



Government of Western Australia
Department of Training
and Workforce Development

STATE PRIORITY OCCUPATION LIST

Scope,
methodology
and sources

September 2018



Building the workforce to meet the economic and community needs of Western Australia



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This paper is produced by the State Workforce Planning branch of Western Australia's Department of Training and Workforce Development.

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Introduction

This information paper details the process undertaken to create the 2018 *State priority occupation list* (SPOL2018). It is intended as a supplement to the *State priority occupation list – Summary and results* paper. Please refer to that paper for SPOL2018 results and introductory explanatory information.

Both the summary paper, plus detailed occupational profiles for 754 occupations are available at the Department of Training and Workforce Development (the Department) website: dtwd.wa.gov.au/spol.

The Department's Economic and Labour Market Analysis (ELMA) team has the responsibility of managing the methodology and generating the SPOL on an annual basis.

Criteria for occupation consideration

The following criteria are applied to determine whether an occupation should be considered for the SPOL.

Valid data

There must be an adequate level of quality information in order to assess and validate the needs of occupations. In practice, this means that the occupation must have a valid Australian and New Zealand Standard Classification of Occupations (ANZSCO) code from the Australian Bureau of Statistics (ABS) at the six-digit level.

The total ANZSCO structure incorporates over 1,350 occupations. However around 600 of these are removed because they do not relate to real occupations. They are statistical purposes 'catch-all' codes (designated 'not further defined' (NFD)) where census or survey respondents do not adequately describe their 'real' occupation¹.

High levels of skill

The occupation must have specialised skills that require extended learning and preparation time. Occupations that do not require post-school qualifications prior to entry, such as construction labourers, process workers and kitchen hands, are therefore not considered for SPOL.

Clear and open pathways

The occupation should have clear education and/or training pathways, with qualifications that can be obtained within Australia, and where the skills learnt can be matched to the requirements of the occupation. Examples such as judges or members of parliament are not considered for SPOL.

The occupation must also operate in an open labour market. That is, there is a regular recruitment process to fill vacancies and there are multiple employers available. Examples such as defence force personnel, police officers and air traffic controllers that operate in a highly regulated market, with tightly controlled recruitment practices and specialist training, are not considered for SPOL.

¹ Example: A person identifying as a 'Manager' would be coded to ANZSCO 100000, rather than a more specific occupation such as Chief Executive Officer, as it is not clear what type of manager they were.

Occupational impact

An occupation will be considered if any disruption in its supply would result in significant impacts more broadly across the industry or the State's economy. These impacts may manifest themselves in higher unemployment and/or slower growth due to supply bottlenecks. For the most part, these tend to be highly skilled occupations, with long training or education lead times, but can also include occupations such as childcare workers which are considered economically important as they help facilitate extra supply across many occupations.

Applying all of these criteria across the ANZSCO classification system leaves a total of 754 occupations to be considered for SPOL each year².

Occupational priority index

A key input to the SPOL is the Occupational priority index (OPI), which represents the output of the Department's statistical analysis of the occupational Western Australian labour market. The OPI actually refers to two distinct indices with separate data sources and inputs.

i A 'market OPI'

Includes direct, market-based factors relating to each occupation, such as;

- employment size;
- future labour demand or supply (FLDOS);
- past labour demand or supply (PLDOS);
- average weekly wages; and
- upcoming job openings.

ii A 'structural OPI'

Includes more long term, structural factors relating to each occupation, such as;

- exposure of workforce to likely retirement;
- change in the median age;
- lead time to enter;
- industry portability; and
- proportion of workers with qualifications.

The mean and standard deviation is calculated for each of these elements. The advantage of using standard deviations is that it allows a valid comparison across all indicators, each of which represent different datasets and would not otherwise be comparable³.

The z-score⁴ for each element is weighted and summed to determine the final score for each index. The weightings and a brief outline of each element of each index.

² The list of eligible occupations is reviewed each year, in consultation with industry advisory bodies, to determine any changes in skill or training requirements of individual occupations.

³ Further information on the use of standard deviations can be found at Appendix 4.

⁴ A z-score (or, a 'standard score') indicates how many standard deviations an element is from the mean.

Table 1 Market OPI weightings

Indicator	Weighting
Employment size	10.0%
FLDOS	20.0%
PLDOS	30.0%
Average weekly wage	10.0%
Job openings	30.0%
Total	100.0%

The five primary, State-based indicators used to determine the market OPI are as follows.

- **Employment size** – Based on the 2016 ABS Census
- **Future labour demand or supply (FLDOS)** and **past labour demand or supply (PLDOS)** – Both based on a number of data sources (see Appendix 5) and provide an indication as to whether current labour supply is broadly meeting demand
- **Average weekly wage** – Based on employee earnings and hours data for full time adult employees (ABS catalogue number 6306.0)
- **Job openings** – based on Monash University’s Centre for the Economics of Education and Training (CEET) data, these are forecasts of emerging vacancies (whether filled or not) for each occupational group

Table 2 Structural OPI weightings

Indicator	Weighting
Retirement exposure indicator	10.0%
Change in median age	15.0%
Lead time	30.0%
Industry portability	15.0%
Occupation qualification usage	30.0%
Total	100.0%

