WATER SERVICES ASSOCIATION
OF AUSTRALIA

An assessment of the skills shortage in the urban water industry

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Overview of WSAA

The Water Services Association (WSAA) is the peak body of the Australian urban water industry. Its 30 members and 31associate members provide water and sewerage services to approximately 16 million Australians and to many of our largest industrial and commercial enterprises.

WSAA was formed in 1995 to provide a forum for debate on issues important to the urban water industry and to be a focal point for communicating the industry's views. WSAA encourages the exchange of information and cooperation between its members so that the industry has a culture of continuous improvement and is always receptive to new ideas.

The functions of WSAA are:

- be the voice of the urban industry at the national and international level and represent the industry in the development of national water policy,
- facilitate the exchange of information and communication within the industry,
- undertake research of national importance to the Australian urban water industry and coordinate key national research for the industry,
- develop benchmarking and improvement activities to facilitate the development and improved productivity of the industry,
- develop national codes of practice for water and sewerage systems,
- assess new products relating to water, sewerage and trade waste systems on behalf of the water industry,
- jointly oversee the Smart Approved Watermark Scheme for products and services involved in conserving water use
- coordinate annual metric benchmarking of the industry and publish the National Performance Framework with the Federal and State Governments.

Prelude

The urban water industry is predicted to invest up to $30 billion over the next 5-10 years in developing new water sources which will ensure that despite the impacts of climate change there will be adequate and reliable supplies of water for our rapidly growing cities and regional urban centres.

It is in this context that there can be very few other challenges confronting the industry more important than having a highly skilled workforce that can not only deliver the planned large water infrastructure program, but also maintain and operate water and wastewater systems to ensure safe and reliable drinking water and protection of the environment.

Despite there being much talk about the skills shortage in the urban water industry, no data previously existed at an industry level on the extent and causes of the skills shortage. Hence, the importance of this report which contains the outcomes of a survey undertaken of WSAA member water utilities by Inform Pty Ltd in late 2007.

The information deduced from this survey will form the foundation of a water industry wide strategic initiative to systematically address the challenges the skill shortage now presents to the industry.

Ross Young
Executive Director

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Foreword

The Water Services Association of Australia (WSAA) commissioned Inform Pty Ltd to undertake a survey of WSAA members to assess the impact of the skills shortage on the operations of water utilities and their ability to deliver rapidly increasing capital investment programs.

Managers of urban water utilities have experienced first hand the difficulties and the stress that the skills shortage is putting on the industry but no one had previously undertaken an industry wide survey to assess the impacts at an industry wide level.

The results contained in "An Assessment of the Skills Shortage in the Urban Water Industry" make sobering reading but they come as no surprise to those in the industry. The results of the survey merely confirm, in an analytical manner, the anecdotal observations of all those in the industry.

The skills shortage in the urban water industry is being significantly exacerbated by the broader boom in infrastructure spending in the Australian economy, particularly in the mining sector.

Water utilities in the urban water industry have already been proactive in developing programs to assist their organisations to manage a dynamic labour market environment where it is becoming increasingly difficult to attract and retain skilled staff. The results of this survey provide an insight into the scale and scope of the skills challenge and the causal factors. However, there is only so much that individual utilities can do and ultimately the entire industry has to be involved in deriving solutions to the current skills shortage. The report will form the basis for developing an industry wide strategic to addressing the skills shortage in the urban water industry.

The mere fact that WSAA has funded this survey of its utility members demonstrates that the industry is proactive in wishing to understand the extent of the problem and the causes of the problem, rather than waiting for governments to undertake this work. It must be understood that this survey only included WSAA members which are the larger urban water utilities in Australia.

The results from this survey provide a robust analytical foundation upon which a stage 2 of the project can commence. The project will involve the development of a skills shortage road map for the industry. Stage 2 will be a water industry wide project and by virtue of this, will include all other sections of the water industry including consultants, constructors, contractors, material and equipment suppliers, government departments and regulators. Given that all the players in the urban water industry "fish out of the same pond" when accessing skilled staff in the market place, it is imperative that the whole industry is involved in developing strategies to overcome the shortage of skilled staff available to the industry.

As a result of this survey the industry is now well placed to move forward in partnership with governments and other key stakeholders and address the challenges posed by the skills shortage in a comprehensive and timely manner.

Ross Young
*Executive D*irector

Executive Summary

1.1 Introduction

During 2007, WSAA sponsored a report 'An Assessment of the Skills Shortage in the Urban Water Industry' to:

(i) analyse the workforce skills and demographic profile of the urban water industry as it is now; and

(ii) determine the workforce skills requirements in ten years' time.

The project was divided into stages and this report addresses stage 1. Project design, data gathering, analysis and reporting was undertaken by The Infohrm Group[1].

The findings are based on survey results obtained from 18 WSAA water utilities. The total headcount of these 18 water utilities is 10,900 which represents 56% of WSAA members' total workforce. It is important to note that the participating water utilities varied widely in terms of workforce size, and other variables. While this report analyses industry data at a total level, it is important to appreciate the significant differences that may exist between water utilities.

This report focuses on six areas: current supply profile, forecast supply, forecast demand, gap analysis, skills (current and future), and critical workforce issues. Key findings from each area are highlighted in this Executive Summary.

1.2 Current supply profile

In comparison with Australian workforce benchmarks[2], the water utilities' workforce:

- ... is relatively stable, in terms of full-time/permanent employment status
- ... is relatively old, suggesting that a significant number of impending retirements can be expected over the next 10 years. Currently, responding water utility workforce's average retirement age is 60.5 years. This is consistent with Infohrm's All Industry median of 60.1 years for 2006. National trends toward a higher retirement age may apply to water utilities in the future - a positive retention outcome. The extremely large number of water utilities staff cohort in the >45 year age range (nearly 50%) suggests that water water utilities will experience a significant number of retirements in the next 5-10 years. This has implications for attraction, retention, knowledge transfer and succession management. WSAA's members staff age profile also has occupational health and safety implications as those currently in manual roles may experience reduced capacity to perform manual roles as they age.
- ... is relatively long-tenured: long workforce tenure has benefits of stability, intellectual knowledge, experience and loyalty; it may have disadvantages in terms of reducing innovation, and enthusiasm for change.
- ... has a high proportion of males relative to the Australian labour force generally. However, the water utilities workforce gender profile is consistent with that of other utilities and capital intensive industries.

At the utility level resignation rates in aggregate are low compared to Australian benchmarks. The resignation rate for civil engineers is very high (median of 20.7%) and this is concerning as civil engineers are critical in the water industry. The resignation rate for civil paraprofessionals is also relatively high (median of 14.4%). The relatively high resignation rates for business support staff (medians around 16%) are also of concern. It is a core function to the water industry and the expense and disruption of high turnover in these roles and other support roles is likely to be detrimental to water utilities.

Water utilities tend to be relatively competitive in salaries for business support roles, but many are not competitive for core water industry roles[3].

1.3 Supply Forecast

The purpose of a supply forecast is to demonstrate, using the most likely assumptions, what proportion of the current workforce will still be employed within the sector during the forecast period. We examined the water utilities supply forecast for the period 2009-2017, based on current headcount and anticipated resignation and retirement rates from reporting water utilities. We report the data in two ways – one including and one excluding Sydney Water.

Not all resignations will leave the urban water sector, as some workers are likely to move within the wider

1 Information about the Infohrm Group and its global HR Benchmarking and Reporting program are provided at Appendix 3.

2 Australian workforce benchmarks are mainly sourced from the Infohrm HR benchmarking and reporting program (see Appendix 3) and also from the Australian Bureau of Statistics.

3 This is an inference which would need to be confirmed through additional data analysis.

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water industry. For the purpose of this report, we assumed 20% leakage (ie. 20% of people who resign from a utility will exit the water industry entirely). For the purpose of forecasting over 2009 - 2017, we assumed an average retirement age of 62.5 years[4] across all water utilities.

According to projections the following can be deduced:

- Within a very short time frame (by 2009) between 5%-6% of the existing water utility workforce will have retired.
- By 2017, between 25%-27% of the existing water utility workforce will have retired.
- Even within a relatively low turnover environment[5], there will be a significant amount of change within water utilities over the next 10 years. In the most likely outcome, by 2017 only 16% of the current workforce will still be employed within their original water utility.
- With Sydney Water included in the survey data, 27% of the current workforce will still be employed within their current organisation in 2017.

It is worth noting the importance of the churn/leakage factor. Of those who resign from a WSAA utility, how many will be available for re-employment to another WSAA utility? The answer to this question has significant implications for decisions regarding national education policy (VET and university), national immigration policy, as well as recruitment and development strategies of individual water utilities. In this report, we have assumed a 20% leakage but this is based on hearsay. We recommend that research be undertaken to determine more objective and accurate churn/leakage factors for the urban water sector.

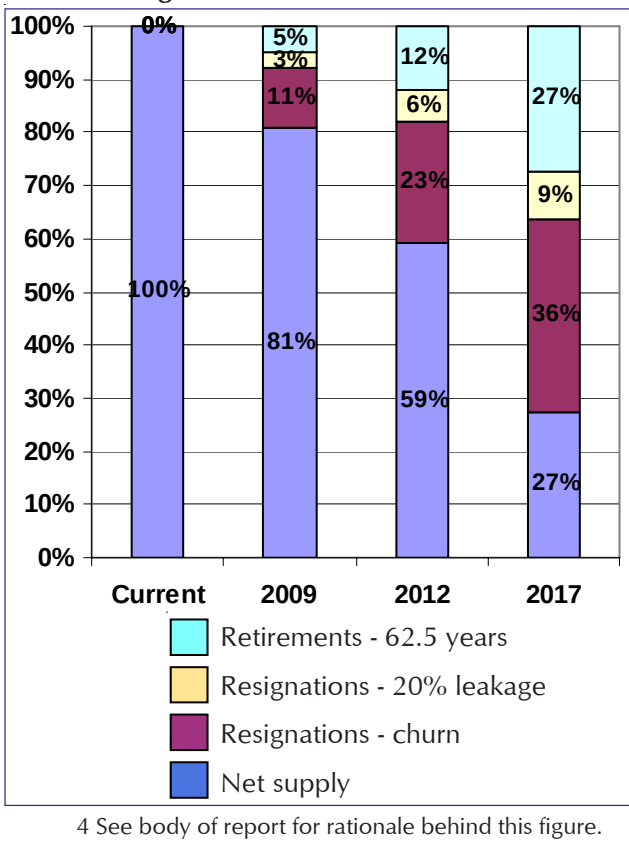
1.4 Demand Forecasts

What type of workforce will be required in the future? The forecasts in this report were provided by senior stakeholders in ten water utilities, taking into account their pressing business issues, and the project scenarios of predicted change and unplanned change.

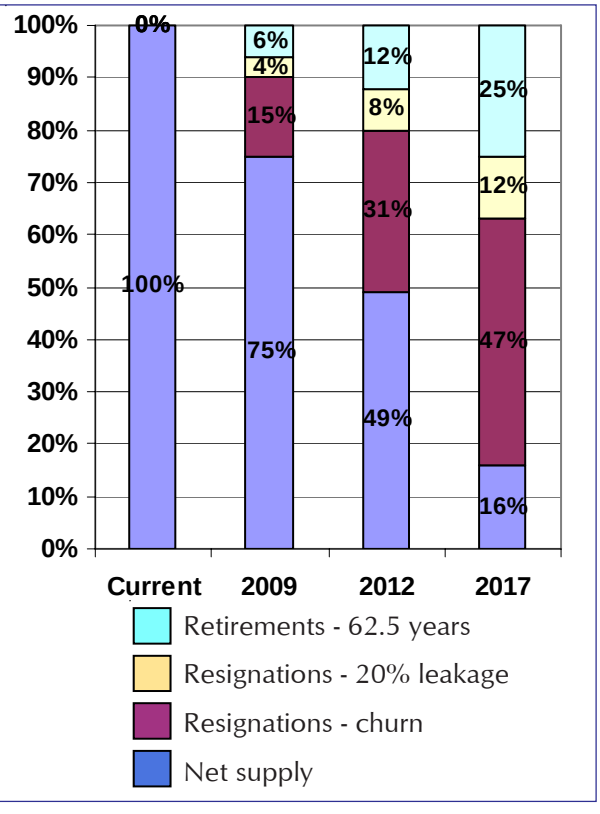
The following business issues were identified as "most pressing" by respondents, and therefore had a big impact on the demand forecasts: climate change, alternative approaches to water supply, infrastructure requiring renewal, possible institutional reform, potential fis-

Chart 1: Supply forecast through to 2017 (assuming retirement at 62.5 yrs, and 20% leakage)

1.1 Including all water utilities



1.2 Excluding Sydney Water



4 See body of report for rationale behind this figure.

5 Even excluding Sydney Water, the utilities report low turnover rates compared with national averages.

cal constraints for increased capital expenditure. It is also possible that, in some cases, increased demand for skills is influenced by significant downsizing during previous decades.

The demand forecasts made by Sydney Water were inconsistent with the trends of most other water utilities, and skew the results. Therefore we included two versions of the forecasts: one including and one excluding Sydney Water's data.

We believe the most likely forecast outcome, excluding Sydney Water is Scenario 1 (Predicted Change). Under this scenario, by the end of 2009 the urban water industry workforce will need to increase by 6.0% on current numbers. Workforce demand will remain fairly stable through to 2012 (a 6.3% increase on current numbers) before rising slightly again through to 2017 (a 7.3% increase on current numbers).

The 'worst case' outcome is Scenario 2 (Unplanned Change), excluding Sydney Water. Under this scenario, the urban water industry workforce will need to increase by 9.4% by the end of 2009 and a total of 13.3% by 2017.

In many instances, labour demand forecasts were based on the assumption that certain work will be outsourced in the future. Within the current project, we were unable to determine whether this was: (a) a proactive strategy driven by business needs, or (b) a reactive response, based on an assumption of increasing difficulty in ability to attract and retain a suitable workforce. This latter approach is not consideered a strategy likely to solve the skills shortage for the water industry as a whole. It could merely move the issue from one sector to another.

1.5 Demand/supply gap analysis

In a demand/supply gap analysis, the **'best case outcome'** is the one with the smallest gap between demand and supply. This occurs under Scenario 1 for demand (Predicted Change), including Sydney Water. Under this outcome, the extent of the 2017 gap between demand (the industry will need) and supply (what the industry will have) is 39.6% of the existing workforce (3.9% increased demand plus 36% diminished supply). Refer Chart 3.1 overleaf.

The **worst case outcome** is the one with the largest gap between demand and supply. This occurs under Scenario 2 for demand (Unplanned Change), excluding Sydney Water. Under this outcome, the extent of the 2017 gap between demand and supply is 50.3% of the existing workforce (13.3% increased demand plus 37% diminished supply). Refer Chart 3.2 overleaf.

We believe the **most likely outcome** occurs under Scenario 1 for demand (Predicted Change) excluding Sydney Water. Under this outcome, the extent of the 2017 gap between demand and supply is 44.3% of the existing workforce (7.3% increased demand plus 37% diminished supply). Refer Chart 3.2 overleaf.

