line Assessment Criteria.

TBL	Assessment Criteria
Economic	Net present value ($)
Environmental	Proportion of town water consumption saved (%)
	Proportion of effluent generated that is used (%)
	Energy consumed ($ million)
Social	Change in typical residential bill (TRB) ($)
	Improved level of service
	Relative expected social acceptability

Based on the criteria set out above, an assessment of each of the scenarios was undertaken. Data from the investigation studies was used to quantify the criteria for each scenario.

Based on the quantification of each of the measurable criteria for each of the scenarios developed, a score from 0 to 5 was assigned. For each criterion, the maximum score was assigned to the best performing scenario. Each subsequent scenario received a proportionately lower score.

However, the relative expected social acceptability and improved level of service criteria were difficult to measure directly. As part of the community consultation program that supported the development of the strategy (see *Macleay Water IWCM Stakeholder Consultation*, JWP 2005), participants at the community meetings were presented with the draft scenarios and asked to comment on the relative acceptability of the scenarios.

The resulting social and environmental scores for each criterion are set out in **Table 3**.

Table 3: Scenario Social and Environmental Scores.

Scenario	Environmental Criteria			Social Criteria		
	Water	Effluent	Energy	TRB	Service	Accept
Do Nothing	0.0	1.1	5.0	5.0	0.0	1.0
Traditional	0.5	2.1	4.9	4.5	4.0	4.0
Integrated 1	2.1	4.7	4.9	4.5	4.0	4.0
Integrated 2	2.4	4.7	4.7	4.5	4.0	4.0
Integrated 3	5.0	5.0	4.7	4.5	2.0	1.0

In order to rank the scenarios, the weighted average of the social and environmental scores of each scenario was divided by the net present value of the costs of implementing the scenario. The results are set out in **Table 4**. As illustrated, Integrated Scenario 1 ranked most highly.

Table 4: Scenario Rankings.

Scenario	Ranking
Do Nothing	5
Traditional	3
Integrated 1	1
Integrated 2	2
Integrated 3	3

Preferred Scenario

Based on the results of the scenario ranking, Integrated Scenario 1 was identified as the preferred scenario for implementation. However, there were some aspects of Integrated Scenario 2 (the sewerage component only) that were considered valuable, including the potential to consider dual reticulation options in South Kempsey and the potential addition of microfiltration to West Kempsey sewage treatment plant. The combination of the Integrated 1 Water and Sewer Scenarios with these additional options formed the final preferred scenario.

Key features of the preferred scenario (which may be implemented over the next 30 years) include:

A Demand Management Program

- Pricing Adjustment
- Community Education (external use target)
- Residential Showerhead Retrofit
- Active Leak Detection
- Business Water Audits
- Recycled Water to New Development

Upgrades to the Water Transfer System

- A new reservoir replacing Hyplon Dam at Crescent Head
- Crescent Head distribution system augmentation
- South West Rock distribution system augmentation

Groundwater Source monitoring and augmentation

- Maguires Crossing (1 production bore, 6 observation bores)
- Hat Head borefield (1 production bore, 3 observation bores)
- South West Rocks borefield (2 production bores, 5 observation bores)
- Kinchela Emergency borefield (3 observation bores)

Water Treatment

- Improved water treatment at Crescent Head
- Improved water treatment at South West Rocks
- Improved water treatment at Kempsey

Reticulated Sewerage

- Potential reticulated sewerage schemes for Bellbrook, Willawarrin, and Stuarts Point

Sewage Treatment

- Augmentation of South Kempsey STP

- Augmentation of South West Rocks STP
- New West Kempsey STP

Recycled Water

- Use of recycled effluent for agricultural irrigation at Bellbrook, Willawarrin, South Kempsey, West Kemspey, Crescent Head, Frederickton, and Stuarts Point
- Use of recycled effluent for municipal irrigation at Bellbrook, Willawarrin, South Kempsey, South West Rocks, Stuarts Point, West Kemspey, and Smithtown/Gladstone
- Potential dual reticulation at Bellbrook, Willawarrin, Stuarts Point, new development in South West Rocks, and new (opportunistic) development in South Kempsey

Implementing the Preferred Scenario

The capital works programs of the preferred scenario are presented in **Table 4** and **Table 5**.