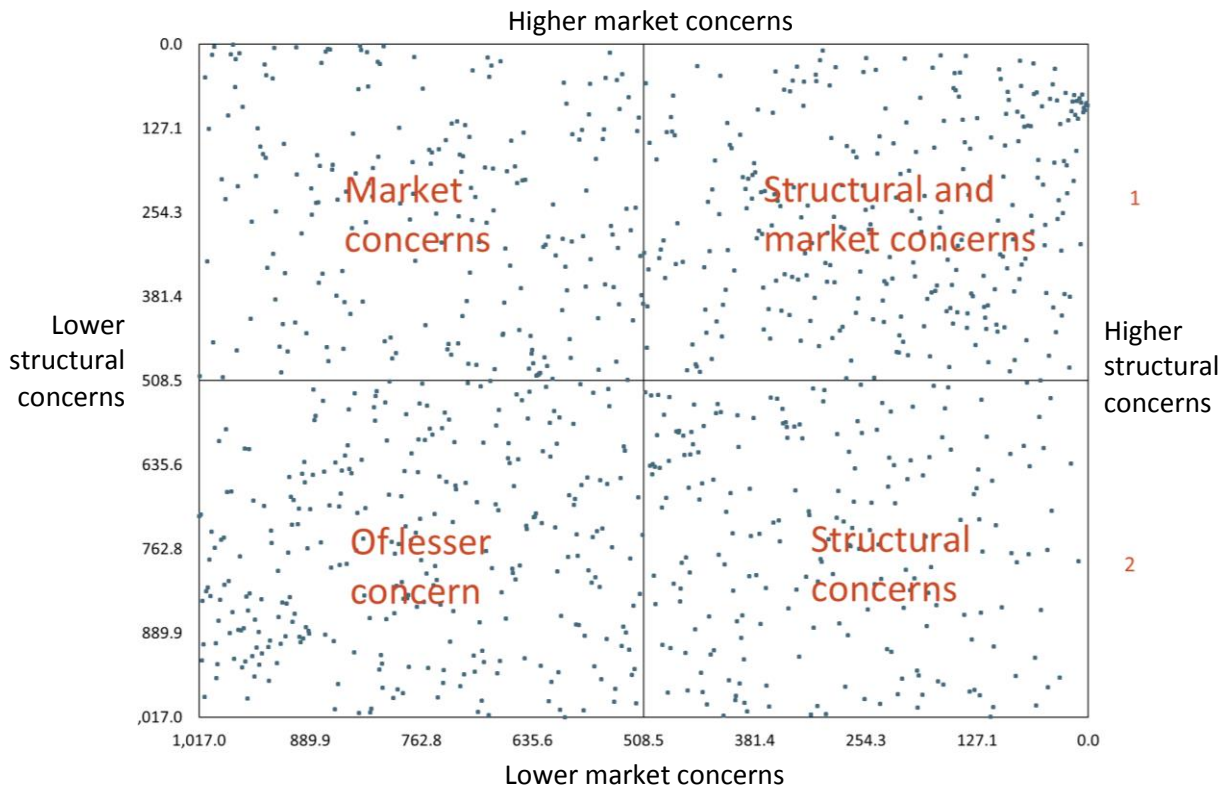
The five primary, State-based indicators used to determine the structural OPI are mostly based on the ABS Census (except for lead time) and can be described as follows.

- **Retirement exposure indicator** – Highlights occupations with a significant proportion of their existing workforce close to, or above, retirement age;
- **Change in median age** – Measures the growth in median age for each occupation between 2011 and 2016
- **Lead time** – Based on the ABS ANZSCO standard definition of lead times for each 6-digit occupation
- **Occupation to industry** – Measures the spread of employment of each occupation across major industry groups as defined by the Australia and New Zealand Standard Industrial Classification (ANZSIC)
- **Occupation qualification usage** – Measures the proportion of an occupation’s workforce with formal qualifications

An occupation's final scores will determine its rank against all other occupations for each OPI. The two ranking values can then be mapped on a scatterplot diagram to provide a two-dimensional view of each occupation's position relative to all other occupations.

Each blue dot in Figure 1 represents one of 1,017 ANZSCO occupations⁵ in Western Australia that are awarded an OPI rank.

Figure 1 Occupational priority index quadrants



The horizontal (x) axis denotes a relative ranking on the structural OPI. The vertical (y) axis represents a relative ranking for the market OPI.

Occupations appearing towards the upper end on the vertical axis are ranked higher on the market OPI and could be said to be experiencing market-driven concerns to a relatively greater degree. This could be because, relative to other occupations, the occupation employs a large number of people, has issues with supply relative to demand, high wage rates and/or a large number of future job openings.

Occupations appearing towards the right side of the scatterplot are ranked higher on the structural OPI. They will be occupations where, relative to other occupations, there are longer education or training lead times, a greater proportion of older workers who are likely to retire, workers operate in many industries, and/or it has strong education or training pathways.

⁵ Please note this number includes all ANZSCO occupations in Western Australia (excluding NFDs). While only 754 are considered eligible for SPOL consideration according to the *Criteria for occupation consideration* outlined earlier, the statistical analysis and OPI ranking is carried out for all occupations.

The scatterplot diagram can then be divided into quarters along the 50th percentile along each axis, or at the ranking value of 508.5 of 1,017 occupations. Each quadrant provides a quick visual indicator of which elements may underlie any issues relating to a specific occupation. Quadrant 1 denotes there are both structural and market issues at play. Quadrant 2 denotes predominantly structural issues, quadrant 3 market issues and so on.