Chart 2: Demand forecast excluding Sydney Water

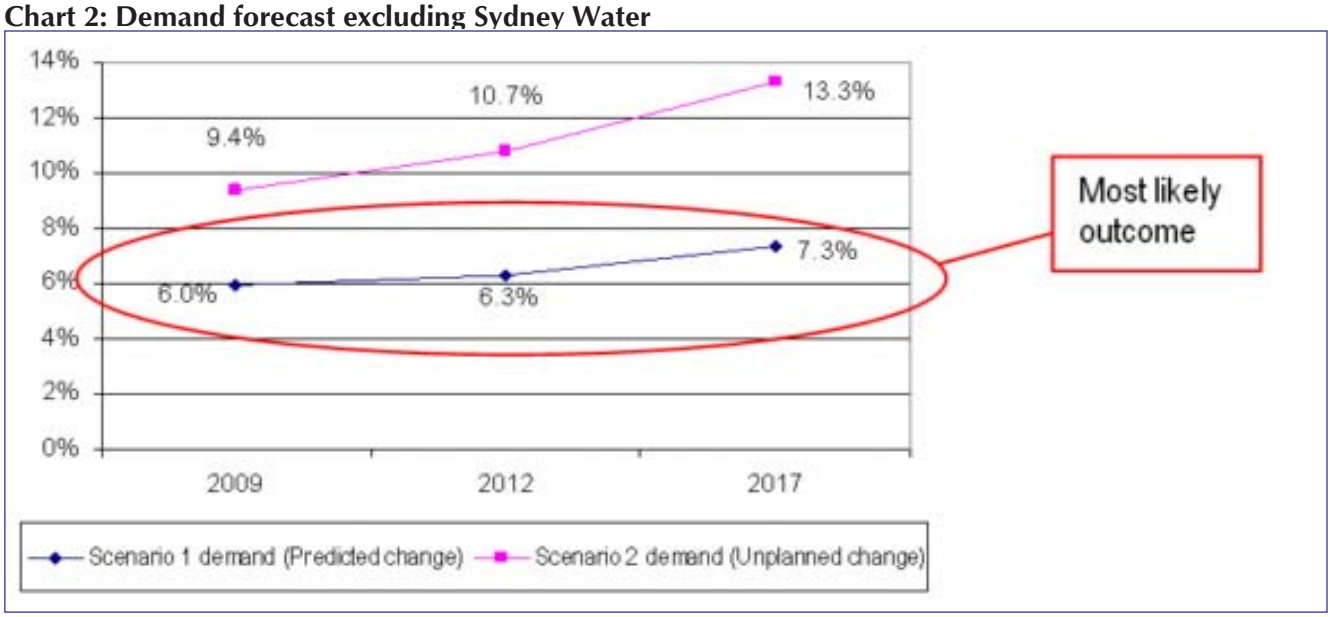


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Chart 3: Gap (Demand/Supply) forecasts through to 2017 – all job roles
Chart 3.1: Including Sydney Water

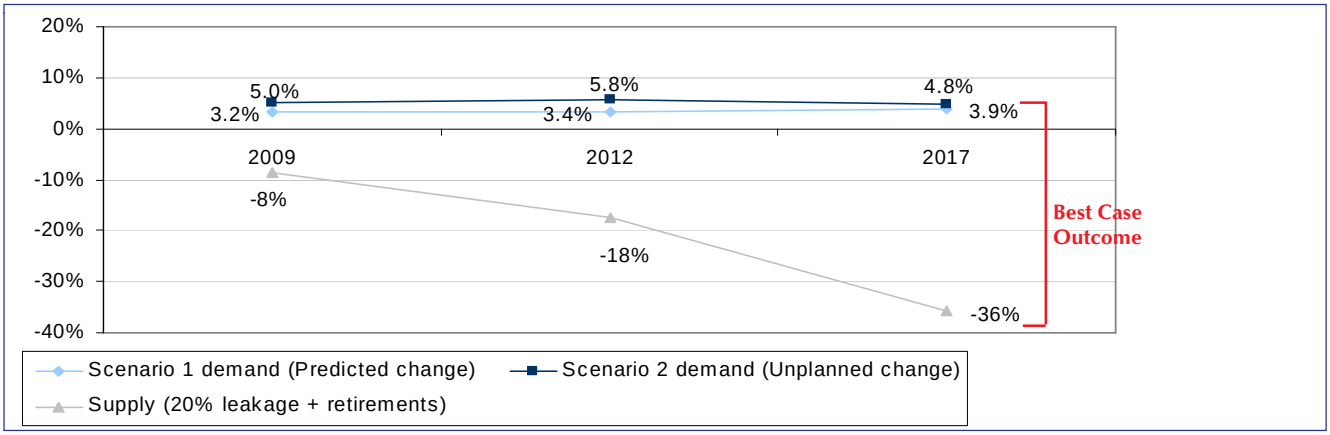
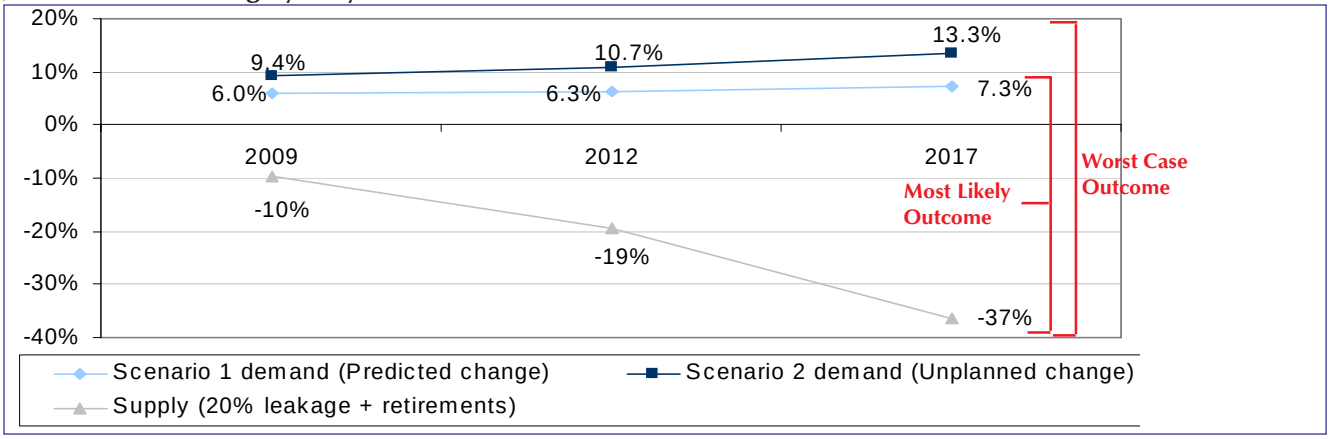


Chart 3.2: Excluding Sydney Water



It may be useful to consider the 'most likely' percentages in terms of the industry's current aggregate workforce of 19,500. By 2017, the 44.3% gap represents a shortfall of about 8,600 employees. Within the short term (ie. 2009) the size of the gap (16%) is much smaller but still significant, representing a shortfall of about 3,100 employees within the next two years.

1.6 Skill requirements

1.6.1 Current Skill Deficits

Project respondents identified the main current skills deficits to be:

- Keeping abreast of developments in science and technology
- Environmental sustainability
- Technical skills such as environmental engineering and process technology, water quality, wastewater and biosolids.
- Leadership and a range of 'people skills' (Managers and Professional Engineers)
- Strategic thinking, business planning and risk management

These findings are consistent with recent research from the International Centre for Excellence in Water Resource Management.

1.6.2 Future Skill Requirements

In the future, most of the above skills will be increasingly important, according to WSAA's survey respondents. In addition, several other skills will become increasingly important in the future. These are: asset management, project management, commercial acumen and cost management.

WSAA and other peak bodies may be able to play an important role in co-ordinating investment in skills development in these areas.

1.7 Critical workforce issues

Survey respondents reported on their current and future critical workforce issues. Consistent themes emerged in five main areas: attraction, retention, skill shortages, the changing nature of the workforce, and workforce planning.

Attraction

Respondents identified several challenges to their ability to attract suitable staff. Nationally, there is a shortage of people with generic science and engineering skills (professional and paraprofessional). In addition, because of the increasing specialisation of water and wastewater processes, water utilities would like to attract university-educated professionals (rather than vocationally-educated paraprofessionals); but there is an acute shortage of staff with these specialist skills.

Within this tight labour market, publicly owned water utilities are rarely competitive with private sector firms in terms of salary and/other benefits.

In working to a solution to these challenges, some water utilities struggle to find the correct balance between: recruiting people with 'ready-now' skills, and recruiting and developing people with appropriate aptitude.

In addition, some regional water water utilities experience difficulty in attracting core water industry skills to their area.

Retention

Water utilities experience challenges in retaining older workers and younger workers. As shown earlier in this report, the water industry has a mature age profile with nearly 50% of staff over 45 years of age. The continual loss of experienced water industry workers due to retirement highlights the importance of knowledge management/transfer and succession management within water water utilities.

At the other end of the spectrum, some water utilities have problems retaining young high performers. Several respondents described their utility as a 'training ground' to provide skilled personnel for private sector organisations. One utility reported that turnover in the 1-3 year tenure range is significant, reflecting the fact that private organisations 'poach' water utilities workers once they have received valuable industry training and experience.

Skills

The previous section discussed issues regarding specific skills, as identified from quantitative survey ratings. Via open-ended survey comments, respondents reinforced the points that:

- major capital works development over next five years would require increased project/contract management, engineering and asset management skills
- impending retirements contribute to shortages of current skills
- emerging technology (greater automation, complexity, diversity) contribute to shortages of new skills.

Changing nature of the workforce

The water industry operates in a complex and rapidly changing environment. The above attraction, retention and development challenges need to be managed in relation to a workforce with increasing demands for flexible work conditions (eg. ways of working, hours of work, work/life balance, attitudes to work/career, etc). This often results in an increasing proportion of 'contingent' staff such as contractors, consultants, fixed term employees, and casual staff, as well as outsourced service providers.

Workforce planning

Survey respondents were asked to rate their preparedness for potential loss of skills, corporate knowledge and leadership. The response was that they were prepared to 'some extent' (average of 3 on a 5 point scale) but admitted this preparedness tended to be short term and reactive. Within many water utilities, workforce planning capability is in a fairly embryonic state.

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1.8 Discussion and conclusion

Water utilities share many workforce challenges, including: an ageing workforce and consequent retention issues; a workforce which demands flexibility and has a dynamic concept of 'career'; and skills shortages due, among other things, to the rapid rate of cultural, scientific and technological changes.

In addition, this project has highlighted specific challenges for urban water industry utilities. The most pressing of these are:

- The sizeable workforce shortfall in the future. This is influenced to some extent by increasing demand, particularly over the next two years due to expanded capital works programs. But in the longer term (through to 2017) the gap will mainly be driven by a large number of retirements, and also resignations. Under the **most likely outcome**, the gap between demand and supply in 2017 will be 44.3% of the existing workforce.
- Water utilities have a relatively old workforce, suggesting a relatively large number of impending retirements and highlighting the need for knowledge transfer, attraction and retention, and succession management strategies.
- There is a high turnover of civil engineers. This job role is core to the industry and represents about 10% of water utilities workforce. (This high turnover rate may not have significant impact on sector-wide supply given the project's assumption that 80% resigning civil engineers are simply moving within the water industry. However, the high turnover rate has potential to significantly impact individual water utilities.)
- Some water utilities are not competitive in relation to salaries for some job roles and this may affect their ability to attract and retain staff.
- In addition to a range of current skill deficits, several skills will become increasingly important in the future. These are: asset management, project management, and commercial acumen/cost management.

2. Introduction

2.1 Background

Water Services Association of Australia (WSAA) is the peak body of the Australian urban water industry. Its 30 members and 31 associate members provide water and wastewater services to approximately 16 million Australians and many of Australia's largest industrial and commercial enterprises.

WSAA engaged Infohrm Pty Ltd[6] to co-ordinate Stage One of a report – An Assessment of the Skills Shortage in the Urban Water Industry. The aims of this project are to:

- Undertake an analysis of the workforce skills and demographic profile of the urban water industry as it is now;
- Determine the workforce skills requirements in ten years' time taking into account future change and the introduction of new technology;
- Identify some of the broader labour market changes that could potentially impact on the industry in ten years' time;
- Characterise existing and future skills shortages;
- Understand water utilities critical workforce issues;
- Understand what water utilities are currently doing in relation to workforce planning; and
- Gain insights into the strategic direction of the industry's workforce, for example: plans for the post-infrastructure boom; new ways of working (eg. contracting versus in-house service provision).

After consideration of Stage One findings, a scope for a potential stage 2 will be developed.

2.2 Sector Involvement

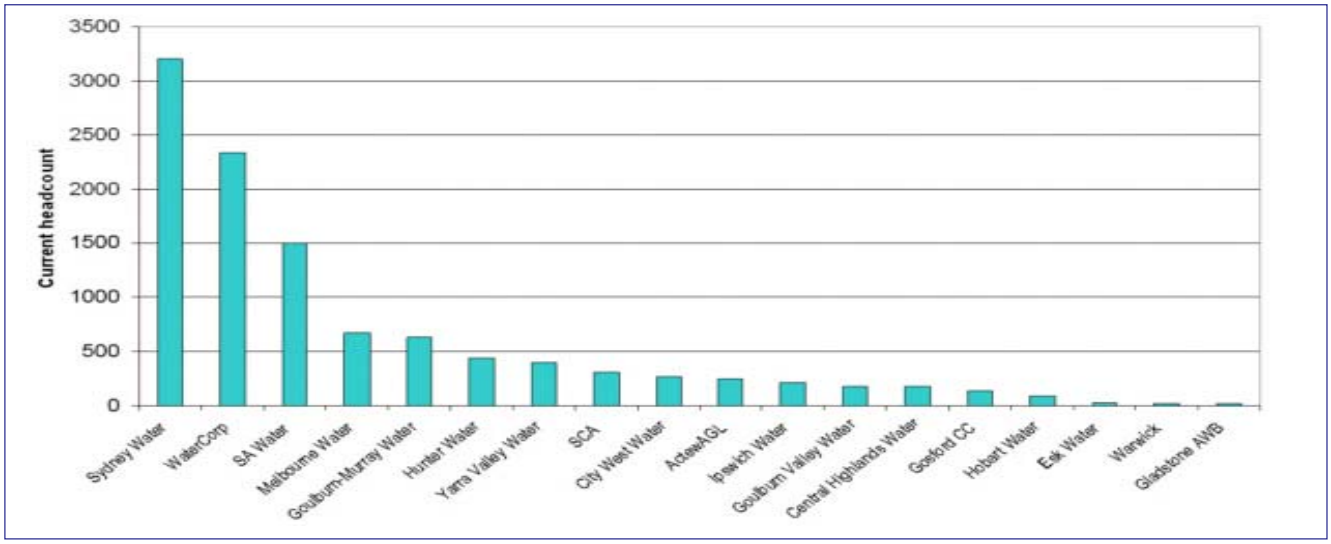
During August 2007, WSAA contacted all members and associate members inviting them to participate in the project. Positive responses were initially received from 28 water utilities. But by the project deadline this had fallen to 18.

Many utilities advised that they were not able to participate actively in the project due to tight deadlines and particularly in the case of Queensland's water utilities uncertainty due to institutional reform.

The total headcount of the participating 18 water utilities is 10,900 which represents 56% of WSAA members' total workforce.

It is important to note that the participating water utilities varied widely in terms of workforce size, and other variables. The largest utility had about 3,200 employees and the smallest had 23 employees. Seven of the water utilities had fewer than 200 employees (see Chart 1). Some water utilities were independent entities while others were part of a local government authority. While this report analyses industry data at an aggregate level, it is important to appreciate the significant differences that exist between water utilities.

Chart 4: Current headcount of project participants (n=18 water utilities)



6 The Infohrm Group leads the world in future focused workforce and business intelligence solutions with a unique blend of knowledge and experience, supported by the most sophisticated reporting, analysis and consulting tools available.