Kempsey Shire Council
CAPITAL WORKS PROGRAM **2005**
Integrated Water Cycle Management Strategy
Integrated 1 - Water

All values are in year 2004/05 $'000

	Project	Type of works				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
		Improved LOS	New System Assets	Renewals	30 year total	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35
Bellbrook																																			
	Demand management																																		
	Pricing Measure Model	100%			**40**	20	20																												
	Public Education for Reduction of External Water Use	100%			**84**			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Resident House Shower Retrofit	100%			**1**			0.3	0.3	0.3																									
	Holiday House Shower Retrofit	100%			**0**			0.02	0.02	0.02																									
	Leak Detection and Repair	100%			**182**		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Business Audit and Retrofit - Permanent Savings	100%			**8**			2	2	2	2	2																							
	Renewals																																		
	Other renewals			100%	**755**	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
	Pump station renewal			100%	**72**	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Meter replacement			100%	**91**	6	6	6	6	6	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	SCADA renewal			100%	**2**	0.4	0.4	0.4	0.4	0.4																									
Crescent Head																																			
	Demand management																																		
	Pricing Measure Model	65%	35%		**40**	20	20																												
	Public Education for Reduction of External Water Use	65%	35%		**140**			5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Resident House Shower Retrofit	65%	35%		**12**			4	4	4																									
	Resident Flat Shower Retrofit	65%	35%		**1**			0.3	0.3	0.3																									
	Holiday House Shower Retrofit	65%	35%		**1**			0.3	0.3	0.3																									
	Holiday Flat Shower Retrofit	65%	35%		**3**			1	1	1																									
	Leak Detection and Repair	65%	35%		**216**		7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	Business Audit and Retrofit - Permanent Savings	65%	35%		**17**			3	3	3	3	4																							
	Business Audit and Retrofit - Temporary Savings	65%	35%		**12**			0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Water treatment																																		
	Fluoridation - liquid	65%	35%		**230**	230																													
	3 ML/d water treatment plant: aeration, filtration, pH correction (soda ash addition), chlorination	65%	35%		**3,588**								3,588																						
	Distribution system augmentation																																		
	Upgrade main (200 dia DICL, 3000m)	65%	35%		**306**		306																												
	Water distribution																																		
	New reservoir replacing Hyplon Dam			100%	**1,000**	1,000																													
	Renewals																																		
	Other renewals			100%	**892**	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	Pump station renewal			100%	**85**	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Meter replacement			100%	**106**	7	7	8	8	8	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	SCADA			100%	**2**	0.5	0.5	0.5	0.5	0.5																									
	Groundwater source monitoring and augmentation																																		
	Maguires Crossing borefield (6 observation bores, 1 production bore)	65%	35%		**156**	78	78																												
Hat Head																																			
	Demand management																																		
	Pricing Measure Model	65%	35%		**40**	20	20																												
	Public Education for Reduction of External Water Use	65%	35%		**140**			5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Resident House Shower Retrofit	65%	35%		**2**			1	1	1																									
	Holiday House Shower Retrofit	65%	35%		**4**			1	1	1																									
	Leak Detection and Repair	65%	35%		**108**		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Business Audit and Retrofit - Permanent Savings	65%	35%		**8**			2	2	2	2	2																							
	Renewals																																		
	Other renewals			100%	**446**	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	Pump station renewal			100%	**42**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Meter replacement			100%	**54**	3	3	4	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	SCADA			100%	**1**	0.2	0.2	0.2	0.2	0.2																									
	Groundwater source monitoring and augmentation																																		
	Hat Head Borefield (3 observation, 1 production)	65%	35%		**106**	53	53																												
Kempsey and Lower Maclay																																			
	Demand management																																		
	Pricing Measure Model	95%	5%		**40**	20	20																												
	Public Education for Reduction of External Water Use	95%	5%		**280**			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Resident House Shower Retrofit	95%	5%		**86**			29	29	29																									
	Resident Flat Shower Retrofit	95%	5%		**6**			2	2	2																									
	Rural Residential Shower Retrofit	95%	5%		**8**			3	3	3																									
	Rural (S&D) Shower Retrofit	95%	5%		**19**			7	6	6																									
	Leak Detection and Repair	95%	5%		**3,159**		109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109	109
	Business Audit and Retrofit - Permanent Savings	95%	5%		**610**			120	121	122	123	124																							
	Business Audit and Retrofit - Temporary Savings	95%	5%		**367**			12	12	12	12	12	12	13	13	13	13	13	13	13	13	13	13	13	13	13	14	14	14	14	14	14	14	14	14
	Water treatment																																		
	21 ML/d plant w/ coagulation, powdered activated carbon dosing, sedimentation, filtration and chlorine disinfection	95%	5%		**15,474**					7,737	7,737																								
	Fluoridation - liquid	95%	5%		**230**	230																													
	Renewals																																		
	Other renewals			100%	**13,072**	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436
	Pump station renewal			100%	**1,245**	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
	Meter replacement			100%	**1,570**	100	100	111	111	111	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
	SCADA			100%	**35**	7	7	7	7	7																									

