

Water, Wastewater and Irrigation Performance Report 2005

Economic Regulation Authority

 WESTERN AUSTRALIA

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1 Introduction

The Economic Regulation Authority (Authority) has evaluated water and wastewater data supplied by the Water Corporation (Corporation) and various small suppliers of water, wastewater and irrigation services to regional Western Australia. The Corporation services a significant majority of the State in terms of water and wastewater supply.

Major towns are defined as those towns where water connection numbers exceed 1000. Small suppliers of water are defined as suppliers to areas where fewer than 1000 water connections are recorded.

This report comprises three parts:

- Part A provides water performance data to 32 major Western Australian towns over the 2001/02, 2002/03, 2003/04 and 2004/05 periods.
- Part B provides wastewater performance data for 21 major Western Australian towns over the periods 2002/03, 2003/04 and 2004/05. Small supplier wastewater information is provided for 24 small suppliers over the periods 2003/04 and 2004/05.
- Part C provides small supplier irrigation data for 4 small suppliers for the periods 2003/04 and 2004/05.

This report describes all water and wastewater services and, where possible, notes any differences and notes any variance between the reporting periods, for the entire sample, individual towns and small suppliers. It also describes maximum and minimum values as well as highest and lowest percentage variations where relevant.

The data supplied includes information on the physical profile of water and wastewater services, including the population serviced and infrastructure, as well as data on the 'typical' regional Western Australian town in comparison to Perth.

The objectives of this report are to:

- Summarise the data provided by the Corporation, Bunbury and Busselton Water Boards, and the Shires and other small suppliers;
- Highlight comparative performance outcomes for the different towns served;
- Examine service performance variations over the reporting period; and
- Benchmark, where possible, Western Australian water service delivery.

2 Executive Summary

2.1 Water Performance

Between 2001/02 and 2004/05, various trends emerged with regard to water performance data for major Western Australian towns. The number of connected properties in Western Australia increased over this period. While population growth (the number of people serviced) was 6% in Perth and as high as 20% in Busselton over the period, regional Western Australia, on average, reported negative growth (-1%). Water consumption per person exhibited a decrease over the period, however total annual consumption marginally increased. Perth was the seventh smallest water consumer per connected property in 2004/05.

A majority of Western Australia's water continues to be extracted from groundwater. The amount extracted from groundwater, however, has marginally decreased over the reporting period. Trends in water treatment observed a reduction in water treated with disinfection only (lower order treatment processes) and an increase in further treatment, indicative of a higher standard of water treatment. Non revenue water, measuring water supplied minus billed authorised consumption, fluctuated between 2001/02 and 2004/05.

Infrastructure for water supply services exhibited an expansion with increases in pump stations, service reservoirs, bores, dams and the length of supply mains, indicative of a general improvement in infrastructure in the State.

Reported water main breaks showed a marginal increase, however remained within the Corporation's target range. Small water suppliers also observed a marginal rise in main breaks over the reporting period. Written complaints over water services for major towns showed a particular increase in 2004/05. Nil complaints were received by small suppliers from 2003/04 to 2004/05. Confirmed service interruptions significantly increased for regional towns, particularly in Busselton and York from 2001/02 to 2004/05. Small suppliers reported a decrease in interruptions from 2003/04 to 2004/05.

2.2 Wastewater Performance

Wastewater performance information for major towns showed an increased number of connected properties from 2002/03 to 2004/05. In 2004/05, the amount of water consumed was twice the amount of wastewater collected.

The majority of wastewater treatment works provided secondary treatment between 2002/03 and 2004/05, with only two primary treatment works reported over the period. The majority of discharge points recorded over the reporting period were inland discharge points, followed by ocean outfalls. Only one estuarine discharge point was reported.

Wastewater infrastructure generally expanded with increases evident in the number of pumping stations and length of sewer mains.

Internal properties experiencing overflows or flooding increased substantially in 2004/05, attributable to overflows in Perth. A similar, although less marked increase was observed for external properties. A decreasing trend, however, was evident in overflows into the environment in 2004/05. The increase in overflows and flooding is noted to be consistent with annual variation.

Wastewater odour complaints decreased over the reporting period.

Small sewerage suppliers rather reported a decline in the length of sewer mains from 2003/04 to 2004/05. Tertiary treatment increased at the expense of primary and secondary treatment, also against the trend of the major towns. The volume of wastewater reused declined, while the amount of biosolids produced increased for small suppliers from 2003/04 to 2004/05.

A single written complaint was received by a small supplier, Kalgoorlie/Boulder, which was successfully resolved in 2004/05. Two odour complaints, in total were received. A significant decline in overflows and blockages was reported over the reporting period.

2.3 Small Suppliers Irrigation Performance

Four irrigation small suppliers were observed from 2003/04 to 2004/05. The number of irrigation connections decreased, while non-potable water supply connections increased. The number of requests also increased, as did the number of accounts issued. The volume of irrigation water supplied increased over the period. However, non-potable water supplied substantially declined in 2004/05.

The number of planned service interruptions increased, while the number of emergency interruptions as well as faulty meters, faults and written complaints decreased.

PART A: WATER PERFORMANCE INFORMATION

**on 32 Major Western Australian Towns
(2001/02 to 2004/05)**

3 Service Localities

Part A of this report compares and evaluates the data submitted by the Corporation, Bunbury Water Board and Busselton Water Board on drinking water (potable water) services to 32 major WA towns over four successive years, 2001/02 to 2004/05.

The towns compared are:

- Albany
- Australind / Eaton
- Bridgetown
- Broome
- Bunbury
- Busselton
- Carnarvon
- Collie
- Denmark
- Derby
- Dongara Denison
- Dunsborough / Yallingup
- Esperance
- Geraldton
- Harvey / Wokalup
- Jurien
- Kalgoorlie / Boulder
- Karratha
- Katanning
- Kununurra
- Mandurah
- Manjimup
- Margaret River
- Merredin
- Narrogin
- Newman
- Northam
- Perth
- Pinjarra
- Port Hedland
- South Hedland
- York

4 Physical Profile

4.1 Properties/Population Serviced

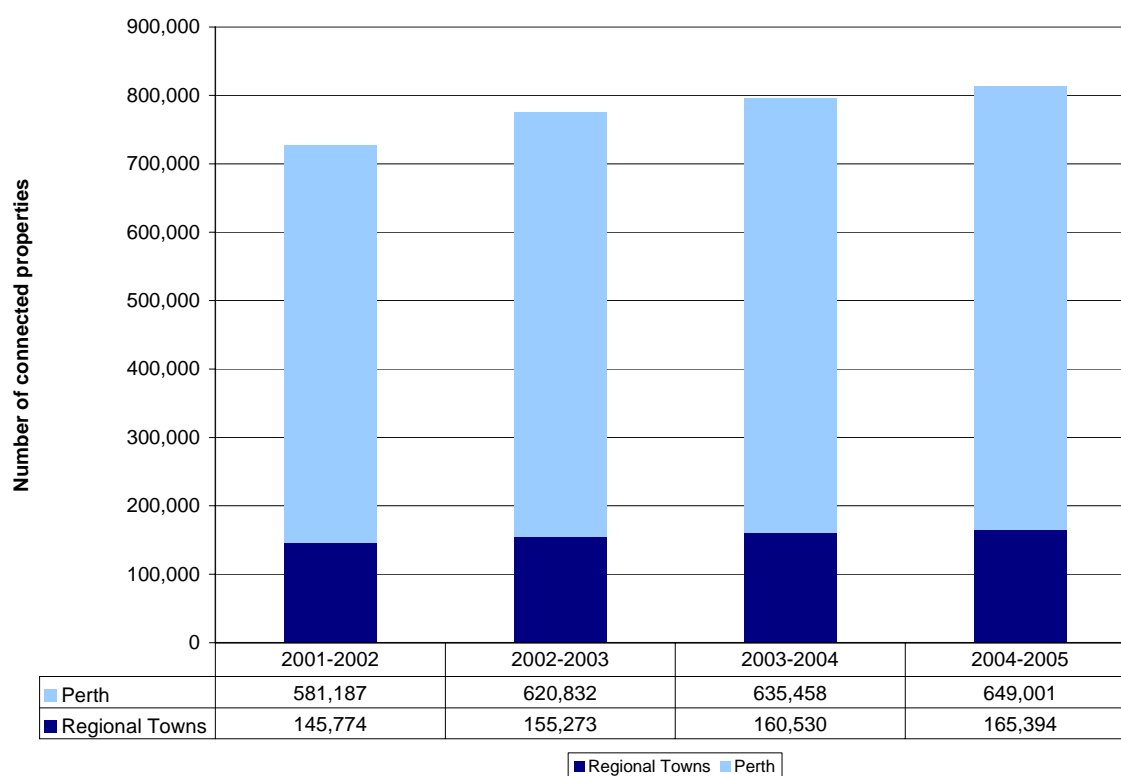
Table 1 shows the number of connected properties during the reporting period.

Table 1: Number of connected properties

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	726,961	776,105 (7%)	795,988 (3%)	814,395 (2%)
Total all towns less Perth	145,774	155,273 (7%)	160,530 (3%)	165,394 (3%)
Average all towns	22,718	24,253 (7%)	24,875 (3%)	25,450 (2%)
Average all towns less Perth	4,702	5,009 (7%)	5,178 (3%)	5,335 (3%)
Maximum number	581,187 Perth	620,832 (7%)	635,485 (2%)	649,001 (2%)
Minimum number	892 Jurien	1,179 (32%)	1,228 (4%)	1,248 (2%)
Largest annual increase		Jurien (32%)	Bunbury (10%)	Dunsborough/ Yallingup (9%)
Largest annual decrease		Manjimup (-0.3%)	Northam (-0.2%)	Newman (-1%)

The number of connected properties has increased by 12% over the reporting period. Albany, Bunbury, Geraldton, Kalgoorlie/Boulder, Mandurah and Perth have over 10,000 connected properties as at 2004/05. In particular, large increases were observed in Jurien (40%) and Karratha (27%) over the reporting period.

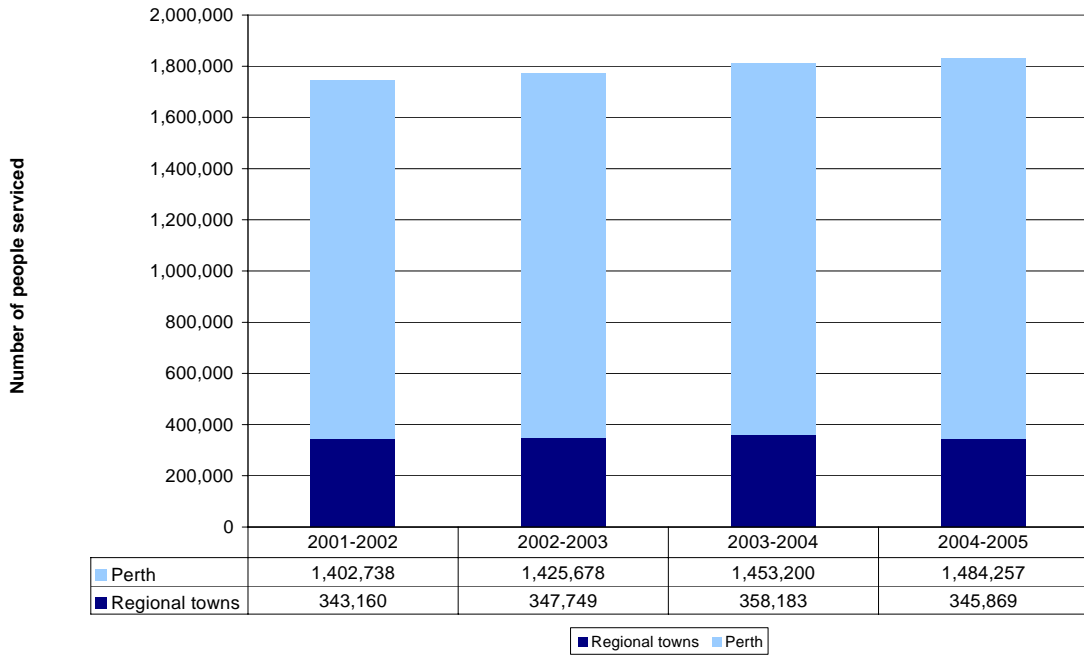
Figure 1 illustrates the number of connected properties in Perth and regional towns.

Figure 1: Number of connected properties**Table 2: Number of people served**

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	1,745,898	1,773,427 (2%)	1,811,383 (2%)	1,830,126 (1%)
Total all towns less Perth	343,160	347,749 (1%)	358,183 (3%)	345,869 (-3%)
Average all towns	54,559	55,420 (2%)	56,606 (2%)	57,191 (1%)
Average all towns less Perth	11,070	11,218 (1%)	11,554 (3%)	11,157 (-3%)
Maximum population	1,402,738 Perth	1,425,678 Perth	1,453,200 Perth	1,484,257 Perth
Minimum population	2,032 Jurien	2,046 Jurien	2,146 Jurien	2,033 Jurien
Largest annual increase		Margaret River (7%)	Dunsborough / Yallingup (6%)	Perth (2%)
Largest annual decrease		Manjimup (-1%)	South Hedland (-1%)	Manjimup (-6%)

The highest rate of population growth during the reporting period was in Busselton, which increased by 20% over this period. The highest rate of negative population growth occurred in Newman (-8%) followed by Northam, Manjimup and Katanning (-7%). Perth recorded growth of 6% over the reporting period, whereas regional Western Australia recorded growth of 1%.

Figure 2: Population served



4.2 Supply/Consumption

The average water consumption per person per day for both residential and non-residential properties in all towns has reduced from 431 litres in 2001/02 to 420 litres 2004/05.

Table 3: Total annual water consumption (ML)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	274,361	259,316 (-5%)	284,145 (10%)	280,717 (-1%)
Total all towns less Perth	71,536	71,863 (0%)	75,653 (5%)	73,725 (-3%)
Average all towns	8,574	8,104 (-5%)	8,880 (10%)	8,772 (-1%)
Average all towns less Perth	2,308	2,318 (0%)	2,440 (5%)	2,378 (-3%)
Perth	202,825	187,453	208,491	206,992
Maximum consumption	202,825 Perth	187,453 (-8%)	208,491 (11%)	206,992 (-1%)
Minimum consumption	266 Jurien	281 (6%)	263 (-7%)	267 (1%)
Largest annual increase		Dongara Denison (17%)	Mandurah (18%)	Newman (10%)
Largest annual decrease		Busselton (-15%)	Derby (-7%)	South Hedland (-20%)

Total annual water consumption has risen over the reporting period, despite decreasing 1.2% between 2003/04 and 2004/05. During the reporting period water consumption has risen by 3% in regional towns and by 2% in Perth. The largest rises were reported for Bridgetown / Hester (31%), followed by Mandurah (25%) and Pinjarra (21%). The largest falls in water consumption were reported for Port Hedland (-34%) followed by Busselton (-17%) and Derby (-17%).