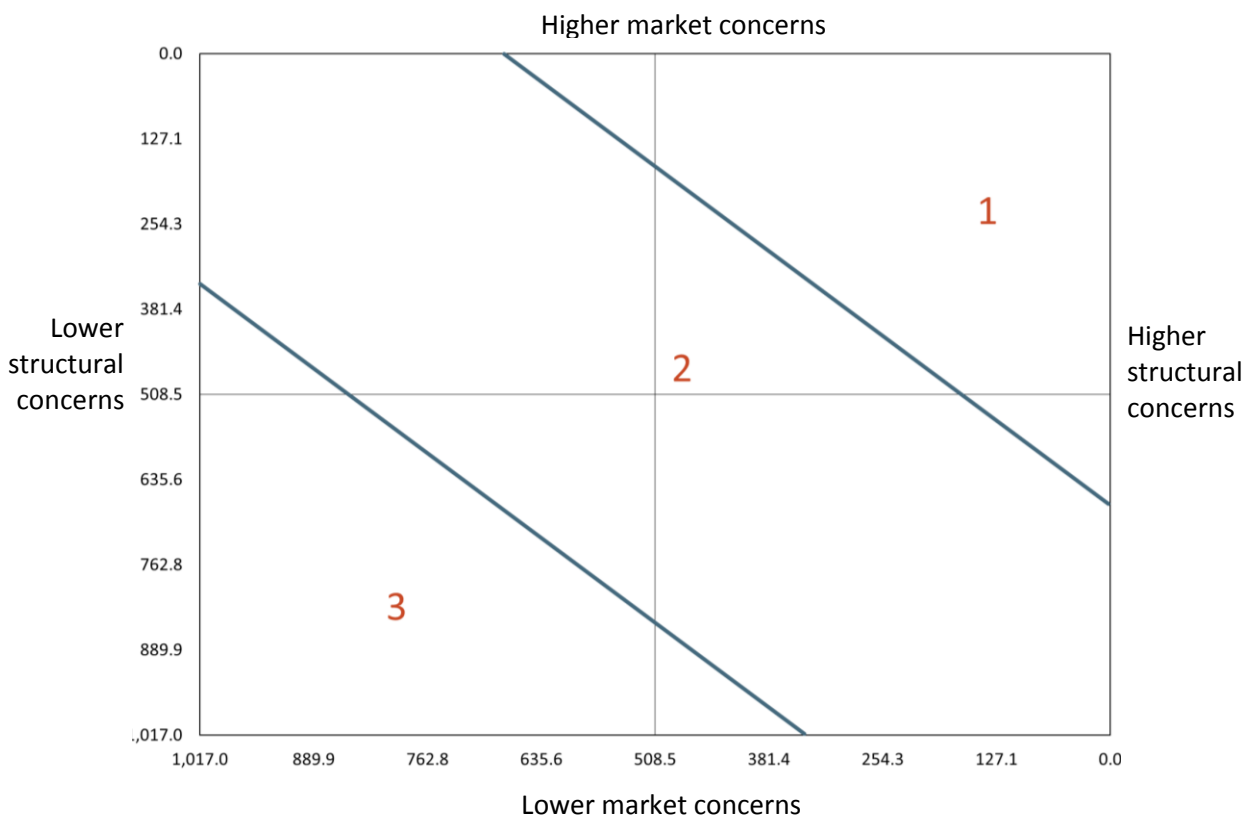
The cluster of dots in the top right corner of quadrant 1 represents most of the high-end medical occupations, which tend to be highly skilled with long lead times, high wages and ongoing employment demand. Other highly skilled jobs with less tight labour markets, such as school teachers and nurses, tend to occur in quadrant 2; whereas many high employing but lesser skilled occupations such as sales assistants occur at the upper end of quadrant 3. Occupations in quadrant 4 are still important contributors to the economy, but are not experiencing structural or market issues to the same extent as others.

If we assume an equal weighting for the two OPI measures, the scatterplot diagram can be further divided into three equal sections by summing the axis coordinates ($a=x+y$) and plotting a line along the values where:

- $a = 339$, and
- $a = 678$.

Since 339 equates to one third of the 1,017 ranked occupations and 678 equates to two thirds, this will create three equal sections, or tertians, containing 339 occupations each. This is illustrated in Figure 2.

Figure 2 Occupational priority index tertians





An occupation's position on the scatterplot will therefore help to determine its final ranking, depending on the availability of additional qualitative evidence, as described in the industry consultation section.

Industry consultation

In 2018, Western Australia's industry training advisory arrangements⁶ included nine contracted training councils and two public sector organisations operating under a memorandum of understanding. Collectively, these advisory bodies cover all 19 industries in the State⁷. The two public sector organisations; the Public Sector Commission and the Western Australian Local Government Association, did not take part in SPOL2018.

Further details regarding the other industry training advisory bodies can be found on the State Training Board website at stb.wa.gov.au/links.

SPOL2018 questionnaire

Advisory bodies were provided access to a standardised, online questionnaire requesting industry information regarding occupations eligible for SPOL on or before 12 January 2018. The questionnaire included four questions and is provided in Appendix 3.

Collectively, respondents were asked to report on an initial 'focus list' of 252 occupations, including occupations previously reported on, as well as a number of key occupations relating to key policy areas (for example; health and aged care, defence industries and Metronet transport and construction occupations). They were also invited to provide responses relating to any of the remaining 502 occupations eligible for SPOL consideration, if they so wished and where sufficient evidence was available.

The Department on 9 February 2018 hosted a face-to-face group workshop on the SPOL 2018 to discuss methodology changes, the new information, communication and technology (ICT) infrastructure, SPOL questionnaire and any occupation-related issues. The workshop incorporated an introductory session on the SPOL methodology, followed by an audience led question and answer session. All relevant advisory bodies were in attendance.

In completing the questionnaire, where claims were made regarding specific occupations, respondents were advised to provide sufficient supporting evidence, including relevant citations of sources. If such evidence was not available, the occupation could not be considered for inclusion as a priority on the SPOL.

During the questionnaire period, staff from the Department were available to answer any queries either by phone or via email. All queries received were responded to within the same business day.

⁶ As laid out under section 21(1)(b) of the *Vocational Education and Training Act 1996*.

⁷ As defined according to ANZSIC.

Questionnaire outcomes

The advisory bodies were given until 9 March 2018 to complete the questionnaire and submit their responses to the Department via the new web portal infrastructure. On 6 March 2018 a one-week extension to the timeline was granted to all advisory bodies, owing to technical issues with the new ICT infrastructure.

Six respondents submitted material for SPOL 2018 process prior to the 16 March 2018 deadline. Three sought short extensions beyond 16 March, which were granted. Two of these did not meet the extended deadline. In all, 355 written submissions relating to 309 distinct occupations were received. The level of response the Department received was less than the equivalent process undertaken for SPOL2017, when 357 responses were submitted pertaining to 329 unique occupations.

The Department undertook an occupational analysis (detailed hereafter) of responses. The preliminary results (including draft occupational rankings) were provided to advisory bodies on 13 May 2018 prior to a face-to-face meeting with Department staff to go through the results and provide additional feedback. Department staff met with each respondent at their offices in the period between 29 May and 18 June 2018.

Advisory bodies were sent a final draft of the SPOL on 13 July 2018 for final comments, prior to endorsement by the Department's Corporate Executive (5 September 2018) and informing the Minister for Education and Training (18 September 2018).

Occupational analysis

Department staff undertook a comprehensive analysis of questionnaire responses, including a review of the statistical OPI data. In addition, a raft of supplementary information sources were also analysed as part of this process, such as the Commonwealth Department of Jobs and Small Business survey data⁸, Internet Vacancy Index (IVI) data, major projects research data, Western Australian Treasury forecasts, and many other sources.