Kempsey Shire Council

CAPITAL WORKS PROGRAM 2005

Integrated Water Cycle Management Strategy

Integrated 1 - Water

All values are in year 2004/05 $'000

Project	Type of works				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	Improved LOS	New System Assets	Renewals	30 year total	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35
South West Rocks																																		
Demand management																																		
Pricing Measure Model	60%	40%		**40**	20	20																												
Public Education for Reduction of External Water Use	60%	40%		**280**			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Resident House Shower Retrofit	60%	40%		**47**			15	16	16																									
Resident Flat Shower Retrofit	60%	40%		**3**			1	1	1																									
Rural Residential Shower Retrofit	60%	40%		**2**			1	1	1																									
Rural (S&D) Shower Retrofit	60%	40%		**8**			3	3	3																									
Leak Detection and Repair	60%	40%		**498**		17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Business Audit and Retrofit - Permanent Savings	60%	40%		**76**			14	15	15	15	16																							
Business Audit and Retrofit - Temporary Savings	60%	40%		**56**			1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
Water treatment																																		
6ML/d Membrane Filtration WTP	60%	40%		**4,900**	4,900																													
Fluoridation - liquid	60%	40%		**230**	230																													
Distribution system augmentation																																		
Upgrade mains PCV 375 mm	60%	40%		**4,272**					4,272																									
Upgrade mains Steel 375 mm (submarine)	60%	40%		**103**					103																									
Submarine River crossing	60%	40%		**1,000**					1,000																									
New Booster pump station 9ML/d @70m lift	60%	40%		**180**					180																									
Contingency	60%	40%		**1,944**					1,944																									
Survey, Investigation and Design	60%	40%		**555**					555																									
Construction Supervision	60%	40%		**555**					555																									
Works augmentation to trunk system (valving, PSs)	100%			**223**		152							70																					
Lead in mains for new devt areas		100%		**812**		271	271	271																										
Renewals																																		
Other renewals			100%	**2,059**	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Pump station renewal			100%	**196**	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Meter replacement			100%	**247**	16	16	17	17	17	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
SCADA			100%	**5**	1	1	1	1	1																									
Groundwater source monitoring and augmentation																																		
South West Rocks borefield (5 observation, 2 production bores)	100%			**190**	95	95																												
Kinchela emergency borefield (3 observation)	100%			**60**	30	30																												
Two layer groundwater flow model for SWR	100%			**36**	36																													
Optimisation of the SWR Borefield	100%			**27**	27																													
Stuarts Point																																		
Demand management																																		