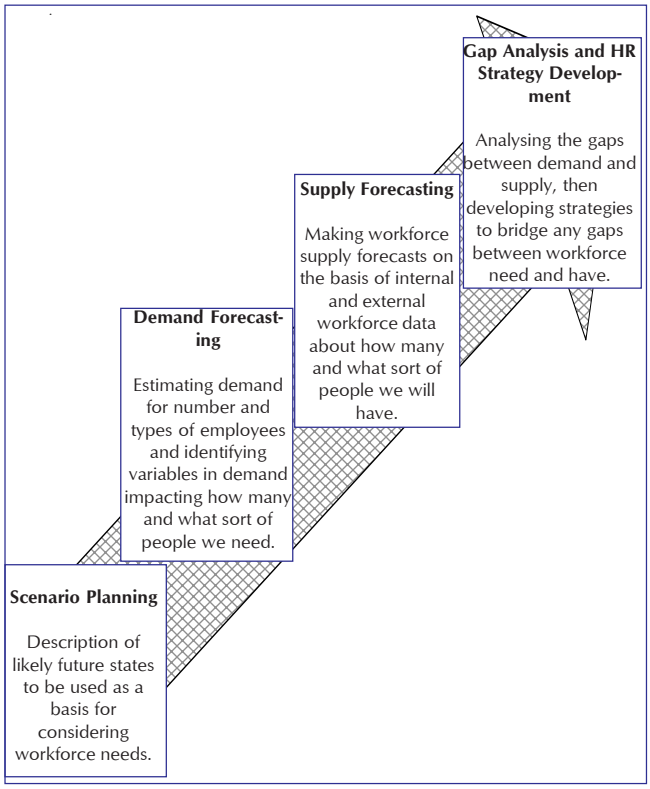
3. Methodology

3.1 Methodology

The methodology used in this project is based on a workforce planning framework developed by Infohrm.

Informs workforce planning framework has four key components, as shown in Figure 1.

Figure 1: Infohrm's workforce planning framework



This framework has been adapted in workforce planning assignments conducted for water industry organisations such as Gold Coast Water, Water Corporation (WA) and Brisbane Water. Infohrm has undertaken several other industry-wide workforce planning projects - for industries such as rail, disability services, banking, and public sector – as well as scores of workforce planning assignments for individual organisations.

Infohrm sees workforce planning as a process to identify future workforce needs to ensure that workforce strategies:

- are linked to business directions and external influences;
- address highest priority issues; and
- focus resources/action/effort on areas of greatest risk and greatest opportunity.

Within this broad framework, a 7-step approach was devised to meet the needs of this project within the given timeframe:

1. Project planning
2. Environmental scan and scenario planning
3. Scenario review, demand forecasting and skills supply forecasting
4. Stakeholder sign-off demand and skills forecasts
5. Supply forecasts (staff numbers)
6. Analyse demand and supply gaps
7. Deliver project findings

Brief details about the initial steps are provided below, with supporting detail in the Appendices. Detailed information about the supply and demand forecasting and gap analysis are included in later chapters.

3.2 Project planning

The project planning phase was initiated at a Steering Committee meeting held on Thursday 13 September 2007, and continued for another week via email. During the project planning phase a number of materials were finalised:

- Project scope – see Appendix 4.
- Sector job role framework for use in this project – see Appendix 5.
- Skills framework for use in this project – see Appendix 6.
- Design of data gathering surveys.

3.3 Environmental scan

The project's bibliography references the main resources which informed the project's environmental scan. A key reference was the WSAA Report Card for 2006/07, which outlines a number of key challenges facing the urban water industry as it moves forward:

- Manage rapidly increasing capital investment programs
- Manage impact of rising water prices
- Protect public health – recycled water for drinking
- Manage skills shortage
- Make decisions in uncertain times

- Manage community expectations – high levels of service
- Deliver rural/urban water trading
- Manage water/greenhouse gas outcomes
- Reform institutional arrangements
- Implement future water conservation programs
- Understand implications of third party access.

These environmental forces were taken into account when developing the project's forecasting scenarios.

3.4 Scenario planning

At its meeting on 13 September 2007, the Steering Committee considered the external factors likely to affect the industry over the next 5-10 years. The purpose of this was to identify scenarios (or 'likely future states') to serve as the basis for forecasting future workforce needs. The Steering Committee noted that scenarios:

- Help deal with a highly uncertain environment and encourage planning which anticipates a range of possible futures, and
- Facilitate consideration of longer term forecasts.

The Committee also noted that, when the variation between different scenario forecasts is large, this increases the importance to initiate two activities:

- Monitor the assumptions underlying the scenario to see which is unfolding or which set of new conditions is emerging so we can assess their implications.
- Implement human resource management programs which provide maximum workforce flexibility, eg. using contract staff, external transfers, temporary assignments.

Taking all influences into account, two likely scenarios were identified**: 'Predicted Change'** and **'Unplanned Change'**. A description of these scenarios is provided at Appendix 7. As its name implies, the 'predicted change' scenario was seen to be the most likely to eventuate for the sector. Via the Senior Stakeholder Survey (see below), respondents noted that these scenarios were feasible, with Scenario 1: Predicted Change being much more likely to emerge.

3.5 Data Gathering and Review

Two surveys were designed and administered to participating water utilities at the outset of the project:

1. the **Senior Stakeholder Survey** was designed to gather:
   - workforce demand forecasts over the next 10 years (in terms of both staffing numbers and skills)
   - at a broad level, evaluation of the skills levels of current workforce and identify future skill requirements
   - information on critical workforce issues.
2. the **HR Reporting Survey** was designed to gather:
   - current workforce headcount (FTE, job role, age, tenure, salary, gender, employment status)
   - resignation rate (by job role)
   - average retirement rate (by job role)

An interim Demand Forecast report was provided to nine water utilities during 11-13 October 2007. This report was customised for each utility and summarised the utility's demand forecasts (numbers) in comparison with an industry aggregate (based on completed Senior Stakeholder Survey returns). These water utilities were invited to provide feedback regarding the report. One utility adjusted its forecasts in response to the interim report.

3.6 Caveats in interpreting the data

The project's data gathering phase was undertaken within very tight timeframes, and this had some impact on comprehensiveness of data which water utilities were able to report. For example:

- some water utilities had difficulty coding their workforce into the project's Job Family/Role framework.
- not all water utilities contributed the full range of information specified in the surveys.
- some water utilities reported differing headcounts in their current profile and demand forecasts. The differences are not large but contribute to different totals in the supply profile and supply forecasts.

4. Current Supply

4.1 Section Summary

This chapter sets out the current workforce of participating water utilities in terms of: job family, job role, employment status, age, tenure, gender, salary, resignation rate and average retirement age. Not all participating water utilities provided full details on all these employment dimensions. The charts in this chapter may therefore have slightly different total staff numbers.

4.2 Job family/role

Two key job families are: (see Chart 5)

- Water Industry Operators, which comprise 18% of the workforce. As Chart 6 shows, 59% of these are in the Construction & Maintenance (Water) job role, eg. Maintenance Operator/Assistant, Operations Assistant, Meter Restrictor/Reader.
- Engineer Professionals, which comprise 13% of the workforce. As Chart 7 shows, the majority (70%) of these are Civil Engineers.

Chart 5: Job family (n= 9,923 FTE)

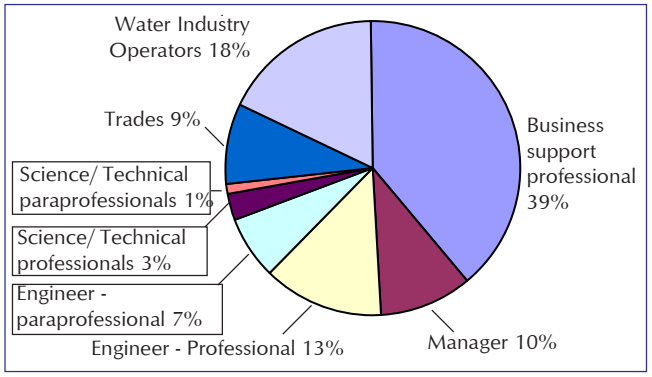


Chart 6: Job roles within Water Industry Operator family (n=1,353.5 FTE)

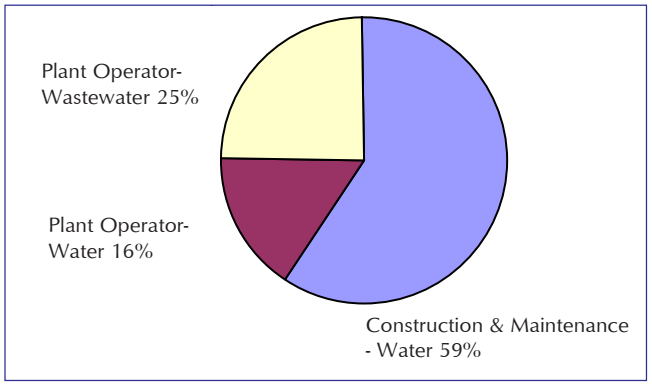
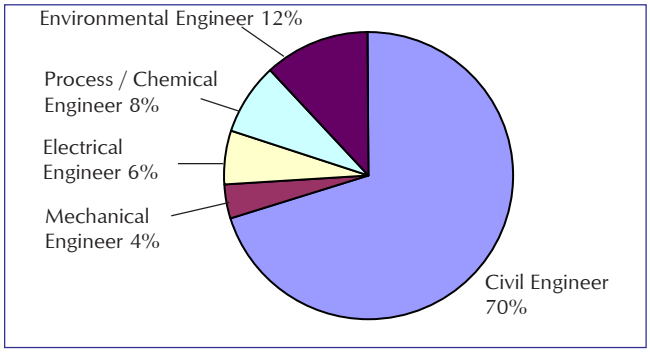


Chart 7: Job roles within Professional Engineer family (n=1,006 FTE)

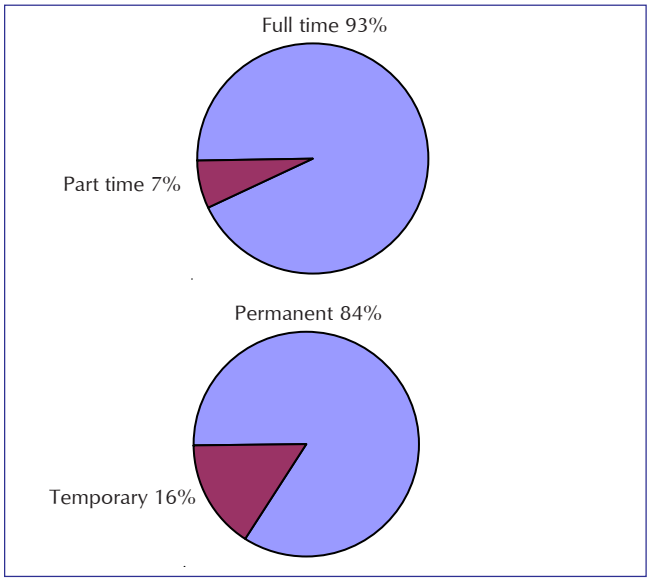


4.3 Employment status

- The majority (93%) of the water utility workforce are full-time (see Chart 8.1). This is significantly higher than the norm (75%) for the Australian workforce generally.
- The majority (84%) of the water utility workforce are permanent (see Chart 8.2). This is higher than the norm (75%) for the Australian workforce generally[7].

These results suggest that the water utilities workforce may not be as flexible as the wider Australian labour force.

Charts 8.1 and 8.2: Full-time v. Part-time (n=10,870 FTE) and Permanent v. Temporary (n=11,363 headcount)

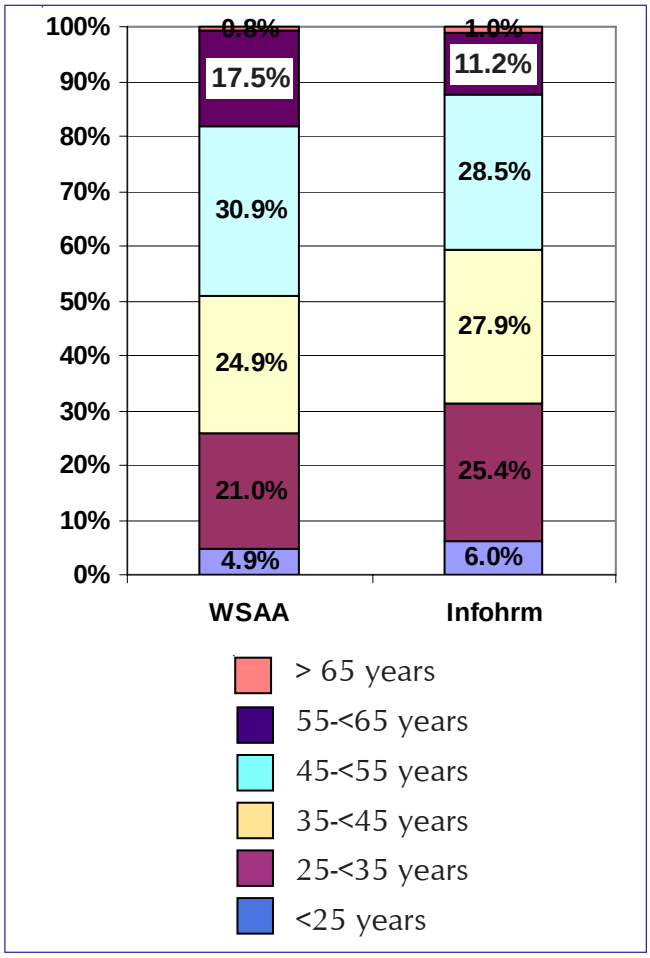


7 All Industry benchmarks are sourced from the Infohrm program, Australia's largest HR benchmarking and reporting program – see Appendix 11.1 – and Australian Bureau of Statistics..

4.4 Age

The water utility workforce includes a relatively large proportion of workers in the 55-65 year age range, i.e. 17.5% compared with Infohrm's All Industry median of 11.2% (see Chart 9). Almost half (49.2%) of the water utilities workforce is 45 years or older, compared with 40.2% for the All Industry median. This older workforce profile has implications for impending retirements - a significant number can be expected over the next 10 years – and this has implications for attraction, retention, knowledge transfer and succession management. This profile also has occupational health and safety implications as those currently in manual roles may experience reduced capacity to perform manual roles as they mature.

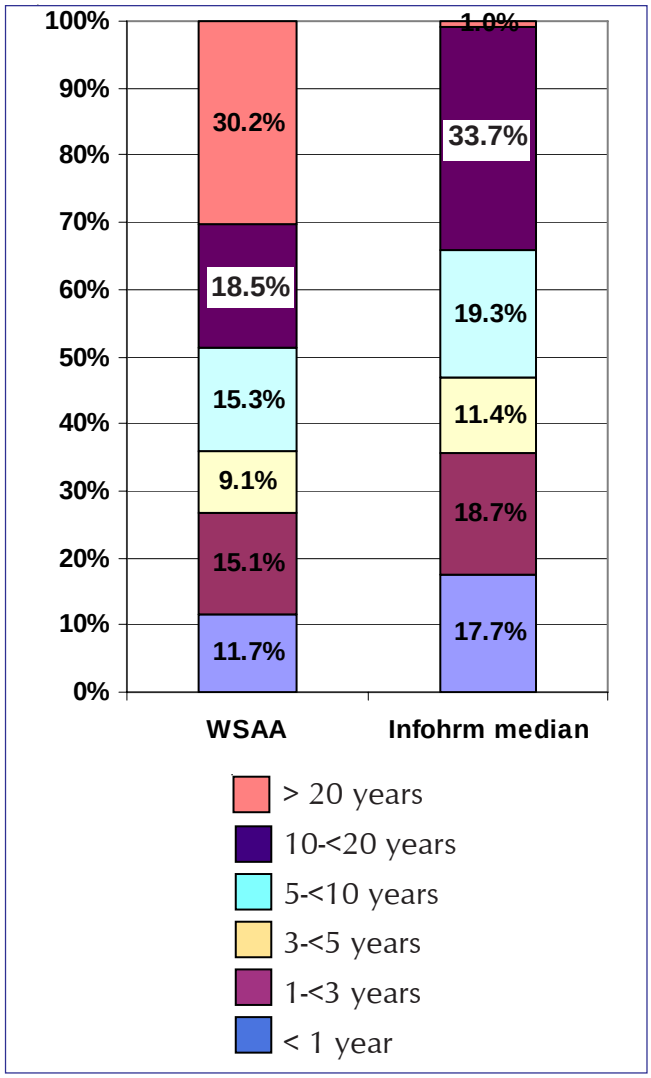
Chart 9: Age profile (n=10,666 headcount)



4.5 Tenure

The water utility workforce tends to have long tenure: 48.7% of water utility staff have more than 10 years tenure, compared with 33.7% for Infohrm's All Industry group[8] (see Chart 10). Long workforce tenure has benefits in terms of stability and loyalty and high levels of experience; it can have disadvantages in terms of innovation and enthusiasm for change.