While evidence provided from these sources is generally not suitable for OPI calculations⁹, they are very useful for providing additional supporting data, as well as validating any anecdotal evidence provided from industry sources via the questionnaire process¹⁰.

Occupations are assessed against the following criteria.

Unmet demand

The Department defines an occupation as experiencing unmet demand:

"... where the evidence shows that employers are currently unable to fill or have considerable difficulty filling vacancies due to skills or qualifications related issues across Western Australia."

⁸ Survey of Employers Recently Advertised (SERA) and Survey of Employers Recruitment Experience (SERE).

⁹ The OPI requires a consistent dataset across all ANZSCOs to avoid distortions in the data.

¹⁰ A list of these data sources is included in Appendix 6.



Unmet demand is sometimes referred to as a ‘skills shortage.’ Evidence should be available to show widespread shortages of suitably skilled workers to fill vacant positions across an entire occupation at the State level. Isolated cases of employers unable to source workers may simply be related to employer specific selection criteria, salary and conditions. In itself, such evidence is not compelling enough to define an occupation as experiencing unmet demand at a statewide and occupational level, and further evidence is required.

Example¹¹

A submission is received citing examples of vacancies not being filled for a particular occupation because there are fewer suitably qualified and experienced applicants. A statistical analysis of graduate outcomes data also shows an overall decrease in the number of people qualifying with relevant qualifications relating to that occupation in recent years. In this case, the statistical evidence indicates the issue is more widespread than a single employer, and that the occupation is experiencing unmet demand.

Shortages may exist within a specific specialisation, but not across an entire occupation. Because the SPOL analysis and outcomes are limited to the detailed six digit ANZSCO level, these instances will be noted but will not result in the occupation being classified as experiencing unmet demand.

Example

A submission claims there is a shortage of science teachers. Supporting qualitative evidence is provided, however no statistical evidence is available as the claim refers to a single specialisation within the broader teaching occupation (ANZSCO 241411 – Secondary School Teacher). Furthermore, there is no suggestion that shortages exist outside of the science specialisation. In this instance, while the specific issues for science teachers would be flagged for follow-up, the overall occupation could not be considered as experiencing unmet demand.

Similarly, an occupation is not considered as experiencing unmet demand if evidence shows that any shortages are confined to a remote or regional locality.

Example

A shortage of enrolled nurses is reported in the Kimberley region. Evidence received supports the claims, with employers in remote areas struggling to source any applicants for advertised vacancies and experiencing high staff turnover. However there is no evidence to suggest other regions, or Perth, are experiencing any such issues. In fact Perth employers report an abundance of suitably qualified and experienced applicants. In this case, the regional issues would be flagged for follow-up, however the occupation would not be considered as experiencing unmet demand as available evidence suggests an abundance of workers in the State.¹²

¹¹ Please note all examples provided are hypothetical only.

¹² A regional labour market review of each of the State’s nine regions is currently being undertaken by the Department, with results to be released in 2019. How the outcomes from this process will feed into the existing SPOL framework is being investigated.

Following the detailed occupational analysis conducted by the Department, there were 28 occupations flagged as experiencing unmet demand.

Non-market factors

The Department defines an occupation as experiencing non-market factors:

“... where the evidence shows a significant change in some external influence (outside regular market driven forces) is impacting upon formal training or migration requirements.”

Non-market factors refer to any set of influences, not related to immediate demand or supply in the regular labour market, which impact upon the training or migration requirements for that occupation. The existence of non-market factors usually infers change at a legislative or regulatory level which will require additional training places for new, but particularly *existing* workers, in the occupation. By definition, they are short term in impact.

Example

New legislation comes into effect that requires all baristas to hold a Certificate III in Hospitality. This is a brand new requirement. The relevant qualification is readily available and complies with the Australian Qualifications Framework. In this instance, the occupation would be flagged as experiencing non-market factors.

The impact must also be deemed significant enough to warrant a Government response. Changes to informal on the job training or short, unaccredited courses are not deemed significant enough to consider an occupation as experiencing non-market factors.

Example

New regulations are reported stipulating that within three years, all shearers must complete an industry approved course relating to animal husbandry. Investigations however show that the new requirements relate to a one day, online course usually undertaken in the workplace. In this instance, the disruption is not material enough to consider the occupation as experiencing non-market factors.

Example

A suite of new generation medical imaging machines has entered the market, and businesses are switching to the improved technology to increase productivity. Radiographers will be required to learn how to operate the new equipment. However training will occur on the job, with the assistance of the equipment manufacturer, and will not require qualified staff to undertake further formal training. The impact on formal training and education pathways is minimal and therefore the occupation is not considered as experiencing any non-market factor.



Identification of non-market factors may also be relevant where there is credible evidence of an impending disruption to the occupational demand and supply balance in the near future. This may be a key material investment commitment which is soon to commence and therefore requires priority consideration in the current SPOL, despite not currently satisfying the criteria to be considered as unmet demand.

It should be noted that non-market factors tend to be an exception rather than the rule, and are only applied where issues are material and long understood, and appropriate formal training strategies are developed.

To ensure a systematic and transparent approach to considering these factors, the SPOL2018 questionnaire to the industry training council network included a question to specifically highlight such non-market factors. When considered along with additional research undertaken by the Department, 21 occupations were found to be experiencing non-market related factors influencing their requirements for formal training.

Principal occupations

The Department defines an occupation as a principal occupation:

'... where specialised skills are learned in formal education and training prior to labour market entry, and the impact of market failure is significant.'

Principal occupations¹³ are considered important to the structure of the Western Australian economy. They may support employment in many other occupations, and/or are linked to the provision of key services in the community.

They are generally highly skilled occupations where considerable negative economic and/or social impacts are likely to be experienced should they experience a shortage of any significance. It is therefore important to maintain a consistent source of supply for these occupations, regardless of any shorter term market fluctuations.

Example

A major hospital in Perth is short of three anaesthetists. Consequently, surgery schedules have been disrupted and the ability for surgeons, nurses and other allied health and hospital support staff to undertake their duties has been compromised (not to mention the impact on patients). Despite the relatively small number, the flow on affects are quite severe with potential further impacts across the wider economy. It is therefore considered important to maintain supply and anaesthetists are considered a principal occupation.