Pricing Measure Model	80%	20%		**40**	20	20																												
Public Education for Reduction of External Water Use	80%	20%		**140**			5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Resident House Shower Retrofit	80%	20%		**8**			3	3	3																									
Resident Flat Shower Retrofit	80%	20%		**0.2**			0.1	0.1	0.1																									
Holiday House Shower Retrofit	80%	20%		**1**			0.2	0.2	0.2																									
Holiday Flat Shower Retrofit	80%	20%		**0.5**			0.2	0.2	0.2																									
Rural (S&D) Shower Retrofit	80%	20%		**1**			0.2	0.2	0.2																									
Leak Detection and Repair	80%	20%		**224**		8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Business Audit and Retrofit - Permanent Savings	80%	20%		**4**			1	1	1	1	1																							
Business Audit and Retrofit - Temporary Savings	80%	20%		**3**			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Renewals																																		
Other renewals			100%	**926**	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Pump station renewal			100%	**88**	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Meter replacement			100%	**111**	7	7	8	8	8	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
SCADA			100%	**2**	0.5	0.5	0.5	0.5	0.5																									
Willawarrin																																		
Demand management																																		
Pricing Measure Model	100%			**40**	20	20																												
Public Education for Reduction of External Water Use	100%			**84**			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Resident House Shower Retrofit	100%			**1**			0.2	0.2	0.2																									
Holiday House Shower Retrofit	100%			**0.3**			0.1	0.1	0.1																									
Leak Detection and Repair	100%			**182**		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Business Audit and Retrofit - Permanent Savings	100%			**8**			2	2	2	2	2																							
Renewals																																		
Other renewals			100%	**755**	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Pump station renewal			100%	**72**	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Meter replacement			100%	**91**	6	6	6	6	6	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
SCADA			100%	**2**	0.4	0.4	0.4	0.4	0.4																									
Total				**66,572**	**7,894**	**2,127**	**1,556**	**1,559**	**17,637**	**8,847**	**1,112**	**4,551**	**1,033**	**963**	**963**	**963**	**963**	**964**	**964**	**964**	**964**	**964**	**964**	**964**	**965**	**965**	**966**	**966**	**966**	**966**	**966**	**966**	**966**	**966**	**966**
Improved LOS				**32,949**	3,832	814	371	373	12,891	7,668	319	2,517	255	185	185	185	185	186	186	186	186	186	186	186	186	186	187	187	187	187	187	187	187	187	187
Other New System Assets (growth works)				**9,603**	2,217	468	325	326	3,886	429	43	1,284	28	28	28	28	28	28	28	28	28	28	28	28	28	29	29	29	29	29	29	29	29	29	29
Renewals				**24,020**	1,845	845	860	860	860	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
Other Grants (NSW Health for fluoridation)				**690**	690																													

Kempsey Shire Council
CAPITAL WORKS PROGRAM **2005**
Integrated Water Cycle Management Strategy
Integrated 1 Solution - Sewerage Preferred