Chart 10: Tenure profile (n=10,666 headcount)



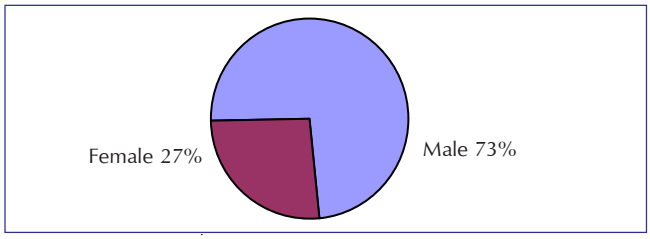
8 The Infohrm category for 10-20 years includes those 20+ years.

4. Current Supply
Continued

4.6 Gender

Only 27% of water utility workers are female, compared with about 45% for the Australian labour force generally[9] (see Chart 11). However, the water utility gender profile is consistent with that of similar industries, eg. Electricity, Gas & Water, Capital Intensive. DEWR (2007) notes that there has been a doubling of women working in the water industry over the past 20 years[10]. From available data, it is not possible to determine which water industry roles have grown. As Chart 12 shows, the majority of the water utilities females work in Business Support roles. However, 22% of Professional Engineers in the water utility workforce are female. This may be an encouraging sign given the traditional male domination of the industry and the Engineering profession. These trends and relevant external benchmarks would need to be examined to establish this.

Chart 11: Gender profile (n=10,865 headcount)

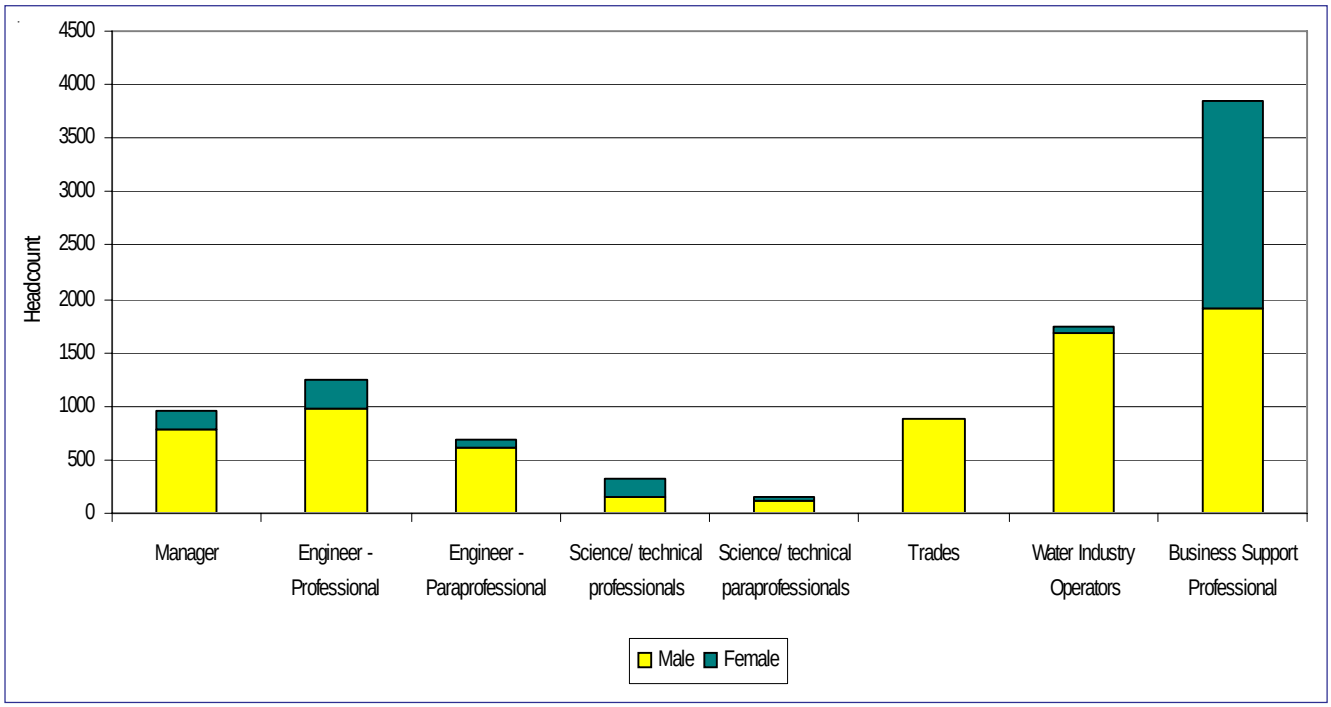


4.7 Salary

Chart 11 shows the average annual salary for each utility, and the median for all reporting water utilities ($57,151 per annum). There was significant variation among reporting organisations, with one utility reporting an average of $78,710 per annum and an other reporting an average of $47,119 per annum. This is further evidence that these water utilities are a heterogeneous group of organisations, with a range of workforce challenges which will require a range of strategies.

Table 1 shows, for all reporting water utilities, the minimum, maximum and median annual salary by job family. Again this shows a wide range of remuneration practices among water utilities. It should be noted that executive salaries have been excluded from the survey.

Chart 12: Gender profile by job family (n=9,827 headcount)



9 Australian Bureau of Statistics (2007) Labour Force October 2007 page 6.

10 Australian Jobs 2007 DEWR (2007) p. 12.

Chart 13: Average annual salary ($ pa)[11]

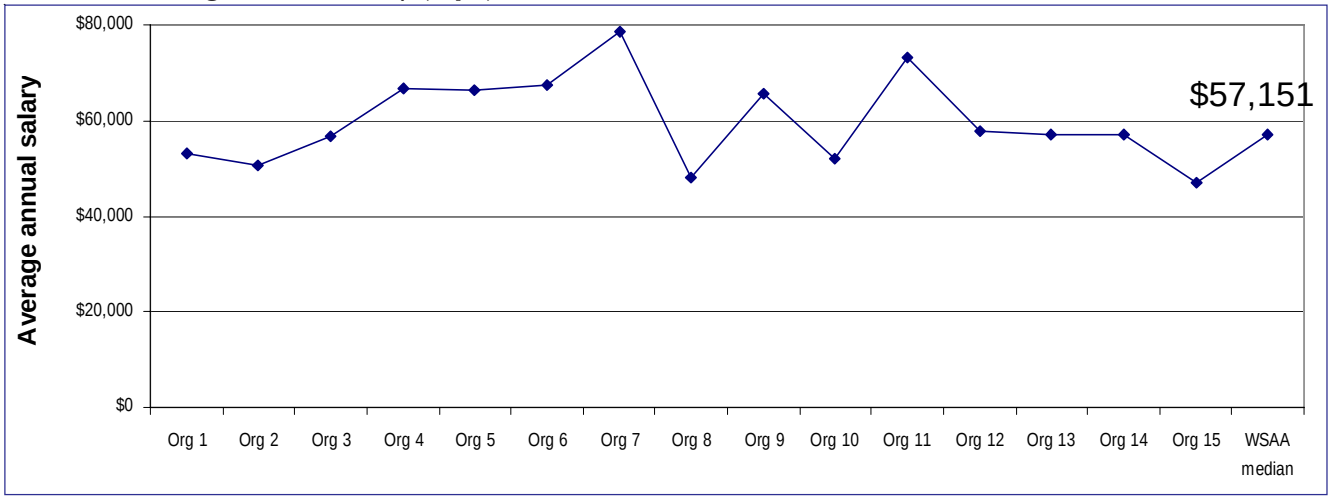
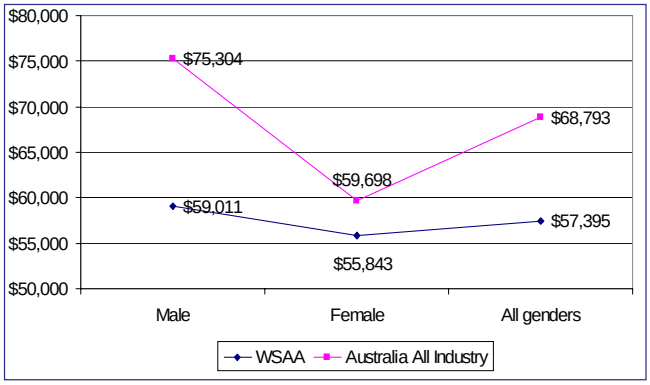


Table 1: Average annual salary ($) – minimum, maximum and median by job family (Dec 2007)

Job Family	Water Utility Min	Water Utility Max	Water Utility Median
Manager[12]	$74,014	$133,287	$95,558
Engineer – Professional	$39,741	$87,596	$64,467
Engineer - Paraprofessional	$44,695	$80,975	$55,760
Science/Technical Professionals	$52,371	$102,772	$63,546
Science/Technical Paraprofessionals	$43,054	$77,456	$56,830
Trades	$37,795	$77,982	$44,790
Water Industry Operators	$39,448	$71,918	$47,360
Business Support Professional	$41,269	$70,648	$53,807
Total	**$47,119**	**$78,710**	**$57,171**

Chart 14 examines gender differences in average salary between the survey respondents and the Australian all industry group[13]. As this shows, the Australian median is much higher than the median for males and for all genders. The difference is not as large for females. This infers that water utilities are relatively competitive in salaries for business support roles but not so competitive for other water industry roles. However, this inference would need to be examined through additional data analysis.

Chart 14: Average annual salary by gender–survey respondents versus Australian All Industry 2007 (median)



11 WSAA members' average remuneration results are based on a 'snapshot' payroll extract provided by each reporting utility in October 2007. These results should be validated with the reporting utilities before undertaking any significant analysis or strategy development.

12 Managers are those at the third and fourth level in the organisation. Exclude CEO and CEO's direct reports (ie. the first and second levels on the organisation)

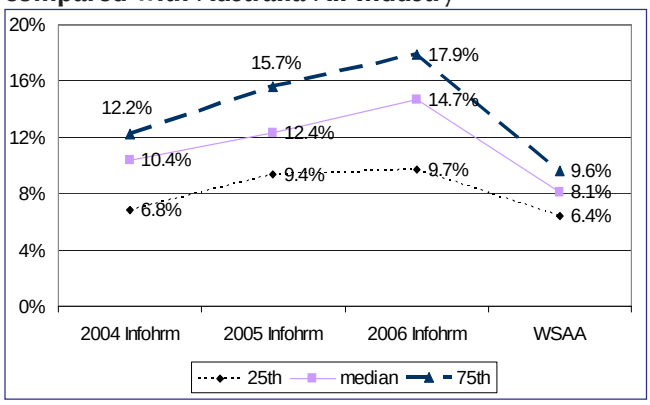
13 Sourced from the Infohrm Program (www.infohrm.com)

4. Current Supply
Continued

4.8 Resignation rate

Sixteen water utilities were able to report on their utility's overall annual resignation rate. As Chart 15 shows, utility resignation rates are much lower than the Australian norm, with the utility median of 8.1% comparing to the All Industry 2006 median of 14.7%. A relatively low resignation rate is generally a positive sign for a utility, indicating a healthy retention rate.

Chart 15: Resignation rate – median rate for WSAA compared with Australia All Industry[14]

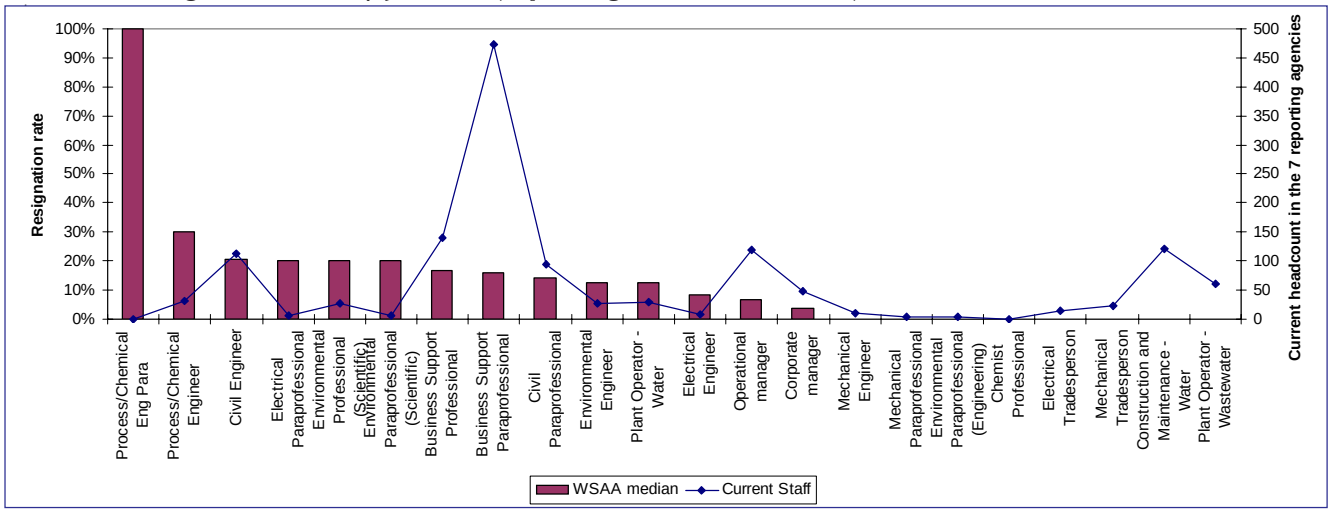


Most survey respondents said they expected their utility's resignation rate to stay about the same in the next few years, or increase slightly in some cases.

Seven water utilities were able to report on their resignation rates by job role, and the results over the past year (2006/07) are shown in Chart 16. The 100% median resignation rate for Process/Chemical Engineer Paraprofessional is misleading as it is based on just one utility having one Process/Chemical Engineer Paraprofessional, who resigned.

In the seven reporting water utilities, job roles with meaningful headcounts and relatively high resignation rates are shown in Table 2. Of particular note is the high rate (median of 20.7%) for Civil Engineer; this high rate is of concern as Civil Engineers are a critical job role in the water industry. The rate and headcount for Civil Paraprofessionals are also relatively high (median of 14.4% and headcount of 95).