Table 4: Average annual consumption per connected property (kL)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Average all towns	377	334 (-11%)	357 (7%)	345 (-3%)
Average all towns less Perth	491	463 (-6%)	471 (2%)	446 (-5%)
Perth	349	302	328	319
Maximum consumption	2,343 Port Hedland	2,065 Port Hedland	2,364 Port Hedland	1,604 South Hedland
Minimum consumption	218 Bridgetown	217 Denmark	203 Denmark	200 Denmark
Largest annual increase		Dongara Denison (11%)	Port Hedland (14%)	Newman (11%)
Largest annual decrease		Jurien (-20%)	Jurien (-10%)	Port Hedland (-43%)

The average daily water consumption per connected property has fallen over the reporting period. By measuring average water consumption per connected property it is possible to compare data between different sized towns. In 2004/05, for example, Perth was the seventh smallest consumer of water per connected property (319L) whereas South Hedland consumed five times that amount (1,604L). In 2004/05 average consumption in Demark was 41% of the average of all regional towns and consumption in South Hedland was 336% of the average.

Water consumption in Perth per connected property was greatest in 2001/02. Water consumption per connected property for all towns was greatest in 2003/04 and observed particular reductions in 2002/03 (-11%) and 2004/05 (-9%). Newman observed the greatest increase in 2004/05 (11%).

Table 5: Average annual residential consumption per connected property (kL)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Average all towns	299	275 (-8%)	297 (8%)	292 (-2%)
Average all towns less Perth	344	340 (-1%)	348 (2%)	355 (2%)
Perth	288	260	285	277
Maximum consumption	657 Port Hedland	636 Port Hedland	633 Port Hedland	680 Port Hedland
Minimum consumption	207 Bridgetown	196 Denmark	191 Denmark	188 Denmark
Largest annual increase		Katanning (11%)	Busselton (13%)	Newman (14%)
Largest annual decrease		Harvey / Wokalup (-13%)	Derby (-8%)	York (-8%)

Residential properties consumed around 24% more water on average between 2001/02 and 2004/05. In 2004/05 this equated to around 73 additional litres of water per property per day. By comparison regional residential properties only consumed around 3% more over the same period. In 2004/05 average residential consumption in Demark was 50% of the average of all regional towns and consumption in Port Hedland was 181% of the average.

In 2004/05, the average residential property consumed 1,019 litres per day. Perth residential properties consumed an average of 759 litres a day while the average residential in country towns consumed 1,030 litres per day.

Table 6: Average annual non-residential consumption per connected property (kL)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Average all towns	1,333	773 (-42%)	787 (2%)	712 (-10%)
Average all towns less Perth	1,667	1,155 (-31%)	1,132 (-2%)	914 (-19%)
Perth	1,195	642	665	639
Maximum consumption	14,238 South Hedland	8,188	8,244	6,213
Minimum consumption	268 Bridgetown	230 Mandurah	216	182
Largest annual increase		Bridgetown (11%)	Pinjarra (22%)	Geraldton (13%)
Largest annual decrease		Jurien (-64%)	Bunbury (-48%)	Port Hedland (-55%)

Non-residential properties consumed around 47% less water on average between 2001/02 and 2004/05. In 2004/05 this equated to around 1701 litres less water per property per day.

The average non-residential property consumed around 1,950 litres per day in 2004/05. Perth non-residential properties consumed 1,751 litres per day, while regional non-residential properties consumed 2,504 litres per day.

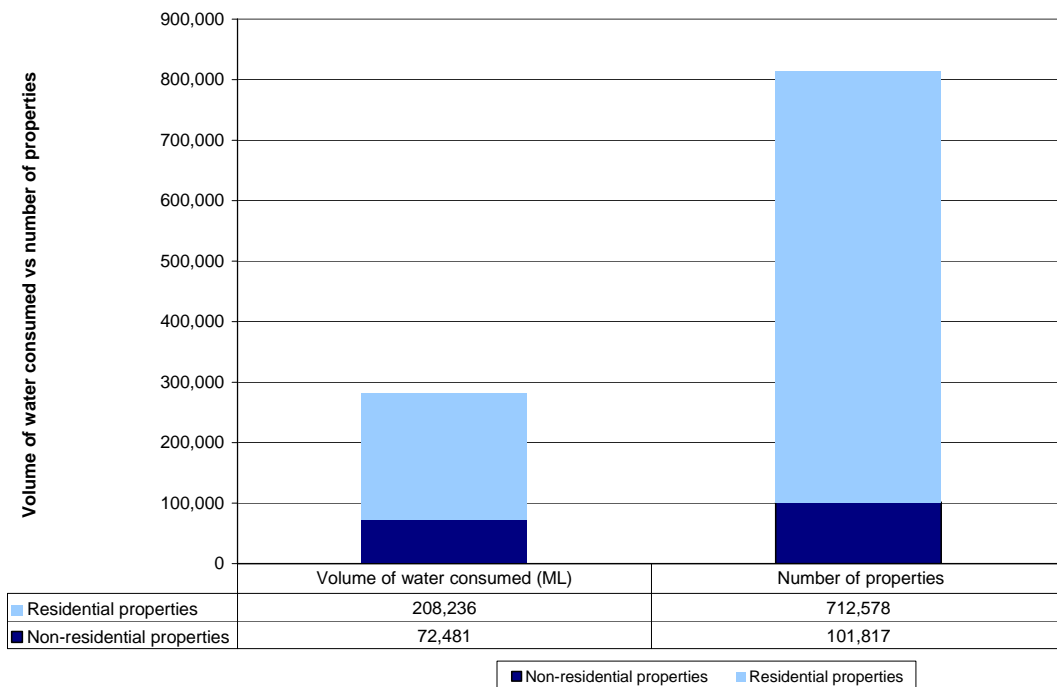
Figure 3: Water consumption of residential and non-residential connected properties (2004/05)

Table 7: Water extracted from impounding reservoir (ML)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	111,435	102,446 (-8%)	113,948 (11%)	125,530 (10%)
Total all towns less Perth	17,195	15,827 (-8%)	16,215 (2%)	21,396 (32%)
Average all towns	3,482	3,201 (-8%)	3,561 (11%)	3,923 (10%)
Average all towns less Perth	555	511 (-8%)	523 (2%)	690 (32%)
Perth	94,240	86,619 (-8%)	97,733 (13%)	104,134 (7%)

The volume of water extracted from impounding reservoirs increased 13% between 2001/02 and 2004/05. The largest cumulative increases over this period were reported at Katanning (81%) and Karratha (70%). For 2004/05 the greatest increases were observed at Katanning (18%) and Collie (11%), while Margaret River showed a decline of 65% and Manjimup a decline of 40%.

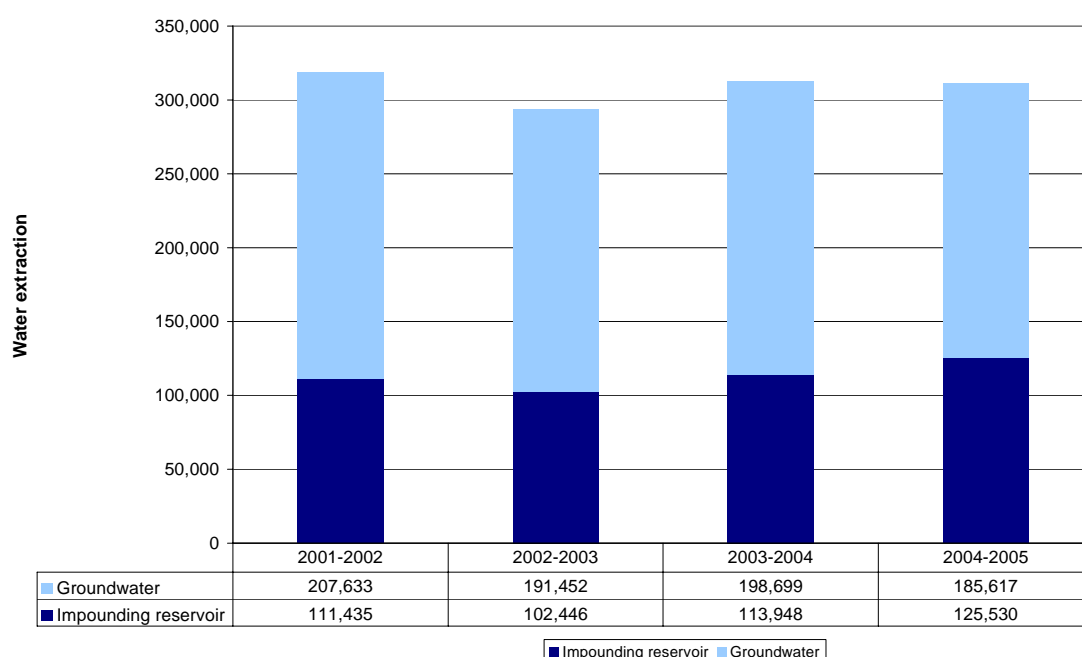
In 2004/05, the towns of Collie, Denmark, Kalgoorlie/Boulder, Katanning, Merredin, Narrogin, Northam and York sourced all of their drinking water supplies from impounding reservoirs.

Table 8: Water extracted by groundwater (ML)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	207,633	191,452 (-8%)	198,699 (4%)	185,617 (-7%)
Total all towns less Perth	53,661	54,178 (1%)	55,246 (2%)	49,668 (-10%)
Average all towns	6,489	5,983 (-8%)	6,209 (4%)	5,801 (-7%)
Average all towns less Perth	1,731	1,748 (1%)	1,782 (2%)	1,602 (-10%)
Perth	153,972	137,274 (-11%)	143,453 (5%)	135,949 (-5%)
Largest annual increase		South Hedland (20%)	Port Hedland (16%)	Albany (25%)
Largest annual decrease		Derby (-18%)	Mandurah (-10%)	Karratha (-90%)

Comparing Table 7 and Table 8 shows the majority of drinking water in Western Australia is extracted from groundwater. The proportion of water extracted from groundwater has decreased marginally over the reporting period, from 65% in 2001/02 to 59% in 2004/05.

In 2004/05, Albany, Australind/Eaton, Broome, Bunbury, Busselton, Carnarvon, Derby, Dongara Denison, Dunsborough/Yallingup, Esperance, Geraldton, Jurien, Karratha, Kununurra, Mandurah, Port Hedland and South Hedland sourced 100% of their drinking water from groundwater. Mandurah reduced its water extracted from groundwater due to water quality problems and has made up the shortfall by taking additional water from the Perth Integrated Water Supply Scheme.

Figure 4: Water extraction

4.3 Treatment

Water treatment information for the reporting periods is detailed below. Water treatment definitions have been altered as of March 2005. Changes are aligned to benchmark reporting for the Water Services Association of Australia (WSAA). For 2004/05 the definitions of 'treatment with disinfection and filtration' and 'treatment with disinfection and additional processes' have been consolidated into a single definition of 'further treatment' under the new reporting regime. Accordingly, separate data is not reported in 2004/05 for 'treatment with disinfection and filtration' and 'treatment with disinfection and additional processes.' The current definitions for water treatment are now 'treatment with disinfection only,' further treatment' and 'full treatment.'

Table 9: Total volume of water requiring treatment with disinfection only (ML)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	144,650	129,266 (-11%)	143,227 (11%)	139,013 (-3%)
Total all towns less Perth	39,691	33,272 (-17%)	33,050 (-1%)	34,714 (5%)
Perth	104,959	95,994 (-9%)	110,177 (15%)	104,299 (-5%)
Largest annual increase		South Hedland (20%)	Bridgetown (20%)	Katanning (18%)
Largest annual decrease		Mandurah, Pinjarra (-100%)	Manjimup (-34%)	Port Hedland (-41%)

There has been an overall reduction in the volume of water receiving treatment with disinfection only (-4%). Nearly all of the reduction is due to a fall in the supply to regional towns, which has fallen by 12% during the reporting period.

In total, 44% of all water in 2004/05 was treated with disinfection only. In the same year, 44% of water treated in Perth and 48% of water treated in regional towns received treatment with disinfection only.

Table 10: Number of treatment works with disinfection only

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	50	49 (-2%)	47 (-4%)	48 (2%)
Total all towns less Perth	26	27 (4%)	25 (-8%)	26 (4%)
Perth	24	22 (-8%)	22 (0%)	22 (0%)
Treatment works added	Perth (x3)	Bridgetown, Busselton, Margaret River	Nil	Australind/Eaton, Manjimup
Treatment works removed	Nil	Mandurah Manjimup Perth (x2)	Busselton, Jurien	Margaret River

Bridgetown, Carnarvon, Collie, Dongara Denison, Kalgoorlie/Boulder, Katanning, Kununurra, Manjimup, Margaret River, Merredin, Narrogin, Northam, Port Hedland, South Hedland and York treated all their water with disinfection only.

Table 11: Total volume of water requiring treatment with disinfection and filtration (ML)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	9,483	10,386 (10%)	11,475 (10%)	n/a
Maximum volume	6,483 Bunbury	6,408 (-12%)	6,847 (7%)	n/a
Largest annual increase		Bridgetown, Mandurah (100%)	Busselton (27%)	n/a
Largest annual decrease		Busselton (-3%)	Bridgetown (-100%)	n/a

Due to a change in reporting categories there is no data available for 2004/05. Between 2001/02 and 2003/04 the volume of water requiring treatment from disinfection and filtration increased by 21%. This was due mainly to increases in Busselton and Bunbury in 2003/04 and an increase in Mandurah in 2002/03. In 2003/04, Bunbury and Busselton were responsible for treating 90% of the total amount of water treated with disinfection and filtration.

Across the reporting period, Perth recorded no volume of water requiring treatment with disinfection and filtration.

Table 12: Number of treatment works with disinfection and filtration

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	9	11	10	n/a
Total all towns less Perth	9	11	10	n/a
Maximum amount (top 2 towns)	Bunbury 6 Busselton 3	Bunbury 6 Busselton 3	Bunbury 6 Busselton 3	n/a
Treatment works added	Nil	Bridgetown Mandurah	Nil	n/a
Treatment works removed	Esperance (x2)	Nil	Bridgetown	n/a

Due to a change in reporting categories there is no data available for 2004/05. In 2003/04, there were 9 water treatment works with disinfection and filtration. All of these works were located in Bunbury (6) and Busselton (3).

Table 13: Total volume of water requiring treatment with disinfection and additional processes (ML)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	24,531	40,366	46,638	n/a
Total all towns less Perth	15,367	17,266	17,452	n/a
Perth	9,164	23,100	29,186	n/a
Largest annual increase		152% Perth	26% Perth	n/a
Largest annual decrease		-100% Harvey/Wokalup	-12% Australind/Eaton	n/a

Due to a change in reporting categories there is no data available for 2004/05. The marked increase in the total volume of water treated with disinfection and additional processes between 2001/02 and 2003/04 was largely attributable to an increase in Perth (218%). The volume of water treated with disinfection and additional processes in Perth had overtaken that in regional towns by 2002/03.

Table 14: Number of disinfection and additional processes treatment works

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	12	9	12	n/a
Total all towns less Perth	8	6	8	n/a
Maximum amount	4 Perth	3 Perth	4 Perth	n/a
Treatment works added	Esperance (x2)	Nil	Manjimup, Perth	n/a
Treatment works removed	Dunsborough/ Yallingup Perth	Geraldton, Harvey/Wokalup, Perth	Nil	n/a

Due to a change in reporting categories there is no data available for 2004/05. The number of treatment works providing disinfection and additional processes has remained relatively steady. In 2003/04, Perth, Esperance, Karratha, Albany, Geraldton, Jurien and Manjimup treated water at such works.