An occupation will **not** be considered principal due to:

- seasonal or distinct employment patterns and conditions;
- semi-skilled or unskilled workforce needs (ABS Skill Level 4 or 5);
- the result of ongoing staffing attraction and retention issues; or
- difficulty in filling positions.

¹³ Prior to SPOL2018, these occupations were referred to as 'critical occupations'. Confusion over the nomenclature with respect to SPOL priority ratings saw the terminology changed this year.

At the end of the SPOL 2018 process, 233 occupations were deemed principal occupations in WA.

Business rules for the prioritisation of the final list

An occupation listed on the SPOL may be assigned to one of five priority ratings.

- **State priority 1**

The highest priority occupations where structural and market-driven issues are impacting at the State level.

- **State priority 2**

The second highest level of priority where structural and/or market-driven issues are impacting at the State level.

- **State priority 3**

The third tier of priority and representing either occupations of pending concern and/or where supply is essential for the State's economy.

- **Other identified occupations**

Refers to occupations where there is inconsistent or conflicting evidence relating to structural or market driven issues. These occupations are not priorities but are closely monitored by the Department.

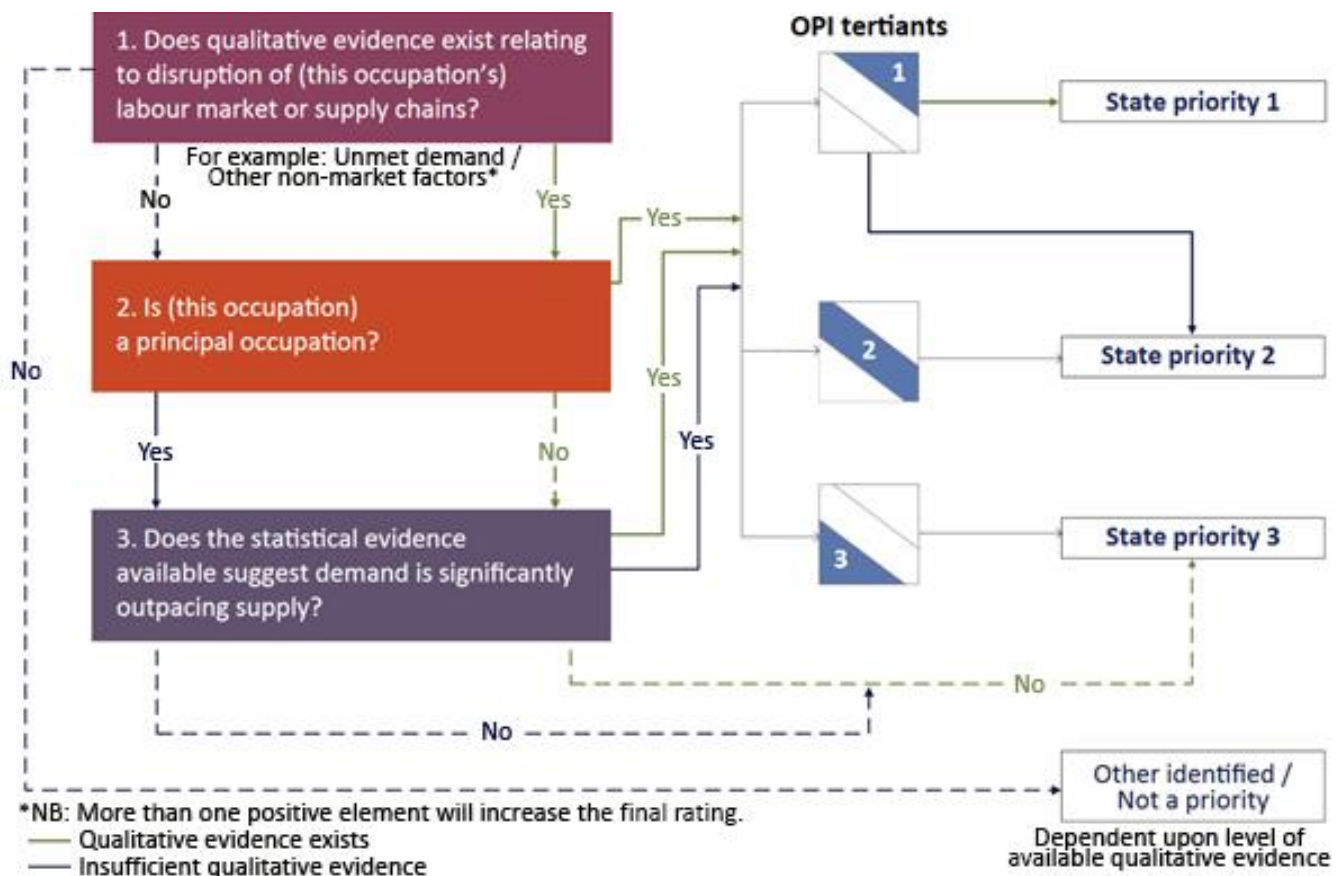
- **Not identified as a priority**

Refers to occupations with no evidence for inclusion on the priority list.

The terminology gives an indication of each occupation's relative priority, and provides a transparent reasoning underpinning it.

Each tier has a specific set of business rules that include references to statistical information about each occupation, as well as the nature of qualitative advice provided by advisory bodies. The interplay of these three business rules with available statistical data in determining the final priority rating is illustrated in Figure 3.

Figure 3 SPOL2018 business rules for determining priority ratings



The green arrows represent the decision pathway where qualitative evidence is available. The dark blue arrows represent where there is insufficient qualitative evidence.

The following is a summary of the business rules used in determining the relative priority for each occupation on the SPOL.

State priority 1

An occupation is deemed to be within the State priority 1 tier if the following criteria are met:

- there is sufficient qualitative evidence that the occupation is experiencing;
 - *unmet demand, and/or*
 - *other non-market factors; and*
- it has an OPI rating in the top tertiant, **or**
- it has an OPI rating in the second tertiant and is a principal occupation.

There are 27 occupations in the 2018 SPOL which are deemed State priority 1.