Chart 16: Resignation rate by job role (reporting water utilities = 7)



14 Trend All Industry Voluntary Separation Rate sourced from the Infohrm program.

Table 2: Water utility resignation rates by job role (2007) – based on 7 water utilities

	Water Utility 25th Percentile	Water Utility Median	Water Utility 75th Percentile	Current Staff
Process/Chemical Engineer	17.50%	30.00%	42.50%	32
Civil Engineer	4.90%	20.70%	27.70%	114
Environmental Professional (Scientific)	0.00%	20.00%	28.60%	27
Business Support Professional	8.30%	16.70%	28.80%	140
Business Support Paraprofessional	7.30%	16.00%	18.20%	472
Civil Paraprofessional	0.90%	14.40%	28.80%	95
Environmental Engineer	6.30%	12.50%	17.40%	27
Plant Operator – Water	6.30%	12.50%	21.30%	30

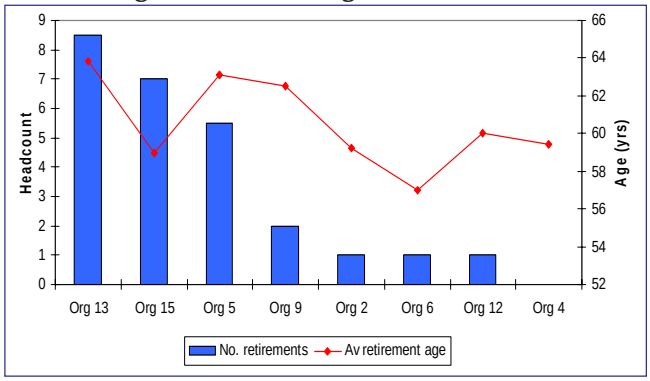
Note: 'Current staff' refers to the current staff numbers in the seven water utilities that reported resignation rates by job role.

The relatively high resignation rates for business support staff (medians around 16%) are also of concern. While these job roles may not be core to the water industry, the expense and disruption of high turnover in these roles is likely to be detrimental to utility operations.

4.9 Retirement rate

Survey respondents reported very few retirements over the past year or so (see Chart 15). Based on formal survey returns, the average retirement age is 60.5 years. This is consistent with Infohrm's All Industry median of 60.1 years for 2006. Note that the Infohrm median has trended upwards, from a median of 58.1 years of age in 2004 to the current median of 60.1 years in 2006. This trend toward a higher retirement age may apply to responding water utilities in the future, which is an encouraging sign for retention. However, the extremely large cohort in the >45 year age range (nearly 50%) suggests that water utilities will experience a significant number of retirements in the next 5-10 years.

Chart 17: Average Number of Retirements (pa) and Average Retirement Age



5. Supply Forecast

5.1 Introduction

The purpose of the labour supply forecast is to demonstrate, using the most likely assumptions, what proportion of the current workforce will still be employed within the sector during the forecast period. For this reason, a supply forecast assumes no change to demand for staff. The demand forecast exercise, and consequent supply/demand gap analysis, is examined in the following chapters.

A supply forecast also assumes that no replacement action (ie. recruitment) takes place. This is because recruitment is just one possible response to a supply/demand gap.

This chapter examines the workforce supply forecast for the period 2009-2017, based on current headcount and anticipated resignation and retirement rates from reporting water utilities.

5.2 Notes about resignation rates

Resignation rates were reported in the previous chapter. The largest water utility, Sydney Water, has a very low resignation rate. The inclusion of this data skewed the results for the utility aggregate, As a result we report the data in two ways – one including and one excluding Sydney Water.

Not all resignations will be lost to the urban water sector, as some workers are likely to move from utility A to the wider water industry. Currently, there are no data available to indicate what proportion of resignations will remain within the urban water sector (the 'churn') and what proportion of the resignations will exit the sector entirely (the 'leakage'). For the purpose of this report, we assumed 20% leakage (ie. 20% of people who resign from a water utility will exit the sector entirely).

5.3 Notes about retirement rates

As indicated in the previous chapter, survey respondents reported an average retirement age of 60.5 years. However, it is likely that in the next decade this average retirement age will increase slightly in line with national trends. Also, Sydney Water's superannuation provisions make 65 years an attractive retirement age. Therefore, for the purpose of supply forecasting over the next ten years, we assumed an average retirement age of 62.5 years across all water utilities.

5.4 Supply forecasts

Chart 18 shows the supply forecasts, including and excluding Sydney Water. According to these supply projections:

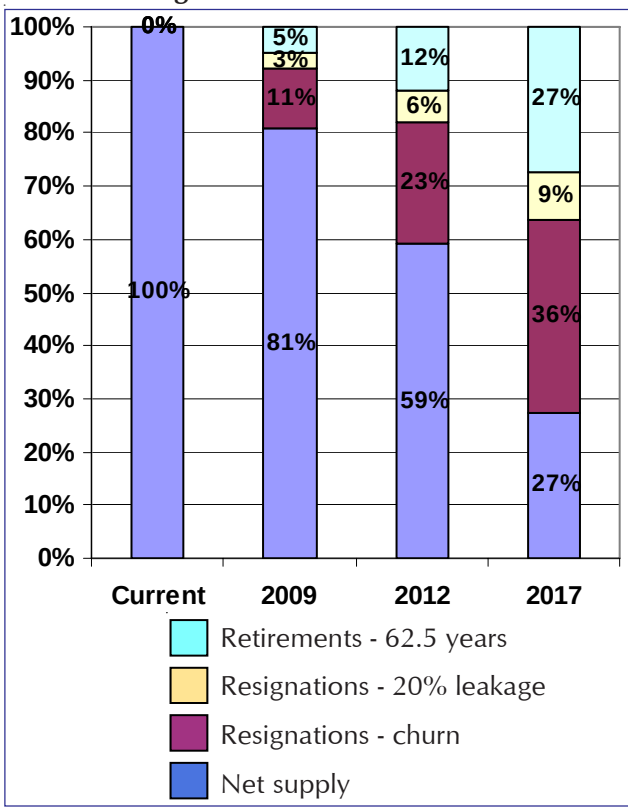
- Within a very short time frame (by 2009) between 5%-6% of the existing workforce will have retired
- By 2017, between 25%-27% of the existing workforce will have retired
- Even within a relatively low turnover environment[15], there will be a significant amount of change within water utilities over the next 10 years. In the most likely outcome (ie. excluding Sydney Water), by 2017 only 16% of the current workforce will still be employed within their original organisation.

15 Even excluding Sydney Water, the utilities report low turnover rates compared with national averages.

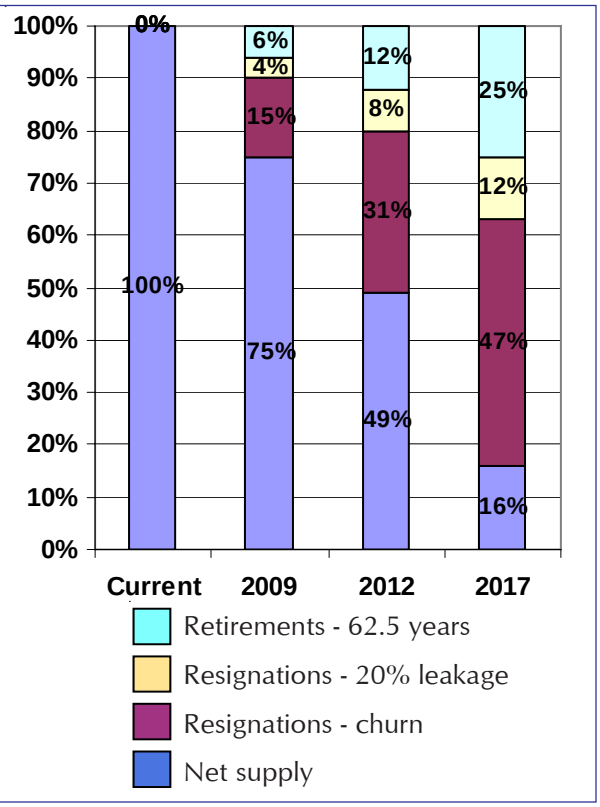
5. Supply Forecast
Continued

Chart 18: Supply forecast through to 2017 (assuming retirement at 62.5 yrs, and 20% leakage)

18.1 Including all water utilities



18.2 Excluding Sydney Water



It is interesting to note that the inclusion and exclusion of the Sydney Water has minimal net effect on availability of current staff within the sector. In Chart 18.1 (above on the left), by 2017 there are 27% of staff still employed within their current utility, and 36% available for employment from other water utilities, for a total of 63% of the current workforce available for employment to the sector. In Chart 18.2 (above on the right), there is also a total of 63% of the current workforce available for employment to the sector; however this net total results from the sum of only 16% of staff still employed within their current utility, and 47% available for employment from other water utilities. (This is because the exclusion of Sydney Water has the effect of increasing the resignation rate and churn factor.)

The full implications of these supply forecasts are best examined in conjunction with demand forecasts and subsequent gap analysis. In the next chapter, we examine the demand forecasts.

Before concluding this chapter, it is worth noting the importance of the churn/leakage factor. Of those who resign from a water utility, how many will be available for re-employment to another water utility? The answer to this question has significant implications for decisions regarding national education policy (vocational education training and university education), national immigration policy, as well as recruitment and development strategies of individual water utilities. In this report, we have assumed a 20% leakage but this is based on hearsay. We recommend that research be undertaken to determine more objective and accurate churn/leakage factors for the sector.

6. Demand Forecasts

6.1 Introduction

Workforce demand forecasts are undertaken to estimate how many and what type of workforce will be required in the future. The demand forecasts in this report were provided by senior stakeholders in ten water utilities, taking into account utility context and pressing business issues, and the project scenarios discussed earlier in this report. The following business issues were identified as "most pressing" by respondents, and therefore had a big impact on the demand forecasts:

- Climate change
- Alternative approaches to water supply
- Infrastructure renewal
- Possible institutional reform
- Potential fiscal constraints for increased capital expenditure.

It is also possible that, in some cases, increased demand is influenced by significant downsizing during previous decades.

The project Steering Committee is aware of DEST forecasts of national water industry workforce reductions (-1.75% pa) through to 2013-14[16]. The Committee found it difficult to reconcile this forecast with the industry's current context, including the fact that $30 billion in urban water infrastructure will be constructed over the next 5-10 years. This expenditure does not include the significant investment that will continue to take place in both wastewater and storm water infrastructure[17].

6.2 Demand forecast outcomes

The demand forecasts through to 2017 are shown in Chart 19 below. The demand forecasts made by Sydney Water were inconsistent with the trends of most other water utilities, and skew the results. Therefore we have included two versions of the forecasts: one including and one excluding Sydney Water.

We believe the most likely outcome is Scenario 1 (Predicted Change), excluding Sydney Water. Under this scenario, by the end of 2009 the urban water industry workforce will need to increase by 6.0% on current numbers. Workforce demand will remain fairly stable through to 2012 (a 6.3% increase on current numbers) before rising slightly again through to 2017 (a 7.3% increase on current numbers).

The 'worst case' outcome is Scenario 2 (Unplanned

Chart 19: Workforce demand forecasts through to 2017

Chart 19.1: Including Sydney Water

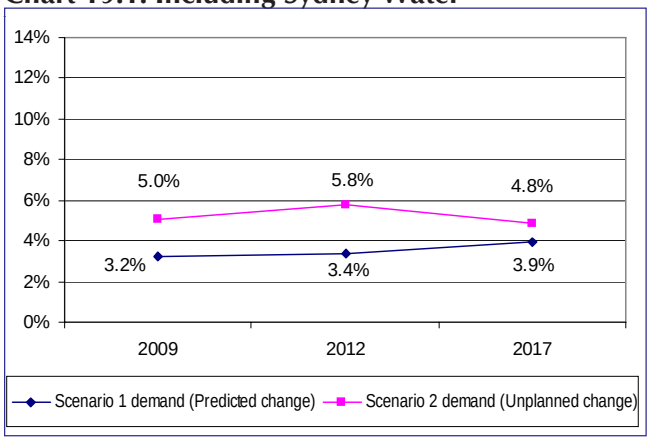
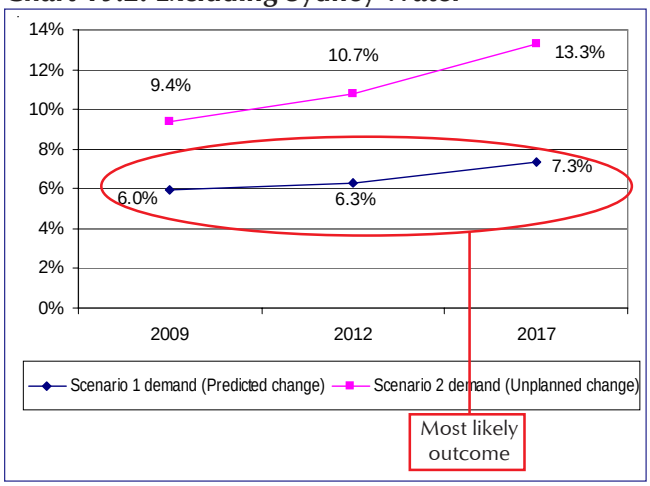


Chart 19.2: Excluding Sydney Water



16 DEST (2007) Industry Skills Report - Government & Community Safety – April 2007 Commonwealth of Australia, page 6. This negative projection is sourced from Monash Centre of Policy Studies, June 2006. However, the report notes: "Industry advice is that there will be significant growth in the Water Industry as a result of a greater focus on water management and related activities."

17 WSAA Ltd (2007) *The WSAA Report Card for 2006/07: Performance of the Australian Urban Water Industry and projections for the future*, page 14.

6 Demand Forecasts
Continued

Change), excluding Sydney Water. Under this scenario, the urban water industry workforce will need to increase by 9.4% by the end of 2009 and a total of 13.3% by 2017.

As noted above, most water utilities forecast an increase in staff numbers through to 2017 at the utility level. However, at the job role level, the direction of forecasts (ie. increase or decrease) can differ. For example, two water utilities predicted an **increased** demand for mechanical engineers and reported their 'forecast assumptions' for this role as:

- "Increases in 2009 (greater in Scenario 2) due to Capital Works Programs. Then in 2012 reduce to current levels."
- "Slight increases due to more complex network and systems."

In contrast, another utility predicted a **decrease** in demand for mechanical engineers as work currently undertaken by this job role will be contracted out in the future. This approach does not change the supply demand on the water industry as a whole.

In many instances, demand forecasts were based on the assumption that certain work will be outsourced in the future. Within the current project, we were unable to determine whether this was: (a) a proactive strategy driven by business needs, or (b) a reactive response, based on an assumption of increasing difficulty in ability to attract and retain a suitable workforce.

In the next chapter we compare these demand forecasts with the supply forecasts from Chapter 5, to provide a workforce 'gap analysis' through to 2017.

7. Gap Analysis

7.1 Introduction

In this chapter, we show the gap between the aggregate labour demand and supply forecasts, for each Scenario, for the calendar years ending 2009, 2012 and 2017. As in previous chapters, we present the outcomes including and excluding Sydney Water.

7.2 Comparing likely and potential outcomes

The 'best case', 'worst case' and 'most likely' outcomes are shown in Chart 20. The **best case** outcome is the one with the **smallest** gap between demand and supply. This occurs under Scenario 1 for demand (Predicted Change), including Sydney Water (see Chart 18.1). Under this outcome, the extent of the 2017 gap between demand (the industry will need) and supply (what the industry will have) is 39.6% of the existing workforce (3.9% increased demand plus 36% diminished supply).

The **worst case** outcome is the one with the **largest** gap between demand and supply. This occurs under Scenario 2 for demand (Unplanned Change), excluding Sydney Water (see Chart 20.2). Under this outcome, the extent of the 2017 gap between demand and supply is 50.3% of the existing workforce (13.3% increased demand plus 37% diminished supply).

We believe the **most likely** outcome occurs under Scenario 1 for demand (Predicted Change) excluding Sydney Water. We believer this is most likely because:

- the scenario – predicted change – is more likely than unplanned change
- it is based on data consistent with trends of the majority of participating water utilities.

Under the most likely outcome, the extent of the 2017 gap between demand and supply is 44.3% of the existing workforce (7.3% increased demand plus 37% diminished supply).