Table 15: Total volume of water requiring further treatment (ML)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	35,117	50,752	58,158	50,980
Total all towns less Perth	28,687	27,652	28,972	21,738
Maximum volume	10,201 Geraldton	23,100 Perth	29,186 Perth	29,242 Perth
Largest increase		Albany (463%)	Busselton (27%)	Jurien (17%)
Largest decrease		Geraldton (-26%)	Bridgetown (-100%)	Albany/Manjimup (-100%)

The change in reporting categories means the 'water requiring further treatment category' from 2004/05 onwards includes water that was previously categorised as 'treatment with disinfection and filtration' and 'treatment with disinfection and additional processes'.

Between 2001/02 and 2004/05 an increase in the volume of water receiving further treatment was reported (45%), however, a decrease was recorded in regional towns (-24%). The increase corresponds with a decline in the volume of water treated with lower order treatment processes. The most significant increase over the period was recorded in Perth.

Table 16: Number of further treatment works

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	21	20	22	18
Total all towns less Perth	17	17	18	15
Maximum amount	6 Bunbury	6 Bunbury	6 Bunbury	6 Bunbury
Treatment works added		Bridgetown, Mandurah,	Perth, Manjimup, Jurien	Nil
Treatment works removed		Geraldton, Perth, Harvey/Wokalup,	Bridgetown	Albany, Karratha, Manjimup, Perth

The change in reporting categories means the 'water requiring further treatment category' from 2004/05 onwards includes water that was previously categorised as 'treatment with disinfection and filtration' and 'treatment with disinfection and additional processes'. The number of treatment works falling into these categories has been combined accordingly.

Bunbury, Busselton and Perth reported the greatest number of treatment works requiring further treatment over the reporting period. In 2004/05, Bunbury treated 33% of the total amount water receiving further treatment, and Busselton and Perth each treated 17%.

Table 17: Total volume of water requiring full treatment (ML)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	148,029	118,401	115,294	125,207
Total all towns less Perth	13,940	10,531	10,871	15,508
Perth	134,089	107,870	104,423	109,699
Largest annual increase		Dunsborough/ Yallingup (6%)	Albany (38%)	Karratha (100%)
Largest annual decrease		Albany (-80%)	Denmark (-10%)	Albany (-30%)

In 2004/05 Perth accounted for 88% of the total amount of water requiring full treatment. Australind/Eaton, Broome, Denmark, Derby and Dunsborough/Yallingup treated 100% of their water in full treatment plants.

The total volume of water requiring full treatment has decreased by 15% over the reporting period. Perth recorded a reduction of 18% and regional towns recorded a reduction of 11%. Albany recorded the largest reduction of all towns in both 2002/03 and 2004/05.

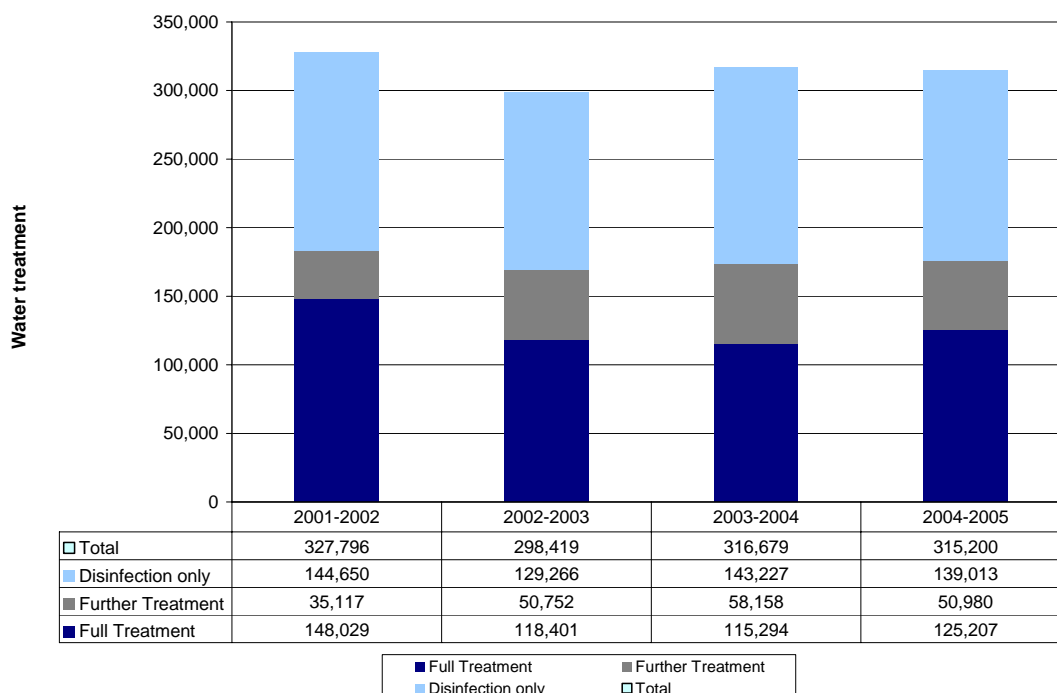
The 100% increase reported for Karratha in 2004/05 is attributable to the change in water treatment categories and the introduction of a new micro-filtration plant servicing the town.

Table 18: Number of full treatment works

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	14	14	13	15
Total all towns less Perth	8	8	7	8
Maximum amount	6 Perth	6 Perth	6 Perth	7 Perth
Treatment works added	Dunsborough/ Yallingup	Manjimup	Nil	Karratha, Perth
Treatment works removed	Nil	Albany	Manjimup	Nil

It is interesting to note that 7 of the 15 full treatment works service Perth but these works produce 7 times more treated water in total than the works servicing regional towns.

Figure 5: Water treatment



4.4 Non Revenue Water

Non revenue water is a useful statistic because it measures water that has been wasted or irretrievably lost, although not all non revenue water is wasted or lost. It includes unbilled metered consumption, unbilled un-metered consumption, unauthorised consumption, customer metering inaccuracies, leakage on mains, leakage and overflows at storages and up to the customer meter. Non revenue water is difficult to quantify due to a number of factors hence non revenue water should be interpreted with caution. It is a useful statistic for comparative reporting purposes.

Table 19: Volume of non revenue water (ML)

Data (annual variance)	2001/02	2002/03	2003/04	2004/05
Total all towns	24,905	36,662	30,710	31,301
Total all towns less Perth	9,354	8,800	8,463	9,655
Average all towns	778	1,145	959	978
Average all towns less Perth	301	283	273	311
Maximum volume	15,551 Perth	27,862 Perth	22,246 Perth	21,645 Perth
Minimum volume	-3 Merredin	-23 Merredin	-228 Kalgoorlie/ Boulder	-26 Carnarvon
Largest annual increase		Margaret River (324%)	Northam (215%)	Denmark (1,323%)
Largest annual decrease		York (-134%)	Merredin (-188%)	Kalgoorlie/ Boulder (-213%)

The total volume of non revenue water has fluctuated over the reporting period, increasing 47% in 2002/03 before decreasing 16% the following year in 2003/04. Over the reporting period there has been an increase in the total volume of non revenue water with Perth accounting for nearly all of the increase.

The volume of non revenue water as a percentage of the volume of water supplied has varied between 9% (2001/02) and 14% (2002/03) over the reporting period. Non revenue water was lower in 2001/02 as a result of the introduction of water restrictions in previous years.

The negative results reported at certain regional towns imply that more water was sold than had been delivered, which highlights the inherent problems associated with the calculation of non revenue water. The reported value for Perth is based on detailed calculations undertaken to determine an infrastructure leakage index – a national water industry measure of water system performance.

Table 20: Non revenue water per connected property (kL/property) and kilometre of water main (ML/km)

Data (annual variance)	Volume per connected property				Volume per kilometre of water main			
	2001/02	2002/03	2003/04	2004/05	2001/02	2002/03	2003/04	2004/05
Average all towns	34	47	39	38	1.5	2.2	1.9	1.8
Average all towns less Perth	64	57	53	58	2.0	1.8	1.8	1.9
Maximum	187 Kununurra	267 South Hedland	293 South Hedland	302 Katanning	5.8 Newman	7.2 South Hedland	7.9 Port Hedland	6.4 Katanning
Minimum	-2 Merredin	-14 Merredin	-17 Kalgoorlie-Boulder	-14 York	0.0 Merredin	-0.2 Merredin	-0.8 Kalgoorlie-Boulder	-0.2 York
Largest annual increase		Merredin (588%)	Northam (216%)	Denmark (1,269%)		Margaret River (305%)	Northam (215%)	Denmark (1,321%)
Largest annual decrease		York (-133%)	Merredin (-187%)	Kalgoorlie-Boulder (-213%)		York (-134%)	Merredin (-187%)	Kalgoorlie - Boulder (-212%)

In 2004/05, towns with the highest levels of non revenue water (based on a threshold of 100 kL per connected property and/or 4 ML per kilometre of mains per annum) included Derby, Karratha, Katanning, Kununurra, Newman, Port Hedland and South Hedland.

4.5 Infrastructure

Table 21: Infrastructure: Supply mains

Data (annual variance)	Length of supply mains				Length of supply mains per 1000 connected properties			
	2001/02	2002/03	2003/04	2004/05	2001/02	2002/03	2003/04	2004/05
Total all towns	16,405	16,694	16,633	17,078				
Total all towns less Perth	4,783	4,865	4,815	5,033				
Average all towns	513	522	520	534	22.6	21.5	20.9	21.0
Average all towns less Perth	154	157	155	162	32.8	31.3	30.0	30.4
Maximum	11,622 Perth	11,829 (2%)	11,818 (0%)	12,045 (2%)	88.3 Carnarvon	78.6 Merredin	78.3 Merredin	78.7 Merredin
Minimum	27 Jurien	28 (0%)	28 (0%)	30 (1%)	20.0 Perth	19.0 Perth	18.6 Perth	18.6 Perth
Largest annual increase		(6%) Bunbury	(18%) Harvey/ Wokalup	(9%) Australind/ Eaton	(19%) Pinjarra	(4%) Bunbury Water Board	(16%) Harvey/ Wokalup	(6%) Jurien
Largest annual decrease		(-1%) Kununurra	(-1%) Bunbury	(-1%) Bunbury	(-14%) Albany	(-22%) Jurien	(-10%) Bunbury	(-7%) Karratha

The length of supply mains has increased around 4% in length over the reporting period. The largest increase was reported for Harvey/Wokalup (19%). Perth experienced an increase of approximately 4% and regional towns an increase of approximately 5%. On average, supply main networks service fewer connected properties in regional towns than Perth. This reflects the denser property distribution in Perth compared to regional towns. Port Hedland was the only town to record a reduction in supply main length over the period, decreasing 0.1 km.

Table 22: Infrastructure: Dams and bores

Data (annual variance)	Dams				Bores			
	2001/02	2002/03	2003/04	2004/05	2001/02	2002/03	2003/04	2004/05
Total all towns	27	27	29	30	435	449	457	455
Total all towns less Perth	14	14	15	16	232	233	241	239
Average all towns	0.8	0.8	0.9	0.9	13.6	14.0	14.3	14.2
Average all towns less Perth	0.5	0.5	0.5	0.5	7.5	7.5	7.8	7.7
Perth	13	13	14	14	203	216	216	216
Largest annual increase		Harvey/ Wokalup (100%)	Nil	Denmark (100%)		Port Hedland (13%)	Carnarvon (26%)	Nil
Largest annual decrease		Nil	Nil	Albany (-25%)		Derby (-29%)	Bridgetown / Hester (-100%)	Bunbury (-7%)

The number of dams has increased over the reporting period. One dam was gained in both Perth and Harvey/Wokalup in 2002/03 and a further two dams were gained in Denmark in 2004/05. In Denmark, the dams had previously been included in the count of service reservoirs and tanks. Albany recorded the loss of one dam in 2004/05 with the removal of Limeburners Creek from the water supply system.

The total number of bores has also increased over the reporting period. However, from 2003/04 to 2004/05 a decrease occurred. This was due to the bores removed in Bunbury and Esperance in 2004/05. Bores removed from service over the reporting period included Bunbury (-1), Bridgetown/Hester (-2), Derby (-3) and Esperance (-1). A total of 14 bores were added in regional towns including 9 in Carnarvon, and 13 bores were added in Perth. A significant increase in the number of bores in Perth was recorded in 2002/03 as the result of introducing new groundwater sources in response to drought in that year.

Table 23: Service reservoirs and pump stations

Data (annual variance)	Service Reservoirs				Pump stations			
	2001/02	2002/03	2003/04	2004/05	2001/02	2002/03	2003/04	2004/05
Total all towns	262	273	257	256	227	230	241	254
Total all towns less Perth	165	170	156	154	129	134	145	155
Average all towns	8.2	8.5	8.0	8.0	7.1	7.2	7.5	7.9
Average all towns less Perth	5.3	5.5	5.0	5.0	4.2	4.3	4.7	5.0
Perth	97	103	101	102	98	96	96	99
Largest annual increase		Collie (100%)	Northam, Kununurra (50%)	Geraldton (8%)		Kalgoorlie/ Boulder (9%)	Geraldton (8%)	Margaret River (50%)
Largest annual decrease		Jurien (-50%)	Karratha (-80%)	Denmark (-18%)		Australind/ Eaton (-14%)	Australind / Eaton (-17%)	Denmark (-17%)

The number of service reservoirs declined between 2001/02 and 2004/05 predominantly due to the loss of 20 in Karratha over the reporting period., In 2004/05 reservoirs decreased by two in Denmark and one in both Albany and Port Hedland in 2004/05. In 2004/05 additional reservoirs were reported in Perth and Geraldton.

A steady increase in the number of pump stations was recorded over the reporting period. Over the reporting period 27 pump stations were added, including 12 in Bunbury (in 2003/04) and one in Perth. This represented an overall increase of 12% in pump stations.

Infrastructure for water supply services has generally expanded over the reporting period with 27 new pump stations, 20 new bores, 4 more dams and the length of supply mains increasing by 4%. The deployment of new infrastructure has been distributed across most of the regional towns and in Perth.

New dams and service reservoirs have been deployed in Collie, Denmark, Esperance, Geraldton, Harvey/Wokalup, Katanning, Kununurra, Margaret River, Narrogin, Northam and Perth. There have been significant increases in the length of supply mains in Dunsborough/Yallingup, Esperance, Geraldton, Harvey/Wokalup, Kalgoorlie/Boulder, Mandurah, Margaret River and Perth.