All values are in year 2004/05 $'000

Project	Improved LOS	Type of works: New System Assets	Renewals	30 year total	1 2005/06	2 2006/07	3 2007/08	4 2008/09	5 2009/10	6 2010/11	7 2011/12	8 2012/13	9 2013/14	10 2014/15	11 2015/16	12 2016/17	13 2017/18	14 2018/19	15 2019/20	16 2020/21	17 2021/22	18 2022/23	19 2023/24	20 2024/25	21 2025/26	22 2026/27	23 2027/28	24 2028/29	25 2029/30	26 2030/31	27 2031/32	28 2032/33	29 2033/34	30 2034/35
Bellbrook																																	
Treatment																																	
New 370 EP tertiary plant and microfiltration	100%			**1,760**							1,759.5																						
Transfer																																	
New sewerage system	100%			**1,784**							1,784.3																						
Effluent pumping station and 80mm supply main to town for landscape and agricultural irrigation	100%			**342**							341.6																						
Dual Reticulation																																	
Pump station, reservoir, chlorination, reticulation for 370 EP	100%			**834**							833.5																						
River Discharge																																	
200mm gravity main from plant to Macleay river	100%			**373**							372.6																						
Crescent Head																																	
Treatment																																	
Minor upgrades (OH&S) to existing 4,000 EP tertiary plant	100%			**105**			52.5	52.5																									
Transfer																																	
150mm effluent transfer main to agricultural irrigation sites	100%			**828**		414	414																										
Renewals																																	
Other renewals			100%	**701**	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4
Pump station renewal (MW planned)			100%	**158**	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
SCADA renewal (MW planned)			100%	**5**	1	1	1	1	1																								
System licensing	100%			**250**			50.1	50.1	50.1	50.1	50.1																						
Frederickton																																	
Treatment																																	
Minor upgrades (OH&S) to existing 1,000 EP secondary plant	100%			**70**			35	35																									
Transfer																																	
80mm effluent transfer main to agricultural irrigation sites	100%			**46**				45.5																									
Renewals																																	
Other renewals			100%	**350**	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Pump station renewal (MW planned)			100%	**79**	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
SCADA renewal (MW planned)			100%	**2**	0.5	0.5	0.5	0.5	0.5																								
System licensing	100%			**133**			26.6	26.6	26.6	26.6	26.6																						
Hat Head																																	
Treatment																																	
Minor upgrades (OH&S) to existing 1,550 EP tertiary plant	100%			**20**			10	10																									
Renewals																																	
Other renewals (pots)			100%	**701**	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3
Pump station renewal (MW planned)			100%	**158**	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
SCADA renewal (MW planned)			100%	**5**	1	1	1	1	1																								
System licensing	100%			**266**			33.3	33.3	66.6	66.6	66.6																						
Smithtown/Gladstone																																	
Treatment																																	
Minor upgrades (OH&S) to existing 2,000 EP secondary plant	100%			**70**			35	35																									
Transfer																																	
Effluent pumping station & 80mm main to landscape irrigation	100%			**76**			75.9																										
Renewals																																	
Other renewals			100%	**701**	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4
Pump station renewal (MW planned)			100%	**158**	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
SCADA renewal (MW planned)			100%	**5**	1	1	1	1	1																								
System licensing	100%			**266**			53.3	53.3	53.3	53.3	53.3																						
South Kempsey																																	
Treatment																																	
Add microfiltration to 5,400 EP existing trickling filter plant.	100%			**2,550**				1,275.1	1,275.1																								
Minor upgrades (OH&S) to existing 5,400 EP secondary plant	100%			**150**			75	75																									
Transfer																																	
Effluent pumping station and 200mm effluent supply main to sites west of the plant	100%			**1,139**						1,138.5																							
Renewals																																	
Other renewals			100%	**1,892**	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1	63.1
Pump station renewal (MW planned)			100%	**426**	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2
SCADA renewal (MW planned)			100%	**13**	2.7	2.7	2.7	2.7	2.7																								
System licensing	100%			**1,079**			215.8	215.8	215.8	215.8	215.8																						
Dual Reticulation - new development																																	
Pump station, reservoir, chlorination for 800 EP		100%		**690**						690.0																							
Pipeline to River																																	
450mm gravity main from plant to Macleay River	100%			**1,104**						1,104.0																							
South West Rocks																																	
Treatment																																	
Augment existing plant to 12,000 EP, microfiltration for total plant capac	50%	50%		**6,834**		3,416.9	3,416.9																										
Transfer																																	
Effluent pumping station and 250mm supply mains to landscape irrigation areas	50%	50%		**1,456**			1455.9																										
Renewals																																	
Other renewals			100%	**2,102**	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1
Pump station renewal (MW planned)			100%	**474**	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
SCADA renewal (MW planned)			100%	**15**	3	3	3	3	3																								
System licensing	100%			**1,671**			334.1	334.1	334.1	334.1	334.1																						
Dual Reticulation - opportunistic (new development)																																	
Pump station, reservoir, chlorination for 1,400 ep		100%		**1,753**			1,752.6																										