Chart 20: Gap (Demand/Supply) forecasts through to 2017 – all job roles

Chart 20.1: Including Sydney Water

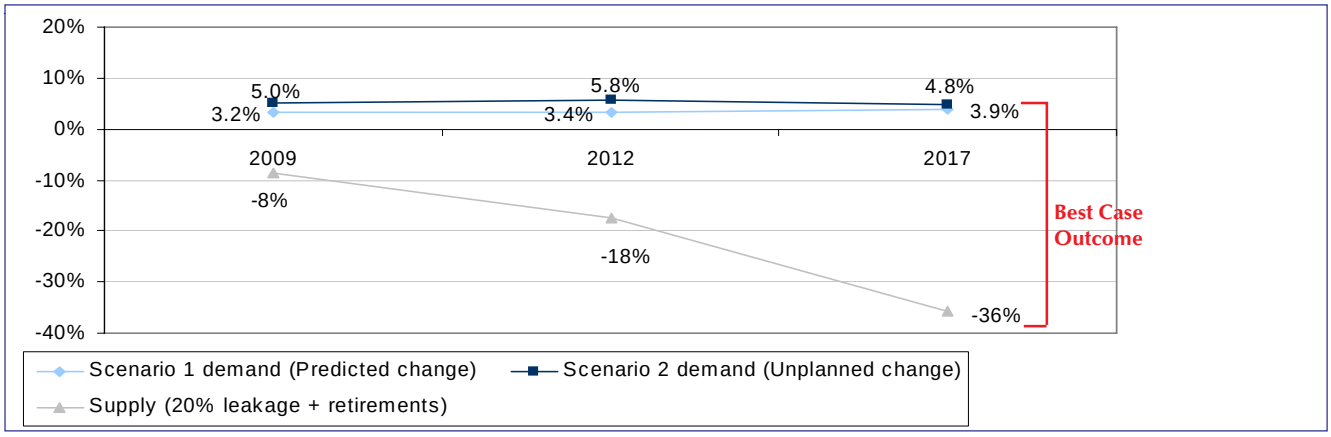
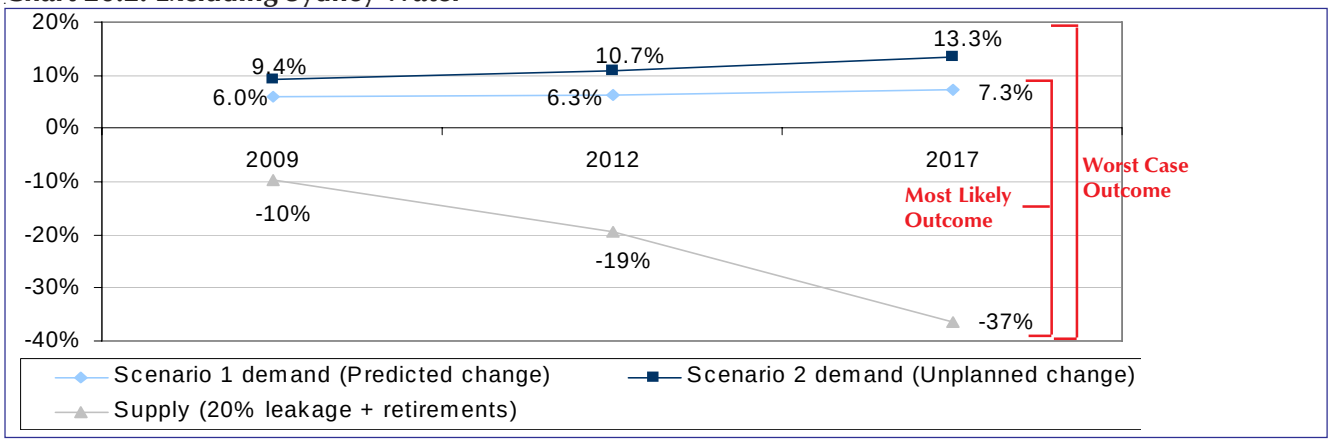


Chart 20.2: Excluding Sydney Water



It may be useful to consider the 'most likely' percentages in terms of the industry's current aggregate workforce of 19,500. By 2017, the 44.3% gap represents a shortfall of about 8,600 employees. Within the short term (ie. 2009) the size of the gap (16%) is much smaller but still significant, representing a shortfall of about 3,100 employees within the next two years.

7.3 Gap analysis for significant job roles

– Civil Engineers and Water Industry Operators

In this section we present the gap analysis for two of the most significant job roles within the job role framework: Civil Engineers and Water Industry Operators. These job roles are significant as they are large: Water Industry Operators comprise 18%, and Civil Engineers comprise about 10% of the utility workforce. In addition, the high turnover rate for Civil Engineers highlights the need for effective workforce planning for this job role

For Civil Engineers (see Chart 21):

- the best case outcome is the one with the smallest gap between demand and supply. This occurs under Scenario 2 for demand (Unplanned Change), including Sydney Water (see Chart 21.1). Under this outcome, the extent of the 2017 gap between demand (the industry will need) and supply (what the industry will have) is 36% of the existing workforce (-0.1% demand plus 36.1% diminished supply);
- the worst case outcome is the one with the largest gap between demand and supply. This occurs under Scenario 1 for demand (Predicted Change), excluding Sydney Water. Under this outcome, the extent of the 2017 gap between demand and supply is 45% of the existing workforce (13.2% increased demand plus 31.8% diminished supply);
- we believe that this 'worst case' outcome is the most likely outcome for Civil Engineers.

It is interesting that demand for Civil Engineers is forecast to be lower in Scenario 2 than in Scenario 1; this is contrary to the trend for the water utility workforce as a whole (see Chart 20). However, the extent of the most likely demand/supply gap for Civil Engineers in 2017 (45%) is similar to the comparable forecast for the workforce as a whole (44.3%).

Considering the gap for Civil Engineers in terms of the total water utility workforce of about 19,500:

- Civil Engineers are about 9.4% of the current workforce of 19,500, ie. 1,830 Civil Engineers.
- The most likely 2017 demand/supply gap for Civil Engineers is 44.9%
- This means the workforce may need an additional 820 Civil Engineers by 2017.

Table 3 shows these estimated gaps for all job roles. These estimates should be taken as indicative only, as they are based on data and assumptions which need to be tested throughout the wider urban water industry.

7. Gap Analysis
Continued

Chart 21: Gap (Demand/Supply) forecasts through to 2017 – Civil Engineers
Chart 21.1: Including Sydney Water

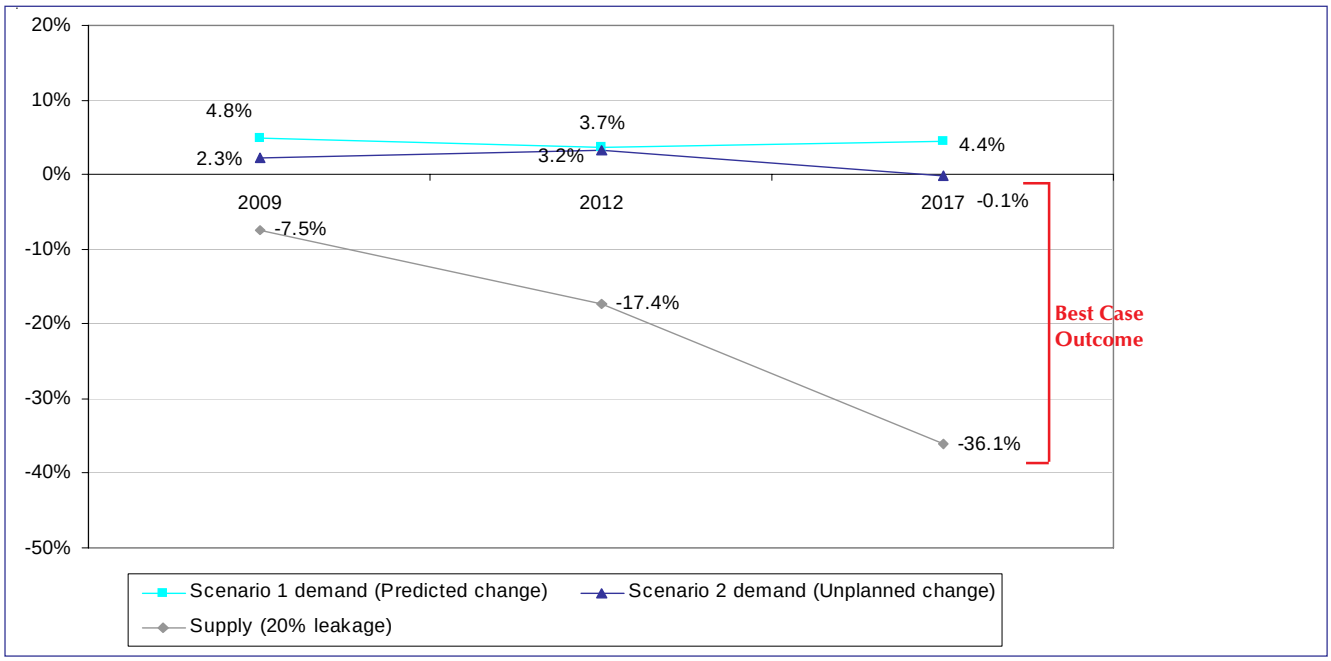
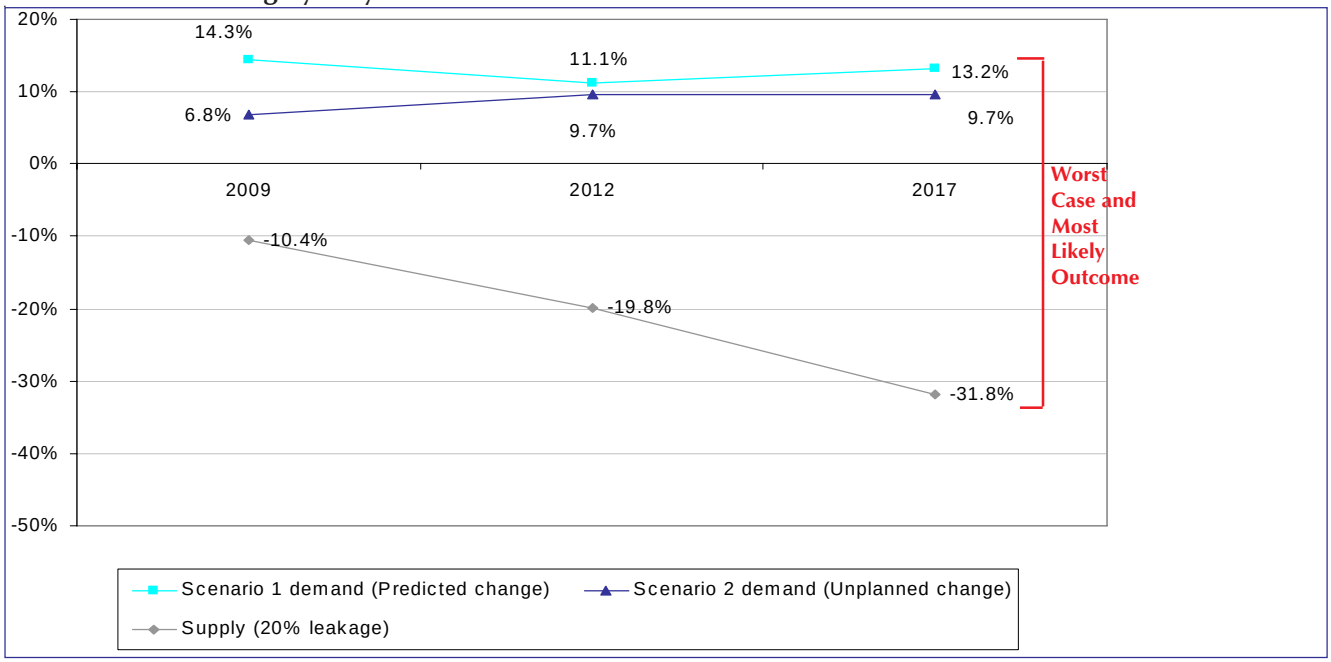


Chart 21.2: Excluding Sydney Water



7. Gap Analysis
Continued

For Water Industry Operators (see Chart 22):

- the best case outcome is the one with the smallest gap between demand and supply. This occurs under Scenario 1 for demand (Predicted Change), including Sydney Water. Under this outcome, the extent of the 2017 gap between demand (the industry will need) and supply (what the industry will have) is 33.5% of the existing workforce (1.8% demand plus 31.7% diminished supply);
- the worst case outcome is the one with the largest gap between demand and supply. This occurs under Scenario 2 for demand (Unplanned Change), excluding Sydney Water. Under this outcome, the extent of the 2017 gap between demand and supply is 56.8% of the existing workforce (13.3% increased demand plus 43.5% diminished supply);
- we believe the most likely outcome occurs under Scenario 1 for demand (Predicted Change) excluding Sydney Water. Under this outcome, the extent of the 2017 gap between demand and supply is 47.2% of the existing workforce (3.7% increased demand plus 31.7% diminished supply). This is slightly higher than the comparable forecast for the workforce as a whole (44.3%).

Chart 22: Gap (Demand/Supply) forecasts through to 2017 – Water Industry Operators

Chart 22.1: Including Sydney Water

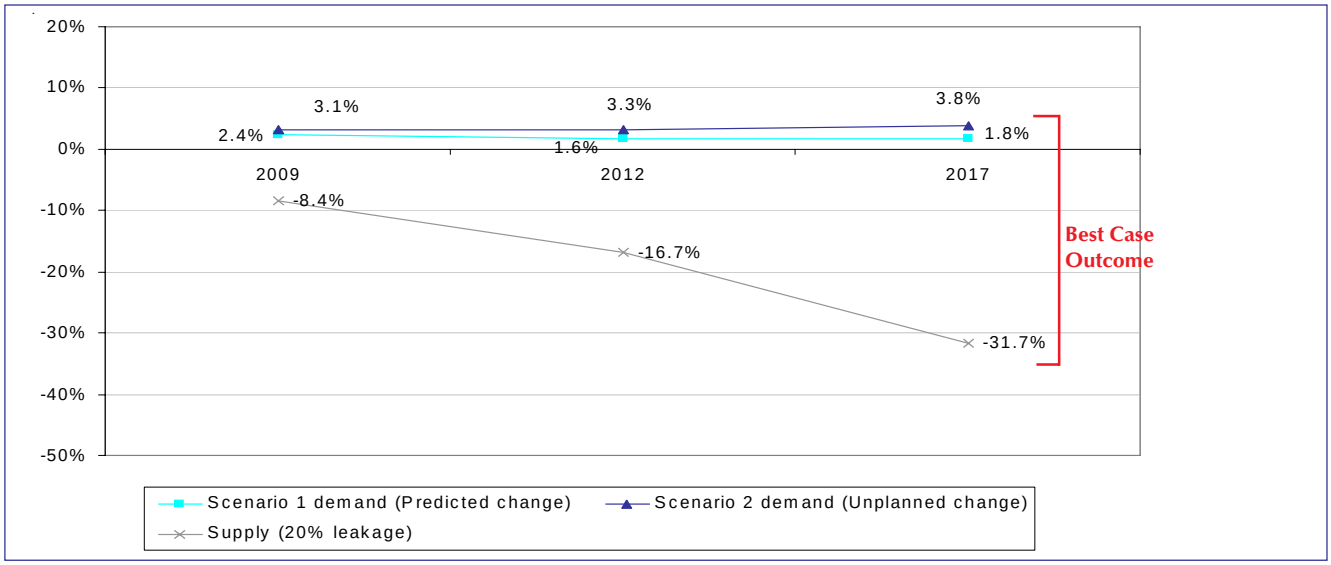
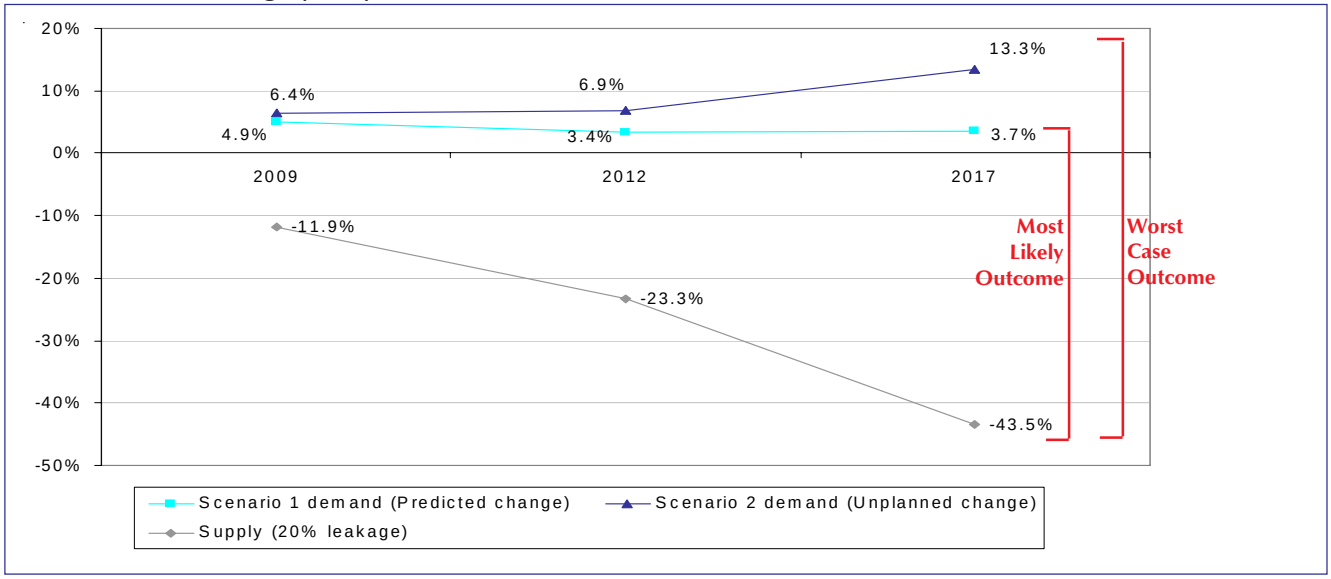