5 Performance Profile

5.1 Key Performance Indicators

Table 24: Number of leaks and bursts

Data (annual variance)	Number of leaks and bursts				Number of leaks and bursts per 100 kilometres of water mains			
	2001/02	2002/03	2003/04	2004/05	2001/02	2002/03	2003/04	2004/05
Total all towns	2,133	2,058	2,275	2,494				
Total all towns less Perth	631	493	670	828				
Average all towns	67	64	71	78	14.2	10.0	14.3	18.8
Average all towns less Perth	20	16	22	27	14.2	9.9	14.3	19.0
Maximum number	1,502 Perth	1,565 Perth	1,605 Perth	1,666 Perth	42 Merredin	25 Port Hedland	37 Bridgetown/ Hester	51 Port Hedland
Minimum number	3 Newman, South Hedland	1 Jurien	3 Jurien	4 Pinjarra	2 South Hedland	1 Karratha	5 Esperance	4 Pinjarra
Largest increase		Port Hedland (200%)	York (400%)	Broome (256%)		Port Hedland (200%)	York (400%)	Broome (252%)
Largest decrease		Jurien (-83%)	Denmark (-55%)	Merredin (-51%)		Jurien (-84%)	Denmark (-56%)	Merredin (-52%)

There has been an increase of 8.4% in the reported level of leaks and bursts. Due to its size, the Perth supply mains experienced the highest level of leaks and bursts but this is in proportion to the length of the water mains.

Measuring the level of leaks and bursts per 100km of water mains normalises the data to the length of water mains installed for each town. During the reporting period the average number of leaks and bursts per 100 kilometres of water mains recorded growth of 35%. Over the same period regional towns recorded a 35% increase.

During the reporting period Bunbury, Merredin, Pinjarra and Harvey/Wokalup had the lowest level of leaks and bursts per 100km of water mains and South Hedland, Port Hedland, Broome and Kununurra had the highest level.

Table 25: Number of water quality complaints

Data (annual variance)	Water quality complaints				Water quality complaints per 1000 properties			
	2001/02	2002/03	2003/04	2004/05	2001/02	2002/03	2003/04	2004/05
Total all towns	11,138	12,685	14,320	12,485				
Total all towns less Perth	1,133	1,120	1,557	1,258				
Average all towns	348	396	448	390	8	6	8	9
Average all towns less Perth	37	36	50	41	8	6	7	8
Maximum number	10,005 Perth	11,565 (16%)	12,763 (10%)	11,227 (-12%)	54 Bridgetown	20 Collie	33 Australind	57 Dongara Denison
Minimum number	0 Jurien	0 Merredin	1 Jurien, Newman	0 Newman	0 Jurien, Newman	0 Merredin, Newman	0 Carnarvon	0 Esperance, Newman
Largest increase		Denmark (453%)	Katanning (600%)	Dongara Denison (2,600%)		Dongara Denison (286%)	Denmark (429%)	Dongara Denison (2,566%)
Largest decrease		Katanning (-83%)	Duns/Yall ¹ (-80%)	Esperance (-75%)		Merredin (-100%)	Katanning (-83%)	Newman (-100%)

The level of water quality complaints have fluctuated during the reporting period, with a significant peak in 2003/04. Katanning recorded the largest increase in complaints in 2003/04 (600%) and Perth recorded the maximum number of complaints (12,763), which displayed a 10% increase from 2002/03.

The number of complaints reported in Perth remains consistent within expected annual variations, of between 10% and 20%. Approximately 75% of all water quality complaints relate to dirty water. The Perth region has commenced a water mains cleaning program. Early indications are that positive results are being achieved in assisting to reduce of the number of dirty water complaints from areas where the work has been carried out. The mains cleaning program is expected to result in an overall reduction in the number of dirty water complaints received in future years.

During the reporting period Derby (25, 18, 4 and 2 in 2001/02, 2002/03, 2003/04 and 2004/05, respectively), Busselton (4, 3, 2 and 1), Bridgetown (54, 10, 9 and 12) and Esperance (2, 3, 2 and 0) recorded the lowest level of water quality complaints per 1000 properties while Pinjarra, York, Katanning and Dongara Denison recorded the highest level.

¹ Duns/Yall refers to Dunsborough/Yallingup in the table.

Table 26: Number of confirmed service interruptions greater than one hour

Data (annual variance)	Number of service interruptions greater than one hour				Number of service interruptions greater than 1 hour per 1000 properties			
	2001/02	2002/03	2003/04	2004/05	2001/02	2002/03	2003/04	2004/05
Total all towns	72,578	103,833	99,641	90,501				
Total all towns less Perth	10,410	10,706	10,977	11,287				
Average all towns	2,268	3,245	3,113	2,828	89	106	79	107
Average all towns less Perth	336	345	354	364	88	104	77	106
Maximum number	62,168 Perth	93,127	88,664	79,214	309 Collie	1,459 Jurien	230 Dongara Denison	1,101 Harvey/ Wokalup
Minimum number	0 Dongara Denison	0 Duns/Yall ² Katanning	0 Duns/Yall, Margaret River	0 Duns/Yall, Manjimup, Kununurra	0 Dongara Denison	0 Duns/Yall, Katanning	0 Duns/Yall, Margaret River	0 Duns/Yall, Manjimup, Kununurra

Between 2001/02 and 2004/05, the number of confirmed service interruptions greater than one hour has increased in Perth (up 14%) and in regional towns (up 8.4%). The most notable increases included Busselton (4000%), York (1489%) and Newman (646%). The most notable decreases occurred in Broome (-100%), Jurien (-99%) and Pinjarra (-92%).

The number of service interruptions per 1,000 connected properties increased for Busselton, Albany, Australind/Eaton, Carnarvon, Dongara Denison, Geraldton, Harvey/Wokalup, Margaret River, Newman, and York. A downward trend was evident for Bunbury, Bridgetown/Hester, Broome, Collie, Denmark, Derby, Dunsborough/Yallingup, Esperance, Jurien, Kalgoorlie/Boulder, Karratha, Katanning, Kununurra, Mandurah, Manjimup, Merredin, Narrogin, Northam, Pinjarra, Port Hedland, and South Hedland between 2001/02 and 2004/05.

² Duns/Yall refers to Dunsborough/Yallingup in the table.

5.2 Performance Benchmarking

Perth is by far the largest town and consumed 79% of all water in 2004/05. It is useful to consider Perth separately from regional towns for the purposes of benchmarking. This approach is consistent with the different water use patterns observed in Perth compared to regional towns. Regional towns have some commonality of demographic and performance characteristics regarding water services. Accordingly, it is useful to provide information on the 'typical' town (excluding Perth) and compare the results to Perth.

Applying the principle of separating Perth from other regional towns shows the difference in scale of water service delivery. Perth services a population 133 times greater than the 'typical' WA town, with 122 times more connected properties and consuming 87 times more water (2004/05). Comparing the data for Perth and typical town reveals Perth consumers use much less water, on average, than a consumer in the typical town. Compared to the typical town, consumers in Perth are twice as likely to complain about the quality of the water supplied.

Table 27: Vital statistics for the 'typical' town less Perth (and Perth)

Data – Typical town (Perth)	2001/02	2002/03	2003/04	2004/05
Population served	11,070 (1,402,738)	11,218 (1,425,678)	11,554 (1,453,200)	11,157 (1,484,257)
Number of connected properties	4,702 (581,187)	5,009 (620,832)	5,178 (635,458)	5,335 (649,001)
Number of residential connected properties	4,181 (542,118)	4,252 (552,573)	4,363 (563,868)	4,465 (574,154)
Number of non-residential connected properties	521 (39,069)	756 (68,259)	816 (71,590)	870 (74,847)
Total annual water consumption – ML	2,308 (202,825)	2,318 (187,453)	2,440 (208,491)	2,378 (206,992)
Residential water consumption – ML	1,439 (156,138)	1,445 (156,138)	1,517 (160,876)	1,583 (159,158)
Non-residential water consumption – ML	868 (46,687)	873 (46,687)	923 (47,615)	795 (47,834)
Average weekly consumption – ML	44 (3,900)	45 (3,605)	47 (4,009)	45 (3,981)
Peak weekly consumption – ML	71 (6,004)	75 (5,836)	80 (6,297)	83 (6,275)
Volume of water consumed per head of population – kilolitres/person	208 (145)	207 (131)	21 (143)	213 (139)
Average annual consumption per residential property – kilolitres/property	344 (288)	340 (260)	348 (285)	355 (277)
Average annual consumption per non-residential property – kilolitres/property	1,667 (1,195)	1,155 (642)	1,132 (665)	914 (639)
Daily consumption per residential property – litres/property	943 (789)	931 (712)	953 (782)	971 (759)

Table 27 continued: Vital statistics for the 'typical' town less Perth (and Perth)

Data – Typical town (Perth)	2001/02	2002/03	2003/04	2004/05
Daily consumption per non-residential property – litres/property	4,568 (3,274)	3,163 (1,758)	3,102 (1,822)	2,504 (1,751)
Total volume of water extracted – ML	1,779 (158,316)	2,259 (223,893)	2,305 (241,186)	2,472 (240,083)
Water extracted from impounding reservoirs – ML	48 (4,344)	511 (86,619)	523 (97,733)	690 (104,134)
Water extracted from groundwater – ML	1,731 (153,972)	1,748 (137,274)	1,782 (143,453)	1,782 (135,949)
Non revenue water – ML	302 (15,551)	284 (27,862)	273 (22,247)	311 (21,646)
Non revenue water per connected property – kilolitres/property	64 (27)	57 (45)	53 (35)	58 (33)
Ratio of residential to non-residential properties	8 (14)	6 (8)	5 (8)	5 (8)
Non revenue water as a percent of volume consumed	13% (8%)	12% (15%)	11% (11%)	13% (10%)
Disinfection only water treatment – ML	1,280 (104,959)	1,073 (95,994)	1,066 (110,177)	1,120 (104,299)
Further treatment – ML	496 (9,164)	557 (23,100)	563 (29,186)	701 (29,242)
Full treatment – ML	450 (134,089)	340 (107,870)	351 (104,423)	500 (109,699)
Length of water mains – kilometres	154 (11,622)	157 (11,829)	155 (11,818)	162 (12,045)
Number of water quality complaints	37 (10,005)	36 (11,565)	50 (12,763)	41 (11,227)
Number of water quality complaints per 1000 properties	8 (17)	6 (19)	7 (20)	8 (17)
Number of confirmed service interruptions > 1 hour	336 (62,168)	345 (93,127)	354 (88,664)	364 (79,214)
Service interruptions > 1 hour per 1000 properties	88 (107)	104 (150)	77 (140)	106 (122)
Number of main leaks and bursts	20 (1,502)	16 (1,565)	22 (1,605)	27 (1,666)
Number of bores	7 (203)	8 (216)	8 (216)	8 (216)
Number of service reservoirs	5 (97)	5 (103)	5 (101)	5 (102)
Number of pump stations	4 (98)	4 (96)	5 (96)	5 (99)

PART B: WASTEWATER PERFORMANCE INFORMATION

**on 21 Major Western Australian Towns
(2002/03 to 2004/05)**

and 24 Small Suppliers (2003/04 to 2004/05)

6 Service Localities

The *Water Agencies (Powers) Act 1984* defines wastewater (or sewage) as “*liquid waste, whether domestic or otherwise, and includes faecal matter and urine. It includes the water used by the toilet, shower, sink and washing machine, and the liquid from some industrial manufacturing processes*”.

The Authority licences all wastewater service providers, including the Corporation, to provide wastewater services in many Western Australian towns. A condition of this licence is that, annually, the licensee must submit prescribed performance data relating to the wastewater services provided.

Part B of this report compares and evaluates the data submitted by the Corporation on wastewater services to 21 WA towns over three successive years (2002/03, 2003/04 and 2004/05) and the data submitted by 24 small wastewater providers over two successive years (2003/04 and 2004/05). Data relating to small sewerage suppliers is provided in the section entitled ‘Small Supplier Physical Profile’.

The towns serviced by the Corporation are:

- Albany
- Australind / Eaton
- Broome
- Bunbury/Dalyellup
- Busselton
- Collie
- Dunsborough / Yallingup
- Esperance
- Geraldton
- Jurien
- Karratha
- Katanning
- Kununurra
- Mandurah
- Manjimup
- Merredin
- Narrogin
- Newman
- Northam
- Perth
- South Hedland

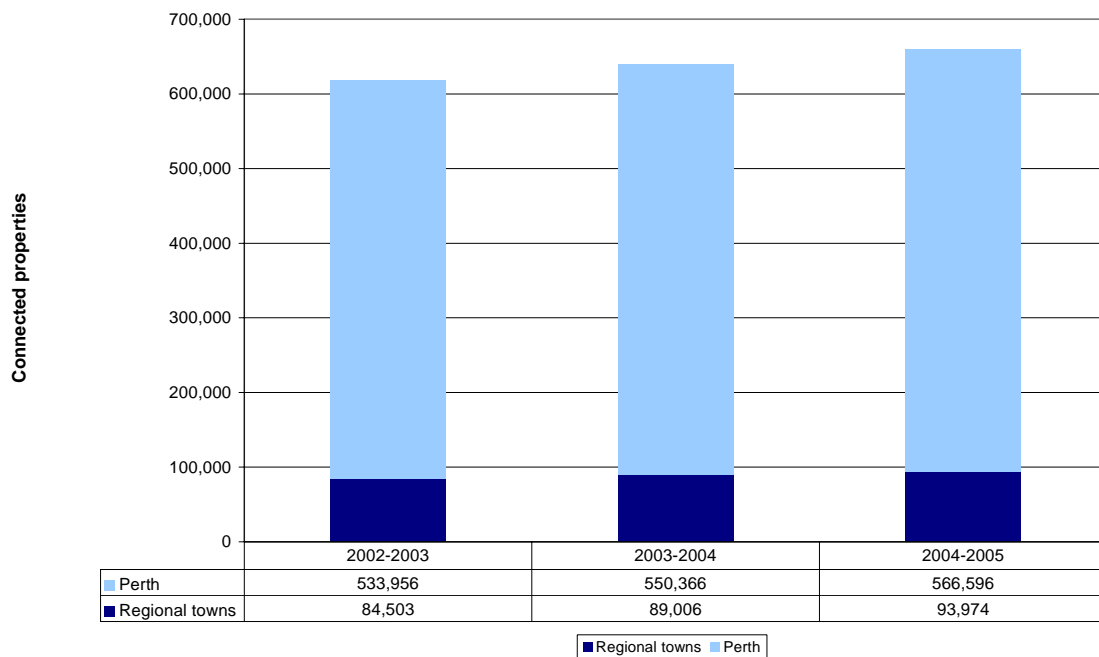
It is noted that, previously, data on 18 towns had been provided by the Corporation in regard to wastewater performance. However, for the period from 2002/03 to 2004/05, 21 towns have been considered. The three towns where wastewater performance information has previously not been provided are Jurien, Manjimup and Newman.

7 Physical Profile

7.1 Properties/Population Served

In 21 towns, the Corporation reported the total number of connected properties as 618,459 in 2002/03, 639,372 in 2003/04 and 660,570 in 2004/05. The number of connected properties in Perth was 533,956, 550,336 and 566,596 during the same periods. The average number of connected properties per town (excluding Perth) for the corresponding periods was 4,225, 4,450 and 4,699. The minimum average number of connected properties was recorded at Jurien throughout the reporting period (412, 433 and 455).

Figure 6: Connected properties



In situations where the actual population served per town is not known, population estimates used in this report are based on data sourced from the Australian Bureau of Statistics. The number of persons served with wastewater services in the 21 towns was 1,431,756 in 2002/03, 1,480,373 in 2003/04 and 1,548,071 in 2004/05, an increase of 8.1%. Perth accounted for 86% of connected properties in the 21 towns by 2005/06.