State priority 2

An occupation is deemed to be within the State priority 2 tier if the following criteria are met:

- it has an OPI rating in the top two tertiants and is a principal occupation, **or**
- it has an OPI rating in the second tertiant with qualitative evidence of unmet demand or non-market factors.

There are 139 occupations in the 2018 SPOL which are deemed State priority 2.

State priority 3

An occupation is deemed to be State priority 3 if the following criteria are met:

- it has an OPI rating in tertiant 3 and is a principal occupation, **or**
- there is no compelling evidence that the occupation is experiencing an undersupply of skilled workers and is a principal occupation, **or**
- it has an OPI rating in tertiant 3 with qualitative evidence of unmet demand or non-market factors.

There are 87 occupations in the 2018 SPOL which are deemed State priority 3.

Other identified occupations

Refers to occupations where there is inconsistent or conflicting evidence relating to structural or market driven issues. Generally they will refer to occupations that are not principal occupations, where anecdotal evidence of issues has been raised but is not supported by statistical evidence.

These occupations are not priorities but are closely monitored by the Department. There are 82 occupations in the 2018 SPOL which are deemed other identified occupations.

Not identified as a priority

This refers to occupations that are eligible for SPOL consideration but are not principal occupations and are not raised as a priority by any stakeholders. These occupations are still important for the functioning of the economy, but no major issues have been identified that require an increased education, training or migration response.

It is important to note that this category will also include occupations operating largely in equilibrium. That is, there are no issues because the supply pipeline and demand are relatively equally matched. For this reason it should not be assumed that occupations with this rating automatically require a reduction in supply, as this may lead to future disequilibrium and potential future skills shortages.

There are 422 occupations in the 2018 SPOL which are not identified as a priority.



APPENDIX 1

Example of OPI calculations

Occupation	Employment	FIDOS	AWE	AWE growth	PLDOS	Job openings	Market total	Change in median age	Occupation to industry	Occupation to qualification usage	Lead time	Retirement exposure indicator	Structural Total	Final tertiant	Final quadrant
253313 Clinical Haematologist	-0.035	0.073	0.386	0.000	0.108	0.024	0.558	0.733	-0.142	0.178	1.144	0.308	2.221	1	1
253322 Renal Medicine Specialist	-0.034	0.000	-0.034	0.073	0.386	0.000	0.391	0.591	-0.142	-0.067	1.144	0.164	1.690	1	1
253323 Rheumatologist	-0.035	0.000	-0.035	0.073	0.386	0.000	0.391	0.248	-0.142	0.199	1.144	0.221	1.670	1	1
253513 Neurosurgeon	-0.034	0.000	-0.034	0.067	0.386	0.000	0.384	0.362	-0.063	0.051	1.144	-0.124	1.371	1	1
253516 Paediatric Surgeon	-0.035	0.000	-0.035	0.070	0.386	0.000	0.387	-0.037	-0.142	0.464	1.144	-0.124	1.305	1	1
253515 Otorhinolaryngologist	-0.034	0.000	-0.034	0.065	0.386	0.000	0.383	0.305	-0.142	0.073	1.144	-0.124	1.256	1	1
253411 Psychiatrist	-0.022	0.000	-0.022	0.068	0.386	0.000	0.410	0.049	-0.063	-0.015	1.144	0.126	1.241	1	1
253324 Thoracic Medicine Specialist	-0.034	0.000	-0.034	0.073	0.386	0.000	0.391	-0.037	-0.142	0.070	1.144	0.049	1.084	1	1
272313 Organisational Psychologist	-0.034	0.000	-0.034	0.050	-0.011	0.000	-0.028	0.106	0.254	0.464	0.212	0.031	1.067	1	1
253913 Obstetrician and Gynaecologist	-0.029	0.000	-0.029	0.072	0.386	0.000	0.399	0.106	-0.142	-0.105	1.144	0.033	1.036	1	1
639212 Wool Buyer	-0.033	0.000	-0.033	0.073	-0.115	0.000	-0.109	0.648	-0.063	0.169	###	0.294	1.026	2	2
253511 Surgeon (General)	-0.033	0.000	-0.033	0.051	0.386	0.000	0.371	0.106	-0.142	-0.169	1.144	0.061	1.000	1	1
253315 Endocrinologist	-0.035	0.000	-0.035	0.073	0.386	0.000	0.390	-0.037	-0.142	0.155	1.144	-0.124	0.995	1	1
111399 Legislators, nec	-0.034	0.000	-0.034	0.073	0.248	0.000	0.253	0.419	0.016	0.110	0.212	0.221	0.979	1	1
253518 Urologist	-0.034	0.000	-0.034	0.060	0.386	0.000	0.379	0.248	-0.142	-0.155	1.144	-0.124	0.971	1	1
253914 Ophthalmologist	-0.032	0.000	-0.032	0.075	0.386	0.000	0.398	-0.094	-0.142	0.057	1.144	0.005	0.970	1	1
234515 Botanist	-0.030	0.000	-0.030	0.079	0.071	0.000	0.089	0.134	0.175	0.392	0.212	0.039	0.951	1	1
253918 Radiation Oncologist	-0.035	0.000	-0.035	0.073	0.386	0.000	0.390	-0.037	-0.142	0.083	1.144	-0.124	0.924	1	1
233915 Environmental Engineer	-0.028	0.000	-0.028	0.048	0.192	0.000	0.183	0.163	0.175	0.440	0.212	-0.072	0.917	1	1
271299 Judicial and Other Legal Professionals, nec	-0.013	0.000	-0.013	0.011	0.103	0.000	0.088	0.191	0.175	0.263	0.212	0.072	0.913	1	2
271212 Magistrate	-0.033	0.000	-0.033	0.068	0.103	0.000	0.105	0.134	-0.142	0.464	0.212	0.240	0.907	1	1
234913 Meteorologist	-0.033	0.000	-0.033	-0.047	0.071	0.000	-0.041	-0.009	0.175	0.464	0.212	0.061	0.903	1	1
253917 Diagnostic and Interventional Radiologist	-0.025	0.000	-0.025	0.040	0.386	0.000	0.375	-0.037	-0.142	-0.108	1.144	0.044	0.901	1	1
234517 Microbiologist	-0.034	0.000	-0.034	0.054	0.071	0.000	0.058	0.106	0.096	0.464	0.212	0.020	0.897	1	1
234599 Life Scientists, nec	-0.032	0.000	-0.032	0.070	0.071	0.000	0.077	0.163	0.175	0.372	0.212	-0.026	0.896	1	1
253321 Paediatrician	-0.027	0.000	-0.027	0.071	0.386	0.000	0.404	-0.009	-0.142	-0.071	1.144	-0.032	0.891	1	1
271213 Tribunal Member	-0.033	0.000	-0.033	0.067	0.103	0.000	0.105	0.049	0.016	0.331	0.212	0.278	0.886	1	1