Chart 22.2: Excluding Sydney Water



7. Gap Analysis
Continued

Considering the gap for Water Industry Operators in terms of the total water utility workforce of about 19,500:

- Water Industry Operators are about 18% of the current WSAA members' workforce of 19,500, ie. about 3,500[18] Water Industry Operators.
- The most likely 2017 demand/supply gap for Water Industry Operators is 47.2%
- This means the workforce may need an additional 1,650 Water Industry Operators by 2017.

Table 3 shows these estimated gaps for all job roles. These estimates should be taken as indicative only, as they are based on data and assumptions which need to be tested throughout the wider urban water industry.

7.4 Gap analysis for other significant job roles

Table 3 shows the estimated headcount gaps for all job roles in Scenario 1, 2017 in terms of the total WSAA members'workforce of about 19,500. These estimates should be taken as indicative only, as they are based on data and assumptions which need to be tested throughout the wider urban water industry.

7.5 Further research required

As shown above, there are different outcomes under the Predicted Change and Unplanned Change scenarios. However, these are not as significant as differences between the forecasts which include and exclude Sydney Water. This suggests the need for two activities:

- In the short term, gather more data to obtain a more representative sector analysis. Also, if data from more water utilities were available, this would enable additional data analysis of homogeneous water utilities, eg. large versus small water utilities; policy versus operational water utilities.
- In the longer term, WSAA needs to examine which scenarios are emerging, and adjust forecasts and strategies accordingly.

Table 3: Estimated headcount gaps for all job roles in Scenario 1, 2017

Job Role	Extrapolated Job Role Headcount	Most Likely % Gap in December 2017	Most Likely Headcount Gap in December 2017 (based on 19,500 FTE)
Corporate Manager	506	-48.80%	-247
Operational Manager	1,472	-35.90%	-528
Civil Engineer	1,830	-44.90%	-822
Mechanical Engineer	98	-79.90%	-78
Electrical Engineer	152	-106.70%	-162
Process/Chemical Engineer	208	-52.30%	-109
Environmental Engineer	298	-35.50%	-106
Civil Para Professional	681	-62.70%	-427
Mechanical Paraprofessional	144	-47.00%	-68
Electrical Paraprofessional	62	-77.80%	-48
Environmental Paraprofessional (Engineering	64	-57.30%	-37
Environmental Professional (Scientific)	465	-28.40%	-132
Microbiology Professional	157	-47.10%	-74
Chemist Professional	105	-96.30%	-101
Environmental Paraprofessional (Scientific)	213	-64.30%	-137
Microbiology Paraprofessional	33	-43.60%	-14
Chemist Paraprofessional	62	-37.60%	-23
Electrical Tradesperson	395	-46.90%	-185
Mechanical Tradesperson	1,497	-42.60%	-638
Construction &Maintenance - Water	2,020	-42.70%	-863
Plant Operator -Water	572	-48.70%	-279
Plant Operator -Wastewater	887	-60.60%	-538
Business Support Professional	3,493	-36.80%	-1,285
Business Support Paraprofessional	4,063	-44.10%	-1,792
	19,477		-8,692

18 Numbers rounded to reflect the approximate nature of this exercise.

8. Discussion and conclusion

Water utilities share many of the challenges facing organisations in the developed world, including: an ageing workforce and consequent retention issues; a workforce which demands flexibility and has a dynamic concept of 'career'; and skills shortages due, among other things, to the rapid rate of cultural, scientific and technological changes.

In addition, this project has highlighted specific challenges for urban water industry water utilities. The most pressing of these are:

- There is a sizeable workforce gap forecast for the future. This is influenced to some extent by increasing demand – particularly over the next two years – but in the longer term through to 2017 the gap will mainly be driven by the large number of retirements and also resignations.
- Water utilities have a relatively old workforce, suggesting a relatively large number of impending retirements and highlighting the need for knowledge transfer, attraction and retention, and succession management strategies.
- There is a high turnover of Civil Engineers. This job role is core to the industry and represents about 10% of water utilities workforce.
- The current workforce is generally highly experienced but is relatively inflexible - permanent, full-time, relatively old, long tenured - and therefore potentially resistant to change.
- Some water utilities are not competitive in relation to salaries for some job roles and this may affect their ability to attract and retain staff.
- In addition to a range of current skill deficits, several skills will become increasingly important in the future. These are: asset management, project management, and commercial acumen/cost management.

The findings from this report has been considered by the WSAA Board in early 2008. While pursuing solutions, WSAA will work to gather workforce supply/demand data from a larger number of water industry organisations (employers and peak bodies) so that utility differences in terms of size, region and service type can be better understood. Ideally, this research would include information on non-employee workers in the sector, eg. consultants and contractors. It could also take into account other issues highlighted in this report, such as 'churn/leakage' factor.

Appendix 1 - Skills, Current and Future

Background

The International Centre for Excellence in Water Resource Management[19] recently conducted research to:

- Identify gaps in current water management skills, training and education services, and
- Highlight where solutions are required to meet the needs of the Australian water industry, government and community over the next decade.

The preliminary report found that:

- There is an overall shortage of technical skills in the industry.
- A wide range of new skills are required owing to wider portfolio responsibilities such as rivers management, wetland design, water sensitive urban design, water trading and so on. These new responsibilities often require training across a broad mix of disciplines, including engineering, biology, economics, sociology, marketing and business management systems.
- Non-technical' skills are also essential for a fully skilled workforce; these include communication skills, customer service skills, problem solving ability, and the acceptance of the 'life-long learning' concept.

Water Utility Skills Analysis - Methodology

Respondents were asked to evaluate current skills and forecast future skill requirements within their utility. For this exercise, a common skills framework was used, and this is shown in **Appendix 6**. The framework has two main groupings, each with two sub-groups:

- Industry specific skills, ie. Industry Knowledge, Technical Skills
- Generic skills, ie. People Skills, Business Skills.

The ratings from all respondents were aggregated[20] and are shown in Appendix 6. The analysis of these ratings is shown in the following sections.

Water Utility Current Skills Ratings

In summary, the major deficiencies relating to skills of current staff are as follows:

19 International Centre for Excellence in Water Resource Management for the National Water Commission 2005, *Gaps in skills, training and education in water management, preliminary report*, October 2005, Canberra Cited by Govt & Community Safety Industry Skills Report April 2007, p.28

20 Using averages weighted in terms of headcount in each job role in each utility.

Industry Knowledge and Technical Skills Deficiencies (Current)

- **Keeping abreast of developments in technology and science**, particularly for four job roles: *Chemist Professional, Microbiology Paraprofessional, Microbiology Professional, and Electrical Engineer*
- **Environmental sustainability –** for most job roles
- *Civil Engineers* have current skills deficiencies in a range of **technical** skills, plus **environmental sustainability** skills
- *Electrical Engineers* have current skills deficiencies in a range of **technical** skills (particularly **keeping abreast of developments in technology and science)**, plus **environmental** skills

People and Business Skills Deficiencies (Current)

- **Leadership** – particularly for *Professional Engineers* and *Managers*
- **Customer service, relationship building, cultural awareness, people management,** particularly for *Professional Engineering* and *Manager* job roles
- **Strategic thinking and business planning skills** – for *Professional Engineers* and *Environmental Paraprofessionals (Scientific)*
- **Risk management/security –** for a number of *Professional* and *Paraprofessional Engineering/Science* job roles
- *Environmental Paraprofessionals (Scientific)* – deficiencies noted for almost all **people** and **business** skills

Water Utility Forecast Skills Ratings

Survey respondents rated how important each skill would become over the next 5-10 years. In summary, the following skills will become increasingly important (in descending order of importance within each major skills group):

Industry Knowledge and Technical Skills Forecasts

- Environmental sustainability and knowledge of local environmental conditions
- Asset management
- Process technology, water quality, waste and wastewater, biosolids, sludge
- Developments in science and technology

Appendix 1 - Skills, Current and Future
Continued

- Local environmental conditions
- Almost all **industry and technical** skills for *Environmental Engineers* (including **environmental sustainability** and **engineering** skills, in particular)
- Almost all **industry and technical** skills for *Environmental Professional (Scientific)* (including **environmental sustainability** and **water quality standards**, in particular)
- Almost all **industry and technical** skills for *Process/ Chemical Engineer* including **Developments in science and technology** and **Process technology, water quality, waste and wastewater, biosolids, sludge**
- Almost all **industry and technical** skills for *Mechanical Engineer* including **Developments in science and technology.**

People and Business Skills Forecasts

Almost all **People and Business** skills will be increasing important in the future. Those likely to be 'critical' in the future mainly relate to *Managers* and *Professional Engineers* and include:

- **Project management**
- **Strategic thinking and business planning**
- **Relationship building, cultural awareness**
- **Commercial acumen and cost management**

Also highly important are **Customer service** and **Process improvement skills.**

Summary

In summary, the main current skills deficits are:

- Keeping abreast of developments in science and technology
- Environmental sustainability
- Technical skills such as environmental engineering and Process technology, water quality, waste and wastewater, biosolids, sludge
- Leadership and a range of 'people skills' (managers and professional engineers)
- Strategic thinking, business planning and risk management

These findings are consistent with the research from the International Centre for Excellence in Water Resource Management.

In the future, most of these skills will be increasingly important, according to survey respondents. In addition, several other skills will become increasingly important in the future. These are:

- Asset management
- Project management
- Commercial acumen and cost management.

WSAA and other peak bodies may be able to play an important role in co-ordinating investment in skills development in these areas.

Appendix 2 - Critical workforce issues

Survey respondents reported on their current and future critical workforce issues. Five main areas were identified: attraction, retention, skill shortages, the changing nature of the workforce, and workforce planning and within these consistant themes emerged.

Attraction

Respondents identified several challenges to their ability to attract suitable staff. Nationally, there is a shortage of staff with generic science and engineering skills (professional and paraprofessional). In addition, because of the increasing specialisation of water and wastewater processes, water utilities would like to attract university-educated professionals (rather than vocationally-educated paraprofessionals); but there is an acute shortage of staff with these specialist skills.

Within this tight labour market, water utilities are not usually competitive with private sector firms in terms of salary and/or benefits.

In working to a solution to these challenges, some water utilities struggle to find the correct balance between: recruiting people with 'ready-now' skills, and recruiting and developing people with appropriate aptitude.

In addition, some regional water utilities experience difficulty in attracting water industry skills to their area.

Retention

Water utilities experience challenges in retaining older workers and younger workers. As shown earlier in this report, the water industry has a mature age profile with nearly 50% of staff over 45 years of age. The continual loss of experienced workers through retirement highlights the importance of knowledge management/transfer and succession management within water utilities.

At the other end of the spectrum, some water utilities have problems retaining young high performers. Several respondents described their utility as a 'training ground' to provide skilled personnel for private sector organisations. One utility reported that turnover in the 1-3 year tenure range is significant, reflecting the fact that private organisations 'poach' workers once they have received valuable industry training and experience.

Skills

The previous chapter discussed issues regarding specific skills, as identified from quantitative survey ratings. Via open-ended survey comments, respondents reinforced the points that:

- major capital works development over next five years would require increased project/contract management, engineering and asset management skills
- impending retirements contribute to shortages of current skills
- emerging technology (greater automation, complexity, diversity) contribute to shortages of new skills.

Changing nature of the workforce

The water industry operates in a complex and rapidly changing environment. The above attraction, retention and development challenges need to be managed in relation to a workforce with increasing demands for flexible work conditions (eg. ways of working, hours of work, work/life balance, attitudes to work/career, etc). In particular, flexible work conditions are required to attract women and younger workers.

Many water utilities are also increasing their proportion of 'contingent' staff such as contractors, consultants, fixed term employees, and casual staff, as well as outsourced service providers.

Workforce planning

Survey respondents were asked to rate their preparedness for potential loss of skills, corporate knowledge and leadership. The response was that they were prepared to 'some extent' (average of 3 on a 5 point scale) but admitted this preparedness tended to be short term and reactive. Within most water utilities, workforce planning capability is in a fairly embryonic state particularly in smaller and regional organisations.

Appendix 3 - Infohrm Pty Ltd and Program

Infohrm Pty Ltd

Infohrm Pty Ltd leads the world in future-focused workforce and business intelligence solutions with a unique blend of knowledge and experience, supported by the most sophisticated reporting, analysis and consulting tools available. Established in 1981, the Infohrm Group consults exclusively in the field of planning, measuring and reporting on human capital in organisations. Infohrm provides consulting, training and benchmarking services to organisations throughout Australasia, North America and Europe.

Through our 27 year history we have developed a reputation for the integrity and quality of our data capture and analysis, and are considered international leaders in the area of human capital reporting. Please refer to our website www.infohrm.com for further information on our background and service offerings. The following provides a partial list of Infohrm members globally.

Infohrm Program

Infohrm established the Infohrm Benchmarking and Reporting Program in Australia in 1992. Since that time, the Infohrm Program has become the definitive standard for measuring the performance of the HR function and people management issues within organisations, both within Australia and internationally. To support the use of the benchmark standards, Infohrm continues to invest significant resources in developing consistent measures and definitions, as well as auditing the data.

While the technology we developed to support the Infohrm Program is globally unique, we believe our competitive advantage lies – not only within the underlying technology – but within our expert professional knowledge of the HR and business operating environments. This enables us to assist organisations to use data to make decisions which add value to their business.