The largest (estimated) population for all towns provided with wastewater services was Perth (1,232,174 in 2002/03, 1,270,337 in 2003/04 and 1,341,649 in 2004/05), which experienced an increase of 9%. Excluding Perth, the total population served in the 20 towns was 190,993 in 2002/03, 201,487 in 2003/04 and 198,358 in 2004/05, an increase of 4%. Excluding Perth the largest population receiving wastewater services was Mandurah at 51,109 in 2004/05. The smallest (estimated) population was reported in Jurien at 380 in 2004/05.

7.2 Supply/Collection

The total annual water consumption in the 21 towns was 241,251 ML in 2002/03, 265,232 ML in 2003/04 and 263,820 ML in 2004/05, an increase of 9%. By comparison, the volume of wastewater collected from all towns totalled 117,777 ML for 2002/03, 124,643 ML for 2003/04 and 129,282 ML for 2004/05, an increase of 10%.

Perth's annual water consumption in 2004/05 was 206,992 ML. The total annual water consumption excluding Perth was 54,928 ML. Excluding Perth the average annual water consumption per town was 2,841 ML.

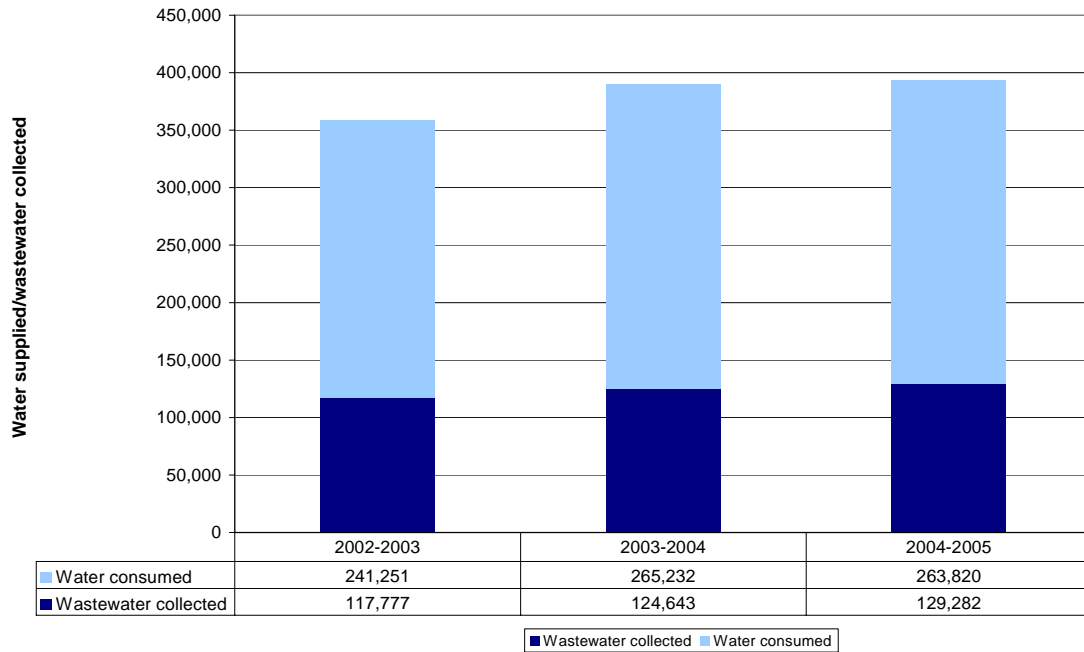
Perth collected 101,679 ML of wastewater in 2002/03, 107,315 ML in 2003/04 and 110,965 ML in 2004/05 respectively. Perth wastewater collection as a proportion of the total wastewater collection was consistent at 86% over the reporting period. The total volume of wastewater collected excluding Perth was 17,999 in 2004/05. The average volume of wastewater collected for all towns excluding Perth was 916 ML. The smallest annual volume of wastewater collected in 2004/05 was 58 ML at Jurien, which experienced a 100% increase between 2003/04 and 2004/05.

The highest volume of wastewater collected per connected property was recorded at Kununurra in 2004/05. By comparison Perth's wastewater volume collected per connected property was 196 ML. The smallest volume of wastewater collection per connected property was recorded at Jurien (127 ML). South Hedland recorded the sharpest decrease in collected volume (26% decrease) in 2004/05.

The largest volume of wastewater collected per head of population in 2004/05 was observed at Jurien and Kununurra. The lowest was reported at Northam and Mandurah.

The average volume of wastewater collected per head of population for all towns was 0.09 ML per person in 2004/05. The average volume, excluding Perth was 0.10 ML per person.

The maximum peak wet weather flow was reported for Perth in 2004/05, with 322 ML/day. The maximum annual variation in peak flow was reported at 329% at Jurien for this period. The minimum annual variation was -49% recorded at Dunsborough/Yallingup. The maximum average dry weather flow was also reported at Perth for this year at 306 ML/day. The maximum annual variation in dry weather flow was reported at 288% at Jurien for this period. The minimum annual variation was -20% recorded at Karratha.

Figure 7: Water supplied/wastewater collected

7.3 Treatment

The number of primary treatment works for all towns remained constant at 2 over the reporting period whereas the number of secondary treatment works totalled 19 after reaching a peak of 20 in 2002/03. It is noted that some treatment works provide a combination of primary and secondary treatment. Tertiary treatment works increased by 1 during the reporting period to a total of 11.

7.4 Disposal

Table 28 summarises the type and number of disposal options utilised during the reporting period.

Table 28: Number of discharge and outfalls

Types of disposal options in use	2002/03	2003/04	2004/05
Estuarine discharge points	1	1	1
Inland discharge points	12	12	14
Ocean outfalls	7	7	7
Total	20	20	22

Over the period the number of inland discharge points increased from 12 to 14, which increased the total from 20 to 22.

From 2002/03 to 2003/04, inland discharge points were reported at Australind/Eaton, Busselton, Collie, Dunsborough, Esperance, Katanning, Kununurra, Mandurah (3), Manjimup (2), Merredin and Narrogin. In 2004/05 there were 2 additional inland discharge points reported at Busselton and Dunsborough.

Seven ocean outfalls were observed across the period; 5 in Perth, 1 in Geraldton and 1 in Bunbury/Dalyellup. One estuarine discharge point was reported at Northam.

The ocean outfall on the Burrup Peninsula in the state's north-west is associated with the Corporation's seawater desalination plant, which provides water supply to industry on the peninsular and is used primarily to dispose of brine and other waste products.

Table 29: Percentage of sewer effluent reused or recycled

Town	2002/03	2003/04	2004/05
Albany	100%	100%	100%
Australind / Eaton	100%	100%	100%
Broome	63%	70%	65%
Bunbury / Dalyellup	0	0	0
Busselton	42%	17%	17%
Collie	0	0	0
Dunsborough	67%	66%	66%
Esperance	60%	45%	45%
Geraldton	24%	25%	23%
Jurien	0	0	0
Karratha	100%	100%	100%
Katanning	25%	29%	25%
Kununurra	0	0	0
Mandurah	0	2%	2%
Merredin	62%	66%	45%
Narrogin	35%	37%	38%
Newman	n/a	n/a	n/a
Northam	60%	55%	46%
Perth	4%	4%	4%
South Hedland	100%	100%	100%

Throughout the reporting period the level of effluent that was reused or recycled in Perth remained constant at 4%. The level of effluent reused or recycled for regional towns averaged 44% in 2004/05.

Biosolids

As detailed in Table 50, the total production of biosolids in regional towns (towns excluding Perth) was 20,876 tds of biosolids (2002/03), 13,917 tds of biosolids (2003/04) and 26,991 tds of biosolids (2004/05). Perth produced 15,708 tds of biosolids (2002/03), 19,292 tds of biosolids (2003/04) and 20,496 tds of biosolids (2004/05), an increase of 30%.

7.5 Infrastructure

Table 30: Volume (ML) of wastewater transported per pumping station

Data (annual variance)	2002/03	2003/04	2004/05
Average all towns	80	84 (5%)	85 (1%)
Average all towns less Perth	75	78 (4%)	79 (1%)
Maximum volume	184 Perth	193 (5%)	197 (2%)
Minimum volume	15 Jurien	15 (0%)	29 (93%)
Largest annual increase in volume transported		17% Bunbury/Dalyellup	100% Jurien
Largest annual decrease in volume transported		-11% Broome	-33% Northam

The number of pumping stations increased from 823 in 2002/03 to 844 in 2004/05. In 2004/05 there were 562 pumping stations in Perth and 282 pumping stations in other towns. The average number of pumping stations per town (excluding Perth) was 14 in 2004/05.

The total length of sewer mains rose from 11,774km (2002/03) to 12,479km (2004/05). The total excluding Perth rose from 2,286km (2002/03) to 2,447 (2004/05). The average length of sewer mains per regional town in 2004/05 was 122km. The minimum was recorded at Jurien over the entire reporting period.

Perth transports a greater volume of wastewater for every 100 km of sewerage mains than any other Western Australian town. Jurien is shown to report the minimum volume of wastewater per 100km of sewerage mains (214), however, showed the largest annual increase (75%) in 2004/05.

Table 31: Volume (ML) of wastewater transported per 100km of sewerage mains

Data (annual variance)	2002/03	2003/04	2004/05
Average all towns	753	777	777
Average all towns less Perth	737	761	761
Maximum volume	1,880 Perth	1,931 (3%)	1,435 (-26%)
Minimum volume	214 Jurien	207 (-3%)	363 (75%)
Largest annual increase in volume transported		15% Northam	75% Jurien
Largest annual decrease in volume transported		-18% Australind/Eaton	-26% South Hedland

Table 32: Number of kilometres (km) of sewerage mains per 1,000 connected properties

Data (annual variance)	2002/03	2003/04	2004/05	Variance
Average all towns	26.9	26.5	26.3	-4%
Average all towns less Perth	27.4	27.0	26.7	0%
Maximum volume	36.7 Geraldton	35.8 (-2%)	35.2 Jurien	5%
Minimum volume	17.4 Karratha	17.0 (0%)	16.2 (-6%)	-6%

The overall trend shows an increase in the number of connected properties per km of sewer mains, which suggests an increase in property distribution density. Towns reporting departure from overall State trends included Australind/Eaton, Busselton, Jurien, Katanning, Kununurra and Merredin.

Table 33: Number of pumping stations per 100 kilometres of sewerage mains

Data (annual variance)	2002/03	2003/04	2004/05
Average all towns	7.0	6.9	6.8
Average all towns less Perth	11.8	11.7	11.5
Maximum number	18 Australind, Esperance	17 Australind, Esperance, South Hedland	17 Esperance, South Hedland
Minimum number	4 Northam	4 Northam	5 Northam, Katanning

Perth recorded 5.83 pump stations per 100 kilometres of sewerage mains in 2002/03, 5.68 in 2003/04 and 5.60 in 2004/05. For most regional towns, the ratio of pumping stations to sewer mains remained relatively constant over the reporting period except Busselton, (16% decrease) and Northam (33% increase).

7.6 Service Quality

Service quality data comprises the following categories:

- Overflows-floodings: internal property – properties affected;
- Overflows-floodings: external property – properties affected;
- Overflows-floodings: environment – number of discharges;
- Odour complaints per 1,000 connected properties; and
- Odour complaints.

Overflows-Floodings: Internal Property – Properties Affected

The total number of internal properties affected by overflows-flooding, was 73 in 2004/05, a significant increase from 9 in 2003/04. Perth accounted for 73% of overflow-floodings affecting internal property (53 properties) in 2004/05. The largest increase in 2004/05 in affected internal properties was noticed in Albany (from 4 in 2003/04 to 10 in 2004/05).

Overflows-Floodings: External Property – Properties Affected

894 external properties were reported as affected by overflows-flooding in 2004/05, representing a 45% increase from 2003/04. 85% of affected external properties were in Perth (761) in 2004/05.

Table 34: Number of overflows-flooding – environment

Town	2002/03	2003/04	2004/05
Albany	0	2	4
Australind / Eaton	4	5	11
Broome	3	2	0
Bunbury / Dalyellup	9	8	8
Busselton	9	16	18
Collie	17	10	11
Dunsborough	0	1	8
Esperance	1	0	2
Geraldton	0	2	2
Jurien	0	0	0
Karratha	3	3	7
Katanning	8	1	2
Kununurra	1	2	0
Mandurah	3	4	11
Manjimup	4	2	3
Merredin	9	2	0
Narrogin	0	0	4
Newman	1	4	2
Northam	15	0	5
Perth	392	299	202
South Hedland	0	6	0
Total	479	369	300

Overflows-Floodings: Environment – Number of Discharges

The total number of discharges into the environment in 2004/05 was 300, a significant decrease over the reporting period. Perth recorded the most discharges (68%) with 202 incidents in 2004/05. The reduction in discharges is mostly due to the decline in the number of discharges in Perth. The average number of discharges per town per annum was 5 excluding Perth. In 2004/05, 5 towns (Broome, Jurien, Kununurra, Merredin and South Hedland) reported nil discharges.

Factors that have impacted on the reported results for all wastewater overflows and floodings relate to:

- Significant rainfall events; and
- New technology.

In March 2005 Cyclone Ingrid brought significant rainfall to Wyndham and the surrounding areas in the State's north-west. Additionally, storms in April, May and June 2005 brought significant rainfall to areas in the south and south-west of the State. In localities susceptible to water infiltration / intrusion, overflows may have resulted from pumping stations being unable to deal with the increased flows.

Table 35: Number of odour complaints

Town	2002/03	2003/04	2004/05
Albany	6	17	13
Australind / Eaton	8	7	7
Broome	3	6	4
Bunbury / Dalyellup	28	31	15
Busselton	32	14	12
Collie	3	1	0
Dunsborough	5	9	4
Esperance	0	0	0
Geraldton	6	19	5
Jurien	1	0	0
Karratha	5	8	13
Katanning	1	0	1
Kununurra	3	1	2
Mandurah	22	34	21
Manjimup	0	1	0
Merredin	2	0	1
Narrogin	1	1	0
Newman	0	0	0
Northam	0	2	1
Perth	849	631	552
South Hedland	1	5	5
Total	976	786	656

Odour Complaints

The number of odour complaints has decreased by 33% over the reporting period, largely due to a reduction in complaints in Perth (down 35%), which comprised 84% of all complaints in 2004/05, and also to significant reductions in Bunbury and Mandurah. Collie, Esperance, Jurien, Manjimup, Narrogin and Newman all reported nil complaints in 2004/05.

Wastewater odour complaints reported in Perth fell 12.5% between 2003/04 and 2004/05 as a result of odour control work at major metropolitan wastewater treatment plants and upgrades to several pump stations.