APPENDIX 2

Additional information on statistical issues

SPOL ratings – Manual adjustments

There are some known issues with labour market data which require manual adjustments or specific data treatments to ensure integrity in the application of SPOL ratings. The best example of this occurs in the case of carpenters. In Western Australia, the official trade is called ‘carpenter and joiner’, which is also an official ANZSCO category (311211)¹⁴. However, it is commonly referred to simply as ‘carpenter’ by those in the occupation and the general public.

This is reflected in official labour market data, which indicates significant levels of employment under the ‘carpenters’ classification in WA and very little employment under the official trade ‘carpenters and joiners’ even though the former does not officially exist in WA. For this reason, all three occupations are grouped at the broader four digit level for SPOL purposes.

Similar rules are applied for; pressure welders and welders (first class), childcare centre workers and managers, and electricians (general) and electricians (special class). Additional evidence and employment pathways are considered in making these adjustments.

In general, the need to undertake such direct adjustments was minimal for SPOL 2018.

Migration program policy changes

In April 2017, the Commonwealth Government announced numerous changes to skilled migration programs. Included in these changes was the replacement of the *Consolidated skilled occupation list* and the *Skilled occupation list* with the *Short term Skilled occupation list (STSOL)*, and the *Medium and long-term strategic skills list (MLTSSL)*. This resulted in the removal of around 200 occupations from the skilled migration lists. Additional caveats were also placed on a further 59 occupations.

While these changes have had a minimal impact on SPOL 2018, migration policy will continue to be closely monitored by the Department to better understand ramifications for migration supply into occupations in the State.

¹⁴ ‘Carpenter’ and ‘joiner’ have their own ANZSCO codes and exist as separate trades in other states.



APPENDIX 3

SPOL 2018 Survey questionnaire

1 Are you aware of instances of unmet demand in relation to this occupation?

- These are sometimes called ‘skill shortages’.
- Highlight the breadth and extent of the shortages, for example: specialties within the occupation or geographic specific bounds that may be applicable.
- If ‘Yes’ can you please provide details? Provide guidance in your response regarding how you came to your conclusions.

2 If you answered ‘Yes’ to question 1. What are the causes and pathways to addressing unmet demand for this occupation?

- Highlight any recent history that has led to increased demand and/or lowered the supply of skilled workers.
- Provide solutions from industry that can help address these circumstances, eg: detail about improving training/education/migration pathways or current industry actions in place to address known issues.
- Statements like – ‘Should be considered a priority 1’ in itself is not a suitable response.

3 Are there any other, non-market-related, factors influencing future training?

- For example; impending legislation/licensing regulations or technological change.
- How are these issues causing disruption?
- Provide insight into how these changes will impact on the wider industry.

4 Do you consider the issues, if any, associated with the occupation to be:

- Short term (one to two years),
- Medium term (three to five years), or
- Long term (five plus years) in nature?
- No issues.

If you have nominated a time period, can you provide further details?

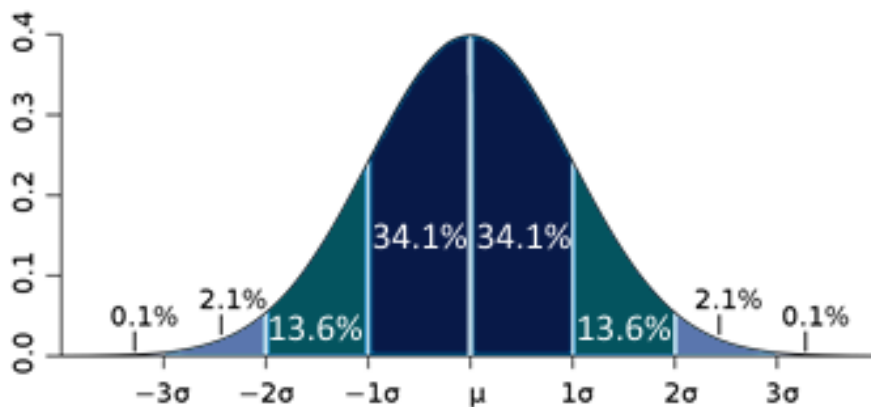
APPENDIX 4

A note on standard deviations

Standard deviation is the most commonly used measure of the spread of values in a distribution, and refers to the extent by which scores in a distribution differ from the mean, or overall average, of those scores.

For a normal distribution of data as shown in the following example graph, approximately 68% of scores (or data points) lie within one standard deviation of the mean, 95% lie within two standard deviations, and 99% lie within three standard deviations.

Figure 1 Example of a normal distribution curve



As an example, the occupation civil engineer had an employment level of 2,523 in 2011, which is a value greater than the mean employment level for all occupations (806). Using traditional standard deviation calculations, this value represents 0.8 standard deviations above the mean (or a z-score of 0.8). This places the employment level of civil engineers in Western Australia firmly within the darkest area of the bell curve above (indicated), along with 68% of all other occupations.

The advantage of using standard deviations in this way is that it allows a comparison across all data indicators used for SPOL, each of which represent different datasets and would not otherwise be comparable.

The z-score for each indicator can be weighted and summed to determine OPI values for each occupation.

APPENDIX 5

Statistical supply and demand elements (PLDOS and FLDOS)

Background

The market OPI figure incorporates two major elements relating to the interaction of labour demand and supply factors:

- Past labour demand or supply (PLDOS), and
- Future labour demand or supply (FLDOS).

To calculate these new two new indicators, the following data is collected and sorted.