The core purpose of the Infohrm Program is to:

- Provide organisations with a comparison of their performance on a range of people management measures
- Facilitate internal benchmarking of workforce data
- Use this information to identify people management priority improvement areas
- Identify and promote HR 'better practices' through conducting qualitative HR best practice studies, both in Australia and internationally.

The Infohrm Program currently supports over 120 members worldwide and over 60 Australian and New Zealand members, encompassing over 2,000,000 employees.

Appendix 4 - Project Scope

In scope

- All job roles (through payroll)
- All members and associate members invited to participate in the project
- Demand forecasting data gathering via survey only (not interview)
- Sub-industry analysis (details of relevant sub-industry groups to be advised when member participation was finalised)
- Formal presentation of final report to Steering Committee as well as written report
- Participating members will be given the opportunity to purchase from Infohrm, a confidential report customised for their company.

Out of scope

- Contractors and other workers not on payroll
- Videoconference to members to explain project and gain understanding and commitment
- Consultation with external stakeholders such as universities and employee unions
- Strategies to address gap (Stage 2)
- Case study approach (potentially Stage 2)
- External supply forecasting (potentially Stage 2)

Appendix 5 - Job Role Framework Identified for this Project

A job role framework is a way of grouping together different types of job roles into meaningful groups across an industry. The creation of a job role framework for the WSAA project helped to ensure all water utilities were using the same information when considering workforce demand and supply forecasting. Below are the job roles which were agreed and used for this project:

Job Family	Description	Job Role	Example job roles
Manager	Managers are those at the third and fourth level in the organisation. Exclude CEO and CEO's direct reports (ie. the first and second levels on the organisation).	Corporate manager	IT Manager, Human Resource Manager, Finance Manager, Corporate Services Manager, Policy and Planning Manager,
		Operational manager	Engineering Manager, Retail Manager,
Engineer - professional	Engineering Professionals are degree qualified or are at a level in the organisation that requires the job role to be performed at a professional standard.	Civil Engineer	Civil Engineer, Project Manager, Asset Manager
		Mechanical Engineer	Mechanical Engineer, Project Manager
		Electrical Engineer	Electrical Engineer, Project Manager
		Process/Chemical Engineer	Process/Chemical Engineer, Project Manager
		Environmental Engineer	Environmental Engineer, Project Manager

Continued on next page

Appendix 5 - Job Role Framework Identified for this Project
Continued

Continued from previous page

Job Family	Description	Job Role	Example job roles
Engineer - paraprofessional	Engineering Paraprofessionals are not required to possess degree level qualifications for the role but are highly experienced in the field of expertise.	Civil Paraprofessional	Civil Engineering Technician, Civil Engineering Associate,
		Mechanical Paraprofessional	Mechanical Engineering Technician, Mechanical Engineering Associate, Plumbing Engineering Technician, Plumbing Engineering Associate,
		Electrical Paraprofessional	Electronic Engineering Technicians, Electrical Engineering Associate,
		Process/Chemical Engineer	Chemical Engineer
		Environmental	Environment Officer
Science/ technical professionals	Science/technical professionals are degree qualified or are at a level in the organisation that considers the job role to be performed at a professional standard.	Environmental Professional (Scientific)	Environmental Scientist
		Microbiology Professional	Microbiologist
		Chemist Professional	Chemist
Science/technical paraprofessionals	Science/technical paraprofessionals are not required to possess degree level qualifications for the role but are highly experienced in the field of expertise.	Environmental Paraprofessional (Scientific)	Environmental Officer/Technician, Technician/Officer
		Microbiology Paraprofessional	Technician/Officer
		Chemist Paraprofessional	Chemistry Technician, Chemistry Technical Officer, Chemistry Lab Technician
Trades	Tradespersons possess a trade certificate. Includes Apprentices.	Electrical Tradesperson	Electrician, Electronic Instrument Tradesperson, Apprentice
		Mechanical Tradesperson	Fitter, Plumber, Painter and Decorator, Carpenter, Blacksmith, Apprentice
Water Industry Operators	Water Industry Operators generally acquire their skills through on-the-job training and/or a relevant VET Certificate 2/3.	Construction and Maintenance - Water	Maintenance Operator/Assistant, Operations Assistant, Meter Restrictor/Reader
		Plant Operator - Water	Water Treatment Plant Operator/Assistant Operator, Water Sampler
		Plant Operator - Wastewater	Wastewater Treatment Plant Operator/Assistant Operator, Assistant Reuse Operator
Business Support Professional	Business Support Professionals are degree qualified or are at a level in the organisation that considers the job role to be performed at a professional standard. Business Support paraprofessionals are not required to possess degree level qualifications for the role but are highly experienced in the field of expertise.	Business Support Professional	Accountant, Learning and Development Co-ordinator, IT Support Officer, Community Liaison Officer
		Business Support Paraprofessional	Payroll Clerk, Accounts Clerk, Administration Officer, Personal Assistant

Appendix 6 - Core skills framework identified for this project

As this was a WSAA Member specific project, a common core skills framework was used to evaluate current skills and forecast future skill requirements. The agreed core skills framework for the project is shown below. It consists of two main groupings, each with two sub-groups:

- Industry specific, ie. Industry Knowledge, Technical Skills
- Generic, ie. People Skills, Business Skills.

INDUSTRY SPECIFIC

Industry Knowledge

1. Understanding of plant operating processes
2. Business process knowledge
3. Statutory and regulatory requirements including governance
4. Water quality standards
5. Environmental knowledge, Sustainability (General)
6. Knowledge of local environmental conditions (eg. soil, irrigation)

Technical Skills

1. Environmental engineering skills
2. Developments in technology and science
3. GIS, Modelling, Mapping
4. Asset management, including Engineering Standards
5. Process technology, Water quality, Waste and Wastewater, Biosolids, Sludge

GENERIC

People Skills

1. Customer service
2. Relationship building, Cultural awareness
3. People management
4. Leadership

Business Skills

For the current skills analysis, the following rating scale was used:

0 = skill not required by this job role

1 = skill levels are adequate or better

2 = skills are absent or underdeveloped, but programs are in place to address these

3 = skills are absent or underdeveloped, but there are NO programs in place to address these

For the future skills rating, the following scale was used:

-1 = skill will become less important in the future

1 = skill will become slightly more important in the future

2 = skill will become more important in the future

3 = skill will become critical in the future

Appendix 7 - Project Scenarios

At its meeting on 13 September 2007, the Steering Committee for the WSAA Skills Shortages Project considered the external factors likely to affect the industry over the next 5-10 years. The purpose of this was to identify scenarios (or 'likely future states') to serve as the basis for forecasting future workforce needs. The Steering Committee noted that scenarios:

- Help deal with a highly uncertain environment and encourage planning which anticipates a range of possible futures, and
- Facilitate consideration of longer term forecasts.

The Committee also noted that, when the variation between different scenario forecasts is large, this increases the importance to initiate two activities:

- Monitor the assumptions underlying the scenario to see which is unfolding or which set of new conditions is emerging so we can assess their implications.
- Implement human resource management programs which provide maximum workforce flexibility, eg. using contract staff, external transfers, temporary assignments.

Taking all influences into account, two likely scenarios were identified**: 'Predicted Change'** and **'Unplanned Change'**. A description of these scenarios is provided on the following pages.

Scenario 1: Predicted Change

As its name suggests, the Predicted Change scenario will see many changes over the next 5-10 years however these changes have been identified and have been or are being planned for.

Because Scenario 1 reflects predicted change, business and workforce implications of this scenario are likely to be identified in each utility's strategic business plan. For example, implications of Scenario 1 may include:

- Greater involvement of private sector in implementing a diverse range of water supply solutions
- Greater need for customer services skills
- Water utilities need to continue to support two different types of workforces: (a) construct/maintain and (b) high-tech
- Continuing need for continuous skills development.

Scenario 1 Predicted Change

Variable	Scenario 1: Predicted Change
Infrastructure development	Consistent with utility's existing business plans and capital works program
Climate change	A continuing scenario of lower rainfalls and extreme weather patterns
Diversified water supply solutions	The sector will continue to identify and implement a diverse range of water supply options.
Water Sensitive Urban Development	Will have low impact on the industry as it will be confined to new developments.
Water pricing	Water prices will double
Economy	The Australian economy continues to grow in line with recent trends
Regulatory framework	Changes (increased regulation) are consistent with industry expectations
Technological developments	The rate of technological and scientific advances continues in line with recent trends.
Consumer expectations	While there is widespread acceptance of need to reduce water usage, water access is considered a right.
Asset management	Greater emphasis on asset management as assets age. In addition, water utilities continue to develop more sustainable assets

Appendix 7 - Project Scenarios
Continued

Scenario 2: Unplanned Change

Under the Unplanned Change scenario, some or all of the following changes may occur (see middle column in table below) with implications as per the third column:

Factors impacting both scenarios

Regardless of which scenario emerges, it was generally agreed that the following would take place:

- **Population change** will be as per regional forecasts.
- **Institutional restructure**: Current rate of change continues, ie. government centralisation. In lead up to restructure, water utilities become less attractive as an employer due to uncertain future. After restructure, as part of a government, water utilities become less attractive employers due to factors such as employment brand, lack of flexibility to offer incentives, etc.
- **Security**: Increased demand for security/risk management provisions has implications for training, and staffing availability (eg. ensuring staff on call).
- **Sustainability:** Energy management – new skills. Increased need for community engagement. More sophisticated decision making. Culture change with decreased focus on financials and increased focus on social and environmental factors.
- **Asset management:** Greater emphasis on assets as they age. Water utilities continue to develop more sustainable assets.

On the workforce supply side it was noted that:

- a continuing mining boom could result in further tightening of the labour market, particularly in affected regions
- a mining industry bust could result in greater availability of critical job roles.

Appendix 7 - Project Scenarios
Continued

Scenario 2 Unplanned Change

Variable	Scenario 2: Unplanned Change	Implications of Scenario 2
Infrastructure development	Significant variations to Capital Works Program due to volatility of other scenario variables.	Need for flexibility and agility to change to radically changing circumstances. Need for increased political acumen.
Climate change	Severe, sustained drought conditions (to extent of dry dams), coupled with erratic incidents of cyclones, flooding etc. High likelihood of natural disaster.	New and/or more water supply solutions will be needed. Disaster Recovery Planning (and potential implementation) assumes greater importance.
Diversified water supply solutions	Significant health incident(s) result in total rejection of recycled water.	Reduced demand for recycled water and increased demand for supply options such as desalination, dams, etc.
Water Sensitive Urban Development	Emergence of 'eco-villages' which become self-sufficient in water supply (and potential water traders).	Eco-villages destabilise the industry, making it difficult to anticipate demand and plan for services. Potential for eco-village supply to contaminate main supply.
Water pricing	In response to significant increases in water price (and greater incidence of self-sourcing) there is reduced demand for water from water utilities.	Water utilities become less financially viable.
Economy	Recession leads to lower levels of business/residential development.	Reduced rate of increase in demand for water.
Regulatory framework	National management of water (Water Bank).	Greater bureaucracy within utility but loss of planning roles to central authority. Greater bureaucracy reduces attractiveness of local water utilities as an employer.
Technological developments	(1) Work which previously required specialised skills will be replaced by technology; and/or (2) breakthrough technology will require new, specialised skill sets.	There will be a continuing need to upgrade skills sets – sometimes within quite radical timeframes.
Consumer expectations	Consumers become increasingly more critical and demanding due, for example, to major health/contamination incidents and/or chronic/acute water restrictions.	There is an increasing need for job roles such as: community consultation and education, public relations. Reduced demand for recycled water and increased demand for supply options such as desalination, dams, etc.

Appendix 8 - Comments Regarding Future Skills Needs

Skill	Comment
1. Plant operating processes	In house management of treatment plants
2. Business process	Corporate knowledge management
3. Statutory and regulatory requirements	Water conservation demand will drive regulation In Tasmania there appears to be a move towards greater regulatory requirements so it will be important for industry participants to increase their knowledge in this area. Regulated business
4. Water quality standards	Water Quality is critical aspect of our business
5. Environment, Sustainability	Increasing community awareness and demand, as well as regulations Should scenario 2 issues or similar eventuate then there will be increased pressure from the community to ensure the long-term implications of solutions are acceptable and do not adversely impact on other stakeholder groups. This will require greater investment in understanding environmental matters and designing solutions that consider environmental consequences (whether or not statutory requirements require this consideration). Environment is becoming large focus of our business
6. Local environmental conditions	Increasing community awareness and demand, as well as regulations
7. Environmental engineering skills	
8. Developments in technology and science	
9. GIS, Modelling, Mapping	Modelling and mapping will play an increasingly important role in condition assessments and asset management
10. Asset management, inc Engineering Standards	With long-lived assets in the later parts of their theoretical useful lives condition assessments will become increasingly important for planning. Asset Management is our main focus for improvement

Continued on next page

Appendix 8 - Comments Regarding Future Skills Needs
Continued

Continued from previous page

Skill	Comment
11. Process technology, Water quality, Waste and Wastewater, Biosolids, Sludge	Water conservation and regulation drivers, plus next generation environmental awareness
	Water quality and technological improvement
12. Customer Service	Increasing customer awareness and demand Slight increase in level for field staff as customer service processes are automated and improved
13. Relationship building, Cultural awareness	Labour shortage Important for employee moral and job satisfaction.
14. People Management	Employee engagement and labour shortage HR methods and processes further develop and improve
15. Leadership	Some slight improvement for senior management and supervisors to guide staff through uncertainty.
16. Project Management	Increasing project focus, efficiency and delivery Some slight improvement to meet demands of replacement, rehabilitation and upgrade works.
17. Strategic thinking	Increasingly complex demand and supply issues Major issue for senior management to deal with population growth, scarce resources and increased community expectations.
18. Business planning	Increasingly complex demand and supply issues Increased demand for management transparency and accountability.
19. Procurement and contract management	Increasing supplier versus employee marketplace
20. Risk management, Security	Drought and water supply shortages Current methods and processes are undeveloped to meet future threats and hazards to a level expected by the public.
21. Commercial acumen	Increased management skill to manage suppliers Economic efficiency methods will need to be developed to meet the demands of scarce resources and increase demand for services.
22. Cost management	Increasing supplier versus employee marketplace Economic efficiency methods will need to be developed to meet the demands of scarce resources and increase demand for services.
23. Analysis	Increasingly complex demand and supply issues Some slight improvement for field staff who will be required to take on more responsibly and solve day to day problems themselves.
24. Process improvement	Complexity and drive for efficiency and project delivery More responsibility for planning, implementation and review will be required at supervisory level as organisation grows.
25. OH&S	Require some fine-tuning as works methods and techniques change with technology improvements.

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Notes to readers:

1. The participating WSAA Members are:

Sydney Water

Water Corporation

SA Water

Melbourne Water

Goulburn-Murray Water

Hunter Water

Yarra Valley Water

Sydney Catchment Authority

City West Water

ActewAGL

Ipswich Water

Goulburn Valley Water

Central Highlands Water

Gosford City Council

Hobart Water

Esk Water

Warwick Water

Gladstone Area Water Board

2. Variations to data

The data from Sydney Water was somewhat inconsistent with the other data collected with a much lower turnover (4% as opposed to 9% in the other data) and consequently a lower growth requirement. In some cases the data has been excluded to normalise and reflect the general water industry trends. A notation has been included where Sydney Water data has been excluded.

3. Job Families and Job Roles

Due to the large variation in job descriptions between the participants, high level definitions are referred to with in the report. For example the job family 'Business Support Professional' has 2 job roles 'Business Support Professional' includes Accountant, Learning and Development Co-ordinator, It Support Officer, Community Liaison Officer, while the 'Business Support Paraprofessional' job role includes Payroll Clerk, Accounts Clerk, Administration Officer and Personal Assistant. A full explanation of the job roles is included in the Appendix 5.