Kempsey Shire Council
CAPITAL WORKS PROGRAM **2005**
Integrated Water Cycle Management Strategy
Integrated 1 Solution - Sewerage Preferred

All values are in year 2004/05 $'000

Project	Improved LOS	Type of works: New System Assets	Renewals	30 year total	1 2005/06	2 2006/07	3 2007/08	4 2008/09	5 2009/10	6 2010/11	7 2011/12	8 2012/13	9 2013/14	10 2014/15	11 2015/16	12 2016/17	13 2017/18	14 2018/19	15 2019/20	16 2020/21	17 2021/22	18 2022/23	19 2023/24	20 2024/25	21 2025/26	22 2026/27	23 2027/28	24 2028/29	25 2029/30	26 2030/31	27 2031/32	28 2032/33	29 2033/34	30 2034/35
Stuarts Point																																	
Treatment																																	
1,500 EP secondary plant and microfiltration	100%			**4,083**					4,083.4																								
Transfer																																	
New sewerage system	100%			**2,867**					2,867.3																								
Effluent pumping station, transfer mains and storage for municipal, agricultural, and landscape irrigation	100%			**1,094**					1,094.4																								
Dual Reticulation																																	
Pump station, reservoir, chlorination, retic for 1,500 EP	100%			**3,373**					3,372.7																								
Dune Discharge - back up																																	
Outlet and 225mm gravity main from plant	100%			**859**					858.9																								
West Kempsey																																	
Treatment																																	
8500 EP new treatment plant with microfiltration	70%	30%		**11,447**				5,723.6	5,723.6																								
Transfer																																	
Effluent pumping station, 200mm main to agricultural, & 80mm main to landscape and agricultural opportunities	70%	30%		**1,104**						1103.7																							
Renewals																																	
Other renewals			100%	**4,204**	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1	140.1
Pump station renewal (MW planned)			100%	**947**	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6
SCADA renewal (MW planned)			100%	**30**	5.9	5.9	5.9	5.9	5.9																								
System licensing	100%			**2,398**			479.6	479.6	479.6	479.6	479.6																							
Connection from new treatment plant to existing main																																	
450mm gravity main from plant to main	70%	30%		**410**						409.9																							
Willawarrin																																	
Treatment																																	
120 EP tertiary plant and microfiltration	100%			**1,399**							1,399.3																						
Transfer																																	
New sewerage system	100%			**985**							985.3																						
Effluent pumping station and 80mm supply main to town for agricultural and landscape irrigation	100%			**245**							245.0																						
Dual Reticulation																																	
Pump station, reservoir, chlorination, reticulation for 120 ep	100%			**316**							316.0																						
River Discharge																																	
200mm gravity main from plant to Macleay river	100%			**373**							372.6																						
			Total	**69,726**	**444**	**4,275**	**8,960**	**8,889**	**20,946**	**6,101**	**10,065**	**429**	**429**	**429**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**	**438**
	Improved LOS			**46,125**	0	2,122	4,327	6,728	18,785	4,528	9,636	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Other New System Assets (growth works)			**10,476**	0	1,708	4,189	1,717	1,717	1,144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Renewals			**13,125**	444	444	444	444	444	429	429	429	429	429	438	438	438	438	438	438	438	438	438	438	438	438	438	438	438	438	438	438	438	438
	Total			**69,726**																													

Monitoring and Revising the IWCMS

The DEUS guidelines require that the IWCMS is reviewed once every five years. However, annual review, as part of the management planning processes of Council and the strategic business planning processes of Macleay water, is required for some key elements of the strategy in order to ensure the issues identified are actually being managed and that no new issues have arisen. In particular, annual review of the following will be required:

- Growth in assessments;
- Changes in water demand;
- Changes in costs associated with infrastructure provision, operation and maintenance.

Where changes in those parameters are noted, the capital works programs and financial models of the water and sewer businesses should be appropriately revised.