Table 36: Number of odour complaints per 1,000 connected properties

Data	2002/03	2003/04	2004/05
Total all towns	29	26	19
Total all towns less Perth	27	25	18
Average all towns	2	1	1
Average all towns less Perth	2	1	1
Maximum number	6 Busselton	4 Dunsborough	2 Karratha
Minimum number – nil	Esperance Merredin Newman Northam	Newman Merredin Katanning Esperance	Collie Esperance Jurien Manjimup Narrogin Newman
Largest increase		South Hedland (399%)	Kununurra (99%)
Largest decrease		Jurien Katanning Merredin (-100%)	Collie Manjimup Narrogin (-100%)
Perth	2	1	1

Odour Complaints per 1,000 Connected Properties

In 2004/05, Karratha, Katanning, Merredin and South Hedland recorded an increase in the number of odour complaints received per connected property while Perth, Northam, Narrogin, Manjimup, Mandurah, Geraldton, Dunsborough, Collie, Busselton, Bunbury/Dalyellup, Broome, Australind/Eaton and Albany recorded a reduction. Nil complaints were received at Collie, Esperance, Jurien, Manjimup, Narrogin and Newman in 2004/05. Over the reporting period the level of written complaints declined.

8 Town Profile

Perth is by far the largest town and collected 86% of all wastewater in 2004/05. It is useful to consider Perth separately from other towns for the purposes of benchmarking. This approach is consistent with the differing characteristics of wastewater production and treatment observed in Perth compared to regional towns. Accordingly, it is useful to provide information on the 'typical' town (excluding Perth) and compare the results to Perth.

In 2004/05 the Perth wastewater system serviced a population 115 times greater than the 'typical' town with 106 times more connected properties producing 105 times more wastewater. Table 53 summarises some key statistics for the 'typical' town in comparison to Perth. The comparison reveals the vastly different scale of wastewater services in Perth compared to other towns.

Table 37: Vital statistics for the 'typical' town and (Perth)

Data – Typical town (Perth)	2002/03	2003/04	2004/05
Population served	9,979 (1,232,74)	10,502 (1,270,337)	10,321 (1,341,649)
Number of connected properties	4,225 (533,956)	4,450 (550,366)	4,699 (566,596)
Average population per connected property	2.27 (2.31)	2.27 (2.31)	2.11 (2.37)
Total amount of water consumption – megalitres	2,690 (187,453)	2,837 (208,491)	2,841 (206,992)
Volume of wastewater collected – megalitres	805 (101,679)	866 (107,315)	916 (110,965)
Volume of wastewater collected per head of population – kilolitres	0.09 (0.08)	0.09 (0.08)	0.10 (0.08)
Peak wet weather flow – megalitres/day	3 (294)	3 (306)	3 (322)
Average dry weather flow – megalitres/day	2 (270)	2 (285)	2 (306)
Primary treatment works	0 (1)	0 (1)	0 (1)
Primary treatment only % of load – percentage	n/a (4%)	n/a (4%)	n/a (4%)
Secondary treatment works	1 (6)	1 (6)	1 (6)
Primary and secondary treatment only % of load – percentage	n/a (55%)	n/a (55%)	n/a (57%)
Tertiary treatment – number of works	0 (2)	1 (2)	1 (2)

Table 37: Vital statistics for the 'typical' town and (Perth)

Data – Typical town (Perth)	2002/03	2003/04	2004/05
Primary, secondary and tertiary treatment % of total load -	n/a (41%)	n/a (40%)	n/a (39%)
Number of ocean outfalls	0 (5)	0 (5)	0 (5)
Number of estuarine discharge points	0 (0)	0 (0)	0 (0)
Number of inland discharge points	1 (0)	1 (0)	1 (0)
Percentage of sewer effluent reused or recycled	47% (4%)	46% (4%)	44% (4%)
Total biosolids disposed or stockpiled – ttds	1,044 (15,708)	696 (19,292)	1,350 (20,496)
Percentage of biosolids reused or recycled	15 (98)	5 (93)	6 (96)
Number of pumping stations	14 (553)	14 (555)	14 (562)
Length of sewer mains – kilometres	114 (9,488)	118 (9,772)	122 (10,032)
Average volume wastewater transported per pumping station – megalitres	75 (184)	78 (193)	79 (197)
Average volume wastewater transported per 100 kilometres sewerage mains – megalitres	737 (1,072)	761 (1,098)	761 (1,106)
Length of sewerage mains per 1000 connected properties	27 (18)	27 (18)	27 (18)
Pump stations per 100 km sewerage mains	11 (6)	11 (6)	11 (6)
Overflows/Floodings: Internal property – properties affected	0 (47)	0 (51)	1 (53)
Overflows/Floodings: External property – properties affected	2 (620)	2 (569)	3 (761)
Overflows/Floodings: Environment – number of discharges	4 (392)	4 (299)	5 (202)
Odour complaints per 1000 connected properties	1 (2)	1 (1)	1 (1)
Odour complaints	6 (849)	8 (631)	5 (552)

9 Small Service Provider Physical Profile

The ERA licences various small suppliers of sewerage services in Western Australia, in addition to the Corporation and major suppliers. The small sewerage providers comprise a number of local government authorities, the Rottnest Island Authority and Hamersley Iron Pty Ltd (Dampier, Paraburdoo and Tom Price). It is noted that information for the Shire of Denmark was unavailable for the 2003/04 period and that data for the Shire of Williams, the Shire of Brookton and the Shire of Ravensthorpe was unavailable for the 2004/05 period.

The small suppliers are:

- City of Kalgoorlie / Boulder
- Hamersley Iron
- Rottnest Island Authority
- Shire of Brookton
- Shire of Coolgardie
- Shire of Dalwallinu
- Shire of Denmark
- Shire of Dowerin
- Shire of Dumbleyung
- Shire of East Pilbara
- Shire of Gnowangerup
- Shire of Goomalling
- Shire of Jerramungup
- Shire of Kent
- Shire of Koorda
- Shire of Lake Grace
- Shire of Moora
- Shire of Morawa
- Shire of Northampton
- Shire of Ravensthorpe
- Shire of Victoria Plains
- Shire of Wickepin
- Shire of Williams
- Shire of Yilgarn-Southern Cross
- Shire of Yilgarn-Marvel Loch

The Shire of Yilgarn operates two sewerage schemes, located at the Southern Cross townsite and Marvel Loch townsite respectively. While they are owned by the single shire, the two schemes are considered separately for the purposes of this report.

The Shire of Northampton provides a non-potable water supply to the town of Port Gregory, and, for completeness, has been included in the list of small suppliers considered in this report.

The total length of sewer mains for small suppliers was 378,987 metres in 2004/05 (excluding data for Brookton, Williams and Ravensthorpe, which was unavailable). The City of Kalgoorlie recorded the greatest length of sewer mains of any of the small suppliers in 2004/05 (221,600m).

Written customer complaints were only received at Kalgoorlie/Boulder, where a single complaint was reported in both 2003/04 and 2004/05. In 2003/04 the complaint was not resolved within 21 days, while in 2004/05 the complaint was resolved within 21 days. The total amount of odour complaints in 2004/05 was 2. Odour complaints were received at the City of Kalgoorlie / Boulder (1) and the Shire of Dowerin (1).

Sewerage overflows attributable to blockage or infrastructure failure totalled 84 in 2004/05, and the maximum was 68, reported at Kalgoorlie/Boulder. Internal sewerage overflows attributable to blockage or infrastructure failure totalled 5 in 2004/05, including 3 in Yilgarn-Southern Cross and 2 in Kalgoorlie/Boulder. This represented a significant decline from the previous period. The total number of sewerage blockages was 320 in 2004/05, a decline of 29% from 2003/04.

PART C: IRRIGATION PERFORMANCE

**on 4 Western Australian Irrigation Suppliers
(2003/04 to 2004/05)**

10 Suppliers

Part C of this report describes performance information on the suppliers of irrigation services in Western Australia. This is the first time that the Authority has reported on the performance of the irrigation suppliers. The data contained in this report is taken from the annual performance report provided to the Authority by the irrigation suppliers as required by their operating licences.

The suppliers providing irrigation services to regional Western Australia are:

- Gascoyne Water Cooperative Ltd;
- Preston Valley Irrigation Cooperative;
- Ord Irrigation Cooperative Ltd; and
- South West Irrigation Management Cooperative (Harvey Water).

11 Physical Profile

Table 38 details irrigation and non potable water supply connections.

Table 38: Number of irrigation connections and non-potable water supply connections

Data	Irrigation connections		Non-potable water supply connections	
	2003/04	2004/05	2003/04	2004/05
Gascoyne Water Cooperative	173	180	24	22
Ord Irrigation Cooperative	129	113	n/a	0
Preston Valley Irrigation	70	75	n/a	75
SWIMCO Harvey Water	1,306	1,301	347	344
Total	1,678	1,669	371	441

Note: 2003/04 data for non-potable water supply connections for Ord Irrigation Cooperative and Preston Valley Irrigation was unavailable.

The number of irrigation connections decreased, while the number of non-potable water supply connections increased in 2004/05.

Table 39: Quality of water (Mg/L TDS)³

Data	Quality of water	
	2003/04	2004/05
Gascoyne Water Cooperative	430	<1,000
Ord Irrigation Cooperative	n/a	<500
Preston Valley Irrigation	391	420
SWIMCO Harvey Water	Wellington >1,200 Harvey < 200 Waroona < 200	Wellington > 1,200 Harvey <200 Waroona <200

Note: 2003/04 data for Ord Irrigation Cooperative was unavailable.

It can be seen the quality of water varies quite markedly between the different irrigation operating areas, which reflects the local environmental conditions.

³ Total Dissolved Solids.

Table 40: Volume of irrigation water supplied and volume of non-potable water supplied (kL)

Data	Volume of irrigation water supplied		Volume of non-potable water supplied	
	2003/04	2004/05	2003/04	2004/05
Gascoyne Water Cooperative	4,619,837	3,514,902	n/a	20,498
Ord Irrigation Cooperative	134,005,000	157,097,000	0	0
Preston Valley Irrigation	1,079,000	1,100,940	0	0
SWIMCO Harvey Water	70,949,000	73,868,000	2,648,000	2,549,000
Total	210,652,837	235,580,842	2,648,000	2,569,498

The volume of water supplied as irrigation water increased while non-potable water decreased significantly in 2004/05.

Table 41: Written customer complaints

Data	Written customer complaints		Complaints resolved within 21 days	
	2003/04	2004/05	2003/04	2004/05
Gascoyne Water Cooperative	0	0	0	0
Ord Irrigation Cooperative	0	1	0	1
Preston Valley Irrigation	0	0	0	0
SWIMCO Harvey Water	7	3	7	3
Total	7	4	7	4

The majority of customer complaints were recorded by SWIMCO (91%). All customer complaints were resolved within 21 days.

Table 42: Number of faults

Data	Number of faults		Faults repaired within 2 business days	
	2003/04	2004/05	2003/04	2004/05
Gascoyne Water Cooperative	27	8	27	8
Ord Irrigation Cooperative	0	0	0	0
Preston Valley Irrigation	0	1	0	1
SWIMCO Harvey Water	14	17	14	17
Total	41	26	41	26

The number of faults reduced from 41 to 26 (-36%) over the reporting period and 100% of faults were repaired within 2 business days. The majority of faults were reported by Harvey Water and at Gascoyne Water Cooperative over the reporting period. Nil faults were reported at Ord Irrigation Cooperative.

Appendix 1: Industry and Statutory Definitions

Table 43: Definitions

<p>Complaint (Standards Australia defined) Any expression of dissatisfaction with a product or service, offered or provided.</p>
<p>Connected properties (Water Services Association of Australia (WSAA) defined) A water property is:</p> <ul style="list-style-type: none"> • Connected to the licensee’s water system; • The subject of billing for water supply (fixed and/or consumption); and • The owner and tenant are not separately counted as water properties. <p>This includes:</p> <ul style="list-style-type: none"> • A connected non-rateable property; and • A connected but not-metered property. <p>It does not include:</p> <ul style="list-style-type: none"> • A body corporate; or • A rated but unconnected property.
<p>Integrated water supply scheme (Corporation defined) The Integrated Water Supply Scheme (IWSS) serves communities from Harvey to Perth as well as the agricultural areas of the north-eastern and eastern wheat belt, and the Goldfields region as far as Norseman. Water for this scheme is supplied from a number of surface (dams) and groundwater (bores) sources which are connected by a system of trunk mains to achieve comprehensive integration.</p>
<p>Interruption (WSAA defined) An interruption commences when the utility is aware that ‘water is no longer available at the customer’s first cold water tap and ceases when ‘normal’ service is restored’ i.e. the last valve has been opened. A water supply interruption is any event causing a total loss of water supply due to any cause.</p> <p>Example: If a customer notifies that they are without water, the duration commences at the time of notification. If the utility is responding to a notification of a broken main, unless this notification also indicates a loss of supply, the duration commences once the shut off valve is closed (if repairs are not being done under pressure).</p> <p>An unplanned interruption is when the customer has not received at least 24 hours notification of the interruption, or when the duration of the interruption exceeds that which was originally notified. This should include all un-notified interruptions caused by third parties.</p>
<p>Non revenue water (IWS defined) The difference between the annual volumes of system input and billed authorised consumption. Non revenue water includes not only the real losses and apparent losses, but also the unbilled authorised consumption.</p>
<p>Water mains (WSAA defined) The total length of mains delivering potable water to customers. This includes all trunk and reticulation mains, expressed in kilometres. It does not include all lengths associated with mains to meter connections, or source works such as bore fields not associated with the water supply.</p>
<p>Water population (WSAA defined) Metropolitan population receiving a water service from the utility based on census data obtained from the Australian Bureau of Statistics.</p>
<p>Water pumping stations (WSAA defined) Total number of water pumping stations used to deliver potable water to the customer within the metropolitan area.</p>

<p>Water quality complaints (WSAA defined) Total number of complaints received by the utility that relate to the water quality. With respect to water quality, this is any complaint regarding discolouration, taste, odour, stained washing, illness, etc. It does not include complaints relating to service interruption, adequacy, restriction, pressure etc.</p>
<p>Water supplied (WSAA defined) Environmental flows – Estimated wholesale flow allocation to the environment, upstream of the master meter in megalitres for the reporting period.</p> <p><i>Bulk water sales</i> - Total external bulk water sales in megalitres for the reporting period.</p> <p><i>Residential</i> - Total metered and estimated non-metered consumption by domestic properties in megalitres for the reporting period.</p> <p><i>Commercial and industrial</i> - Total metered and estimated non-metered consumption by non-domestic properties in megalitres for the reporting period.</p> <p><i>Other</i> - Total estimated non-metered consumption by other properties/sources. This includes but may not be limited to an estimate of water used for fire fighting, mains flushing estimated losses due to customer meter errors, water taken by councils or contractors, and any other consumption due to operations.</p> <p><i>Total</i> - The water master meter volume and should equal the sum of environmental flows, bulk water sales, residential consumption, commercial and industrial consumption, and other consumption.</p>
<p>Water treatment plants (WSAA defined) For both ground-water and surface water, a water treatment plant is defined as an individual location that receives raw or partially treated water for treatment (excluding secondary disinfection) and ultimate delivery to customers.</p> <p><i>Disinfection only</i> - Total number of water treatment plants providing simple disinfection only treatment of potable water supply to the metropolitan area.</p> <p><i>Further treatment</i> - Total number of water treatment plants providing disinfection, filtration and additional processes treatment.</p> <p><i>Full treatment</i> - Total number of water treatment plants providing substantial treatment, in excess of further treatment works.</p>
<p>Biosolid re-use (WSAA defined) Percent of total dry tonnes of biosolids produced in the financial year that are either re-used or recycled (i.e. used as an input to another process).</p>
<p>Complaint (Standards Australia defined) Any expression of dissatisfaction with a product or service, offered or provided.</p>
<p>Connected properties (WSAA defined) A Sewerage property is:</p> <ul style="list-style-type: none"> • A water property which is connected to the sewerage system (hence is separately billed for sewerage services (fixed and/or consumption); and • Any other property which, at the end of the reporting period, is connected to the sewerage system and is separately billed for sewerage services (fixed and/or consumption). • A sewerage property, which is also a trade waste property, counts as one property. <p>Total properties connected is:</p> <p>'Domestic Properties' + 'Commercial (trade waste) Properties' + 'Commercial (non-trade Waste) Properties' + 'Industrial (trade waste) Properties' + 'Industrial (non-trade waste)' + 'Other Properties'</p>

<p>Primary treatment (WSAA defined) The first major treatment process in a wastewater treatment facility principally designed to remove a substantial amount of suspended matter but little or no colloidal or dissolved matter. Waste water treatment processes typically consisting of clarification with or without chemical treatment to accomplish solid-liquid separation.</p> <p><i>Typical Processes</i> - Primary sedimentation including where assisted by chemicals, grease removal, screens designed to remove a substantial amount of suspended matter.</p>
<p>Properties served Number of properties as reported by the Australian Bureau of Statistics census data.</p>
<p>Secondary treatment (WSAA defined) Typically, a level of treatment that is principally designed to remove approximately 85% of the BOD and influent suspended solids. May incidentally remove some nutrients and may convert ammonia to nitrate. Principally a biological wastewater treatment process. May include sand filtration, disinfection or a polishing step to lower suspended solids and bacterial levels.</p> <p><i>Typical Processes</i> – Activated-sludge processes, anaerobic plus aerobic processes, biological filters, lagoons (aerated, facultative, maturation or polishing).</p>
<p>Sewage (Water Agencies (Powers) Act 1984 defined) 'Sewage' has the same meaning as wastewater.</p>
<p>Sewer (Water Agencies (Powers) Act 1984 defined) 'Sewer' means a conduit through, on or under any street or other land, whether public or private, for the carriage of any sewage or water and includes any part of such a conduit but does not include a conduit that is a property sewer.</p>
<p>Sewage biosolids disposal (WSAA defined) Quantities of sewage biosolids (also known as 'Sludge') disposed of by different approaches. This has been divided into a number of forms of disposal.</p> <ul style="list-style-type: none"> • Agriculture: (includes disposal for use in landscaping and forestry or plantations); • Land Fill; • Land Rehabilitation; • Incineration; • To Sea; • Other.
<p>Tertiary treatment (WSAA defined) The treatment of wastewater beyond the secondary stage. Principally designed to remove nutrients such as phosphorus (typically <2mg/L) and/or nitrogen (typically <15mg/L). Removes a high percentage (typically >95%) of effluent suspended solids. May also target other contaminants of concern (e.g. toxicants and salt).</p> <p><i>Typical Processes</i> - Secondary activated or biological sludge where the sewage is subsequently passed through grass plots, sand filter. Microstrainers, tertiary nitrifying filters and all facilities for the removal of ammonia and phosphates. Sometimes known as 'polishing'.</p>

<p>Total sewer overflows per 100km main (WSAA defined) Total number of sewer overflows / total length of sewer mains / 100</p> <p><i>Total number of sewer overflows</i> - The total number of overflows in either wet or dry weather that the business is aware of and can attribute to its infrastructure in the financial year.</p> <p><i>Overflow</i> - Untreated sewage spills/discharges/escapes from the sewerage system (ie pumping stations, pipes, maintenance holes, or designed overflow structures) to the external environment that are caused by system faults originating in the system under the utility's responsibility. It does not include those caused by a blockage in the house branch connection, or a spill, discharge, overflow, or escape to a designed storage.</p> <p><i>House branch connection</i> (for this purpose) - In the wastewater system, the lateral or service branch line up to the point of connection to the house drain.</p>
<p>Wastewater (Water Agencies (Powers) Act 1984 defined) Wastewater means liquid waste, whether domestic or otherwise and includes faecal matter and urine.</p>
<p>Wastewater collected (WSAA defined) <i>Residential and non-trade waste</i> – Wastewater received from domestic and non-domestic, non-trade waste sources expressed in megalitres. This also includes any volumes collected due to stormwater and illegal connection inflow and infiltration to the wastewater system.</p> <p><i>Trade waste</i> - Total volume of estimated and metered trade waste collected and treated by the Utility, or on behalf of the utility expressed in megalitres.</p> <p><i>Total</i> - Total volume of sewage treated by the business, measured as treatment plant inflow and expressed in megalitres. Includes sewage treated by another business on the utilities behalf e.g. wholesaler. Where only treatment plant outflow is measured.</p>
<p>Wastewater mains and channels (WSAA defined) The total length of mains includes all trunk, pressure and reticulation mains, expressed in kilometres. It does not include all lengths associated with house branch connections or mains carrying treated effluent.</p>
<p>Wastewater population (Corporation defined) Wastewater population served - population estimates are based on a calculation of average household size. These factors are applied to the number of connected residential wastewater properties. Factors applied were based on Australian Bureau of Statistics (ABS) data for 2001 that the ABS found to be flawed and were subsequently withdrawn. However, as substitute data was not available and, for consistency, the same factors were used until 2004/05. For 2004/05, the ABS provided figures for the average household size for Perth and for the remainder of WA. Based on 2001 Census data, the Perth figure was relatively consistent with that applied previously (2.503 versus 2.520), but the figure for the remainder of WA is considerably lower (2.485 versus 2.650 previously used).</p> <p>For Perth, it was decided not to use the ABS figure provided, but rather base the calculation of average household size on the result of dividing the ABS estimated population for 2004/05 by the number of residential water properties. The resultant factor of 2.585 is considered to be more accurate than relying on projections from a 2001 base and was applied to Perth's connected residential wastewater properties.</p> <p>For the remainder of WA, as a consequence of applying the new ABS figure of 2.485, the population estimates are reported to have decreased for the majority of the localities. The prior year average household estimate of 2.650 now appears to be higher than would have been expected.</p>
<p>Wastewater pumping stations (WSAA defined) Total number of wastewater pumping stations providing wastewater services to the customer within the metropolitan area.</p>

Wastewater re-use (WSAA defined)

The percentage of sewage effluent that is reused or recycled. This is the percentage of all wastewater treated and actually used by either the water business itself or a business supplied by the water business. The parameters are the volume of influent to the plant and the volume of reclaimed water actually used again. The calculation is:

$$\text{Volume of reclaimed water used} / \text{volume of influent} \times 100$$

Two forms of effluent are considered. Effluent can be provided for agriculture, irrigation, industry, potable or other use external to the treatment process.

Wastewater treatment plants (WSAA defined)

Total number of wastewater treatment plants servicing the metropolitan area.

Appendix 2: Wastewater Performance Data

Tables 44 to 57 show wastewater performance data reported for each major town.

Table 44: Population served and number of connected properties

Town	Population served			Number of connected properties		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	No.	No.	No.
Albany	20,458	21,046	20,188	8,705	9,173	9,391
Australind/Eaton	8,668	9,217	9,555	3,356	3,585	3,994
Broome	8,414	9,010	8,735	4,276	4,540	4,657
Bunbury/Dalyellup	25,358	27,102	26,893	10,420	11,218	11,892
Busselton	12,224	13,298	13,218	5,429	5,887	6,240
Collie	6,588	6,657	6,285	2,695	2,699	2,715
Dunsborough	4,463	4,746	4,652	1,912	2,062	2,323
Esperance	6,447	6,710	6,466	2,723	2,829	3,086
Geraldton	13,070	13,926	14,217	5,342	5,758	6,337
Jurien	313	358	380	412	433	455
Karratha	10,648	10,968	10,531	4,824	4,930	5,385
Katanning	3,546	3,540	3,305	1,538	1,531	1,528
Kununurra	2,926	2,942	2,786	1,273	1,291	1,295
Mandurah	46,667	50,647	51,109	18,965	20,457	22,042
Manjimup	3,429	3,456	3,275	1,426	1,430	1,443
Merredin	2,820	2,838	2,644	1,270	1,271	1,265
Narrogin	4,198	4,237	3,978	1,799	1,810	1,812
Newman	5,160	5,093	4,789	2,069	2,042	2,049
Northam	6,190	6,230	5,857	2,620	2,606	2,612
Perth	1,232,174	1,270,337	1,341,649	533,956	550,366	566,596
South Hedland	7,995	8,016	7,559	3,449	3,454	3,453
Average	68,179	70,494	73,718	29,450	30,446	31,456
Average (excluding Perth)	9,979	10,502	10,321	4,225	4,450	4,699
Perth	1,232,174	1,270,337	1,341,649	533,956	550,366	566,596
Total (all towns)	1,431,756	1,480,373	1,548,071	618,459	639,372	660,570
Maximum (number/unit)	1,232,174	1,270,337	1,341,649	533,956	550,366	566,596
Minimum (number/unit)	313	358	380	412	433	455
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	199,582	210,036	206,422	84,503	89,006	93,974

Table 45: Volume of water consumed and volume of water collected

Town	Total annual water consumption			Volume of wastewater collected		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	No.	No.	No.
Albany	3,477	3,420	3,706	1,673	1,808	1,997
Australind / Eaton	2,655	2,902	3,023	689	638	745
Broome	3,790	3,763	3,960	1,056	1,101	1,142
Bunbury / Dalyellup	5,267	5,913	5,904	2,100	2,451	2,640
Busselton	3,387	3,623	3,302	1,009	1,089	1,158
Collie	1,167	1,199	1,165	598	628	618
Dunsborough	979	1,136	1,177	453	504	517
Esperance	1,581	1,496	1,642	588	600	627
Geraldton	6,970	7,373	7,704	1,077	1,079	1,155
Jurien	281	263	267	30	29	58
Karratha	3,320	3,287	3,510	863	933	1,021
Katanning	880	913	894	299	331	314
Kununurra	1,007	962	987	409	395	408
Mandurah	7,244	8,512	9,010	2,864	3,226	3,698
Manjimup	645	636	630	311	311	318
Merredin	528	537	562	155	179	189
Narrogin	772	798	832	311	322	380
Newman	1,164	1,150	1,269	n/a	n/a	n/a
Northam	1,116	1,133	1,102	391	449	399
Perth	187,453	208,491	206,992	101,679	107,315	110,965
South Hedland	7,566	7,726	6,183	1,222	1,255	933

Table 45 continued: Volume of water consumed and volume of water collected

Town	Total annual water consumption			Volume of wastewater collected		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	No.	No.	No.
Average	11,488	12,630	12,563	5,608	5,935	6,156
Average (excluding Perth)	2,690	2,837	2,841	805	866	916
Perth	187,453	208,491	206,992	101,679	107,315	110,965
Total (all towns)	241,251	265,232	263,820	117,777	124,643	129,282
Maximum (number/unit)	187,453	208,491	206,992	101,679	107,315	110,965
Minimum (number/unit)	281	263	267	30	29	58
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	53,798	56,740	56,828	16,098	17,328	18,317

Table 46: Peak wet weather flow and average dry weather flow

Town	Peak wet weather flow			Average dry weather flow		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	ML/day	ML/day	ML/day	ML/day	ML/day	ML/day
Albany	6	6	5	4	5	5
Australind / Eaton	2	2	2	2	2	2
Broome	3	3	4	3	3	3
Bunbury / Dalyellup	7	8	8	6	6	7
Busselton	3	3	3	3	3	3
Collie	2	3	2	1	1	1
Dunsborough	1	3	1	1	2	2
Esperance	3	3	2	1	2	2
Geraldton	3	4	4	3	3	4
Jurien	0	0	1	0	0	0
Karratha	3	3	2	2	2	1
Katanning	1	1	2	0	1	1
Kununurra	1	1	1	1	1	1
Mandurah	8	10	9	8	8	10
Manjimup	1	1	1	1	1	1
Merredin	1	1	1	0	0	0
Narrogin	1	2	2	1	1	1
Newman	n/a	n/a	1	n/a	n/a	1
Northam	1	2	2	1	1	1
Perth	294	306	322	270	285	306
South Hedland	4	4	4	3	3	3

Table 47: Peak wet weather flow and average dry weather flow

Town	Peak wet weather flow			Average dry weather flow		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	ML/day	ML/day	ML/day	ML/day	ML/day	ML/day
Average	16	17	18	15	16	17
Average (excluding Perth)	3	3	3	2	2	2
Perth	294	306	322	270	285	306
Total (all towns)	345	364	378	311	330	355
Maximum (number/unit)	294	306	322	270	285	306
Minimum (number/unit)	0	0	1	0	0	0
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	52	58	56	41	45	49

Table 48: Water consumed which was ultimately collected and wastewater collected per property served

Town	Percent of water consumed which was ultimately collected as wastewater			Volume of wastewater collected per property served		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	%	%	%	%	%	%
Albany	48	53	54	192	197	213
Australind / Eaton	26	22	25	205	178	187
Broome	28	29	29	247	243	245
Bunbury / Dalyellup	40	41	45	202	218	222
Busselton	30	30	35	186	185	186
Collie	51	52	53	222	233	228
Dunsborough	46	44	44	237	244	223
Esperance	37	40	38	216	212	203
Geraldton	15	15	15	202	187	182
Jurien	11	11	22	73	67	127
Karratha	26	28	29	179	189	190
Katanning	34	36	35	194	216	205
Kununurra	41	41	41	321	306	315
Mandurah	40	38	41	151	158	168
Manjimup	48	49	50	218	217	220
Merredin	29	33	34	122	141	149
Narrogin	40	40	46	173	178	210
Newman	0	0	0	0	0	0
Northam	35	40	36	149	172	153
Perth	54	51	54	190	195	196
South Hedland	16	16	15	354	363	270

Table 48 continued: Water consumed which was ultimately collected and wastewater collected per property served

Town	Percent of water consumed which was ultimately collected as wastewater			Volume of wastewater collected per property served		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	%	%	%	%	%	%
Average	33	34	35	192	195	195
Average (excluding Perth)	32	33	34	192	195	195
Perth	54	51	54	190	195	196
Total (all towns)	n/a	n/a	n/a	n/a	n/a	n/a
Maximum (number/unit)	54	53	54	354	363	315
Minimum (number/unit)	11	11	15	73	67	127
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	n/a	n/a	n/a	n/a	n/a	n/a

Table 49: Disposal options

Town	Number of ocean outfalls			Number of estuarine discharge points			Number of inland discharge points		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	No.	No.	No.	No.	No.	No.
Albany	0	0	0	0	0	0	0	0	0
Australind / Eaton	0	0	0	0	0	0	1	1	1
Broome	0	0	0	0	0	0	0	0	0
Bunbury / Dalyellup	1	1	1	0	0	0	0	0	0
Busselton	0	0	0	0	0	0	1	1	2
Collie	0	0	0	0	0	0	1	1	1
Dunsborough	0	0	0	0	0	0	1	1	2
Esperance	0	0	0	0	0	0	1	1	1
Geraldton	1	1	1	0	0	0	0	0	0
Jurien	0	0	0	0	0	0	0	0	0
Karratha	0	0	0	0	0	0	0	0	0
Katanning	0	0	0	0	0	0	1	1	1
Kununurra	0	0	0	0	0	0	1	1	1
Mandurah	0	0	0	0	0	0	3	3	3
Manjimup	0	0	0	0	0	0	2	1	2
Merredin	0	0	0	0	0	0	1	1	1
Narrogin	0	0	0	0	0	0	1	1	1
Newman	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Northam	0	0	0	1	1	1	0	0	0
Perth	5	5	5	0	0	0	0	0	0
South Hedland	0	0	0	0	0	0	0	0	0

Table 49 continued: Disposal options

Town	Number of ocean outfalls			Number of estuarine discharge points			Number of inland discharge points		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	No.	No.	No.	No.	No.	No.
Average	0.3	0.3	0.3	0.0	0.0	0.0	0.7	0.6	0.8
Average (excluding Perth)	0.1	0.1	0.1	0.1	0.1	0.1	0.7	0.7	0.8
Perth	5	5	5	0.0	0.0	0.0	0.0	0.0	0.0
Total (all towns)	7	7	7	1	1	1	13	13	16
Maximum (number/unit)	5	5	5	1	1	1	3	3	3
Minimum (number/unit)	0	0	0	0	0	0	0	0	0
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	2	2	2	1	1	1	13	13	16

Table 50: Biosolids disposed or stockpiled and biosolids reused or recycled

Town	Total biosolids disposed or stockpiled			% of biosolids reused or recycled		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	ttds	ttds	ttds	%	%	%
Albany	0	1,000	0	0	25	40
Australind / Eaton	3,306	1,411	1,285	0	0	0
Broome	0	0	3,800	0	0	0
Bunbury / Dalyellup	3,073	800	2,010	50	80	70
Busselton	2,760	0	850	0	0	0
Collie	1,137	1,231	884	0	0	0
Dunsborough	0	0	0	0	0	0
Esperance	3,000	3,000	1,000	0	0	0
Geraldton	0	0	0	0	0	0
Jurien	0	0	0	0	0	0
Karratha	0	75	0	0	0	0
Katanning	0	470	0	0	0	0
Kununurra	3,000	0	0	50	0	0
Mandurah	792	0	8,094	100	0	0
Manjimup	2,808	390	468	100	0	0
Merredin	0	0	6,000	0	0	0
Narrogin	0	400	0	0	0	0
Newman	n/a	n/a	n/a	n/a	n/a	n/a
Northam	1,000	3,700	2,600	0	0	0
Perth	15,708	19,292	20,496	98	93	96
South Hedland	0	1,440	0	0	0	0

Table 50 continued: Biosolids disposed or stockpiled and biosolids reused or recycled

Town	Total biosolids disposed or stockpiled			% of biosolids reused or recycled		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	ttds	ttds	ttds	%	%	%
Average	1,742	1,581	2,261	19	9	10
Average (excluding Perth)	1,044	696	1,350	15	5	6
Perth	15,708	19,292	20,496	98	93	96
Total (all towns)	36,584	33,209	47,487	398	198	206
Maximum (number/unit)	15,708	19,292	20,496	100	93	96
Minimum (number/unit)	0	0	0	0	0	0
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	20,876	13,917	26,991	300	105	110

Table 51: Pumping stations and sewer mains

Town	Number of pumping stations			Length of sewer mains		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	Km.	Km.	Km.
Albany	25	26	26	257	260	261
Australind / Eaton	18	19	20	102	115	130
Broome	6	7	7	87	90	92
Bunbury / Dalyellup	39	39	39	269	273	280
Busselton	19	18	18	165	171	186
Collie	11	11	11	81	81	81
Dunsborough	10	10	10	70	72	75
Esperance	14	14	14	80	81	81
Geraldton	23	24	24	196	206	210
Jurien	2	2	2	14	14	16
Karratha	7	7	7	84	84	87
Katanning	2	2	2	42	42	42
Kununurra	5	5	5	31	31	33
Mandurah	62	66	69	506	545	571
Manjimup	4	4	4	40	40	40
Merredin	4	4	4	37	37	37
Narrogin	2	2	2	44	44	44
Newman	3	3	3	39	39	39
Northam	3	3	4	77	77	77
Perth	553	555	562	9,488	9,772	10,032
South Hedland	11	11	11	65	65	65

Table 51 continued: Pumping stations and sewer mains

Town	Number of pumping stations			Length of sewer mains		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	Km.	Km.	Km.
Average	39	40	40	561	578	594
Average (excluding Perth)	14	14	14	114	118	122
Perth	553	555	562	9,488	9,772	10,032
Total (all towns)	823	832	844	11,774	12,139	12,479
Maximum (number/unit)	553	555	562	9,488	9,772	10,032
Minimum (number/unit)	2	2	2	14	14	16
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	270	277	282	2,286	2,367	2,447

Table 52: Volume of wastewater per pumping station and volume of wastewater per 100km of sewerage mains

Town	Average volume wastewater transported per pumping station			Average volume wastewater transported per 100kms sewerage mains		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	ML	ML	ML	ML	ML	ML
Albany	67	70	77	651	695	765
Australind / Eaton	38	34	37	675	555	573
Broome	176	157	163	1,214	1,223	1,241
Bunbury / Dalyellup	54	63	68	781	898	943
Busselton	53	61	64	612	637	623
Collie	54	57	56	738	775	763
Dunsborough	45	50	52	647	700	689
Esperance	42	43	45	735	741	774
Geraldton	47	45	48	549	524	550
Jurien	15	15	29	214	207	363
Karratha	123	133	146	1,027	1,111	1,174
Katanning	150	166	157	712	788	748
Kununurra	82	79	82	1,319	1,274	1,236
Mandurah	46	49	54	566	592	648
Manjimup	78	78	80	778	778	795
Merredin	39	45	47	419	484	511
Narrogin	156	161	190	707	732	864
Newman	n/a	n/a	n/a	n/a	n/a	n/a
Northam	130	150	100	508	583	518
Perth	184	193	197	1,072	1,098	1,106
South Hedland	111	114	85	1,880	1,931	1,435

Table 52 continued: Volume of wastewater per pumping station and volume of wastewater per 100km of sewerage mains

Town	Average volume wastewater transported per pumping station			Average volume wastewater transported per 100kms sewerage mains		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	ML	ML	ML	ML	ML	ML
Average	80	84	85	753	777	777
Average (excluding Perth)	75	78	79	737	761	761
Perth	184	193	197	1,072	1,098	1,106
Total (all towns)	1,690	1,761	1,776	15,804	16,325	16,318
Maximum (number/unit)	184	193	197	1,880	1,931	1,435
Minimum (number/unit)	15	15	29	214	207	363
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	1,506	1,567	1,578	14,732	15,227	15,212

Table 53: Overflows / floodings

Town	Overflows / Floodings: Internal property – properties affected			Overflows / Floodings: External Property – properties affected			Overflows / Floodings: Environment – no. of discharges		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	No.	No.	No.	No.	No.	No.
Albany	0	4	10	2	2	20	0	2	4
Australind / Eaton	0	0	0	1	1	4	4	5	11
Broome	0	0	0	10	0	2	3	2	0
Bunbury / Dalyellup	1	1	3	3	7	11	9	8	8
Busselton	0	0	0	0	1	6	9	16	18
Collie	0	0	0	4	5	16	17	10	11
Dunsborough	0	0	0	0	0	2	0	1	8
Esperance	0	0	1	0	0	3	1	0	2
Geraldton	0	0	1	0	0	1	0	2	2
Jurien	0	0	0	0	0	0	0	0	0
Karratha	0	0	0	2	1	8	3	3	7
Katanning	0	0	2	2	3	11	8	1	2
Kununurra	0	0	0	0	2	0	1	2	0
Mandurah	0	3	3	4	7	9	3	4	11
Manjimup	0	0	0	0	0	3	4	2	3
Merredin	0	0	0	1	1	2	9	2	0
Narrogin	0	0	0	1	5	23	0	0	4
Newman	0	0	1	1	9	6	1	4	2
Northam	4	0	0	11	3	13	15	0	5
Perth	47	51	53	620	569	761	392	299	202
South Hedland	0	0	0	0	8	2	0	6	0

Table 53 continued: Overflows / floodings

Town	Overflows / Floodings: Internal property – properties affected			Overflows / Floodings: External Property – properties affected			Overflows / Floodings: Environment – no. of discharges		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	No.	No.	No.	No.	No.	No.
Average	2	3	4	32	30	43	23	18	14
Average (excluding Perth)	0	0	1	2	3	7	4	4	5
Perth	47	51	53	620	569	761	392	299	202
Total (all towns)	52	59	74	662	624	903	479	369	300
Maximum (number/unit)	47	51	53	569	761	569	392	299	202
Minimum (number/unit)	0	0	0	0	0	0	0	0	0
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	5	8	21	42	55	142	87	70	98

Table 54: Odour complaints

Town	Odour Complaints			Odour Complaints per 1000 connected properties		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	No.	No.	No.
Albany	6	17	13	1	2	1
Australind / Eaton	8	7	7	2	2	2
Broome	3	6	4	1	1	1
Bunbury / Dalyellup	28	31	15	3	3	1
Busselton	32	14	12	6	2	2
Collie	3	1	0	1	0	0
Dunsborough	5	9	4	3	4	2
Esperance	0	0	0	0	0	0
Geraldton	6	19	5	1	3	1
Jurien	1	0	0	2	0	0
Karratha	5	8	13	1	2	2
Katanning	1	0	1	1	0	1
Kununurra	3	1	2	2	1	2
Mandurah	22	34	21	1	2	1
Manjimup	0	1	0	0	1	0
Merredin	2	0	1	2	0	1
Narrogin	1	1	0	1	1	0
Newman	0	0	0	0	0	0
Northam	0	2	1	0	1	0
Perth	849	631	552	2	1	1
South Hedland	1	5	5	0	1	1
Average	46	37	31	1	1	1
Average (excluding Perth)	6	8	5	1	1	1
Perth	849	631	552	2	1	1
Total (all towns)	976	787	656	29	27	19
Maximum (number/unit)	849	631	552	6	4	2
Minimum (number/unit)	0	0	0	0	0	0
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	127	156	104	27	26	18

Table 55: Primary treatment

Town	Primary treatment – number of works			Primary only treatment - % of total load		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	%	%	%
Albany	0	0	0	0	0	0
Australind / Eaton	0	0	0	0	0	0
Broome	0	0	0	0	0	0
Bunbury / Dalyellup	0	0	0	0	0	0
Busselton	0	0	0	0	0	0
Collie	0	0	0	0	0	0
Dunsborough	0	0	0	0	0	0
Esperance	0	0	0	0	0	0
Geraldton	0	0	0	0	0	0
Jurien	0	0	0	0	0	0
Karratha	0	0	0	0	0	0
Katanning	0	0	0	0	0	0
Kununurra	0	0	0	0	0	0
Mandurah	0	0	0	0	0	0
Manjimup	0	0	0	0	0	0
Merredin	1	1	1	100	100	100
Narrogin	0	0	0	0	0	0
Newman	n/a	n/a	n/a	n/a	n/a	n/a
Northam	0	0	0	0	0	0
Perth	1	1	1	4	4	4
South Hedland	0	0	0	0	0	0
Average	0.1	0.1	0.1	n/a	n/a	n/a
Average (excluding Perth)	0.1	0.1	0.1	n/a	n/a	n/a
Perth	1	1	1	n/a	n/a	n/a
Total (all towns)	2	2	2	n/a	n/a	n/a
Maximum (number/unit)	1	1	1	n/a	n/a	n/a
Minimum (number/unit)	0	0	0	n/a	n/a	n/a
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	1	1	1	n/a	n/a	n/a

Table 56: Secondary treatment

Town	Secondary treatment – number of works			Primary & secondary only treatment - % of total load		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	%	%	%
Albany	0	0	0	0	0	0
Australind / Eaton	0	0	0	0	0	0
Broome	1	1	1	100	100	100
Bunbury / Dalyellup	0	0	0	0	25	25
Busselton	0	0	0	0	0	0
Collie	0	0	0	0	0	0
Dunsborough	0	0	0	0	0	0
Esperance	1	1	1	100	100	100
Geraldton	2	2	2	100	100	100
Jurien	1	1	1	100	100	100
Karratha	3	3	3	100	100	100
Katanning	1	1	1	100	100	100
Kununurra	1	1	1	100	100	100
Mandurah	1	0	0	6	0	0
Manjimup	0	0	0	0	0	0
Merredin	0	0	0	0	0	0
Narrogin	1	1	1	100	100	100
Newman	n/a	n/a	n/a	n/a	n/a	n/a
Northam	1	1	1	100	100	100
Perth	6	6	6	55.4	55.46	56.6
South Hedland	1	1	1	100	100	100
Average	1	0.9	0.9	n/a	n/a	n/a
Average (excluding Perth)	0.7	0.7	0.7	n/a	n/a	n/a
Perth	6	6	6	n/a	n/a	n/a
Total (all towns)	20	19	19	n/a	n/a	n/a
Maximum (number/unit)	6	6	6	n/a	n/a	n/a
Minimum (number/unit)	0	0	0	n/a	n/a	n/a
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	14	13	13	n/a	n/a	n/a

Table 57: Tertiary treatment

Town	Tertiary treatment – number of works			Primary, secondary & tertiary treatment - % of total load		
	2002/03	2003/04	2004/05	2002/03	2003/04	2004/05
Units	No.	No.	No.	%	%	%
Albany	1	1	1	100	100	100
Australind / Eaton	1	1	1	100	100	100
Broome	0	0	0	0	0	0
Bunbury / Dalyellup	1	1	1	100	75	75
Busselton	1	1	1	100	100	100
Collie	1	1	1	100	100	100
Dunsborough	1	1	1	100	100	100
Esperance	0	0	0	0	0	0
Geraldton	0	0	0	0	0	0
Jurien	0	0	0	0	0	0
Karratha	0	0	0	0	0	0
Katanning	0	0	0	0	0	0
Kununurra	0	0	0	0	0	0
Mandurah	2	3	3	94	100	100
Manjimup	1	1	1	100	100	100
Merredin	0	0	0	0	0	0
Narrogin	0	0	0	0	0	0
Newman	n/a	n/a	n/a	n/a	n/a	n/a
Northam	0	0	0	0	0	0
Perth	2	2	2	41	40	40
South Hedland	0	0	0	0	0	0
Average	1	1	1	n/a	n/a	n/a
Average (excluding Perth)	0	1	1	n/a	n/a	n/a
Perth	2	2	2	n/a	n/a	n/a
Total (all towns)	11	12	12	n/a	n/a	n/a
Maximum (number/unit)	2	3	3	n/a	n/a	n/a
Minimum (number/unit)	0	0	0	n/a	n/a	n/a
Maximum variation	n/a	n/a	n/a	n/a	n/a	n/a
Minimum variation	n/a	n/a	n/a	n/a	n/a	n/a
Total (excluding Perth)	9	10	10	n/a	n/a	n/a