For demand

- ABS Census 2011 levels of employment (ANZSCO six digit)
- ABS Census 2016 levels of employment (ANZSCO six digit)
- ABS Labour Force Survey, Australia, Detailed, Quarterly, 6291.0.55.003 (ANZSCO three digit)
- ABS Labour Force Survey, Australia, Summary, 6202.0
- Monash University, Centre of the Economics of Education and Training (CEET) Net Replacement Rate by Occupation (ANZSCO three digit)
- Victoria University, Centre of Policy Studies (CoPS – formerly at Monash University) Forecast of Occupation Employment Growth (ANZSCO 3-Digit) (FLDOS only)

For supply

- Higher education domestic student completions for post graduate and undergraduate courses for the five year period 20012-2016 (by ASCED – Field of Education)
- Vocational education and training (VET) qualifications awarded by course between 2012–2013
- Total VET activity (TVA) qualifications awarded by course between 2014–2016
- Skilled migration arrivals to Western Australia between 2012 – 2016 (primary applicants only)
- Arrivals to WA of Australian permanent residents/citizens who have spent 12 months or more overseas¹⁵
- Departures of permanent residents/citizens and select long term visitors where WA has been the primary place of residence¹⁶

Administratively sourced supply side data has a time lag prior to publication from the various responsible agencies. Data from 2017 and 2018 was not fully available at the time of calculations.

¹⁵ Following cessation of data collected by the Australian Government (through departure cards), this dataset will be phased out between SPOL2018 and 2022.

¹⁶ Following cessation of data collected by the Australian Government (through departure cards), this dataset will be phased out between SPOL2018 and 2022.

Demand considerations

Labour market demand refers to the ability of the market to both maintain and increase the number of persons employed at any given time. In other words, we are interested in both the net change (growth or decline) that occupations experience, as well as the net replacement (sometimes referred to as ‘turnover’ or ‘churn’) needed to maintain stable employment on account of persons moving in and out of the occupation.

An indicative demand indicator at the six digit ANZSCO level is determined by:

- calculating the employment difference between the two points in time; and
- adding the net replacement requirement for the same time period.

Census data provides ANZSCO six digit data, however is not timely (released every five years) and does suffer from a level of non-sample error due to the self-nomination of occupational information by respondents. For this reason, three digit labour force survey data is used and proportioned out to the six digit level using census data. This allows for demand to be calculated more accurately on an annual basis, particularly outside census release years. The employment differential is then adjusted upwards on the basis of CEET net replacement rate data, to account for staff turnover occurring within the same time period¹⁷.

The combined figure represent indicative demand for a particular occupation within a time period – the last five years for PLDOS (aligning with census periods) and the next four years for FLDOS (aligning with the budget cycle).

The calculation is further moderated to account for the strength of an occupation’s connection to education or training pathways. That is, it is reduced according to the proportion of workers in the occupation that have no qualifications or too low level qualifications according to the ABS’ notional ‘required’ skill level for the occupation¹⁸.

Example

Bricklayer is an ABS skill level three occupation, notionally requiring a Certificate IV or Certificate III with two years’ experience (inclusive of apprenticeship). The 2016 Census results showed that 40% of all bricklayers held either no post-school qualifications or held a Certificate I or II only. All else being equal, it is assumed that any growth or turnover required for this occupation will result in demand for a similar proportional breakdown. The indicative demand number is therefore adjusted down by 40% to account for the structural characteristics of this occupation.

¹⁷ Labour force data at the ANZSCO minor group (three digit) level and by state has a high volatility at any given time. This volatility is softened somewhat by the application of a four quarter moving average, however strong shifts on an annual and quarterly basis can still occur. It is due to this that the PLDOS takes into account a longer time five year time period for an indicative net change in employment demand, rather than focusing on any short term shifts could equally be noise in the raw data rather than a meaningful employment estimate.

¹⁸ This assumes that the specific labour market for each occupation is currently operating at a level of equilibrium, in terms of demand for skills and qualifications, and that there are no policy or market-based drivers for change.

These adjustments reflect the SPOL's primary purpose of prioritising formal education and training pathways¹⁹. The ABS' defined skill level for any occupation may be altered where there is clear evidence the pathway to entry has significantly changed²⁰.

At the end of this calculation, a positive number indicates demand for labour that has formal education and training has grown, while a negative number indicates an overall decline or the occupation shrinking in size.

Supply considerations

Labour market supply in the SPOL context refers to the number of persons completing relevant qualifications for each occupation. While factors such as an individual's workplace experience do impact supply, it is difficult to measure these impacts, particularly across different occupations at the macro level. Those completing education and training qualifications, on the other hand, can be quantified and measured easily and reliably. Raw supply data in the form of counts from official Government sources is collated and summed to provide a relatively accurate picture of new skilled labour entering the market for different occupations. This data spans the same five year period as the demand-side data²¹.

Though official counts are used, it is acknowledged there are limitations to the data. In particular:

- not all people completing a qualification will move an occupation immediately but may, for example, move into postgraduate study;
- there is not a one to one relationship between qualifications and occupations. In areas such as in business and ICT, qualification completion data is proportioned out to ANZSCOs at the four, three or two digit ANZSCO levels where appropriate; and
- it is not possible to accurately estimate interstate migration at an occupational level.

Higher Education results are provided by the Commonwealth Department of Education and Training – the appointed agency responsible for collecting national higher education data. Data is provided to the Department of Training and Workforce Development according to the Australian Standard Classification of Education (ASCED) field of education and then coded to ANZSCO by the Department. Only completions by domestic students from the five WA-based Universities are included. Overseas students who study in WA are excluded from counts.

The VET data incorporated into the SPOL includes all qualifications awarded over the five-year historical window of the PLDOS. The VET data includes all qualifications awarded and makes distinction between:

- both employment and institution based training delivery;
- public and privately funded delivery; and
- public (TAFE) and private provider delivery.

¹⁹ Field of education data was also considered as a basis for moderating demand measures, as was the concept of over qualification, but in both cases data quality and capture issues precluded their use for such a purpose.

²⁰ The need to do so is becoming more prevalent as the time elapsed since a major review of ANZSCO increases.

²¹ The DTWD is unable to publish counts of higher education completions, migration outcomes or total VET activity data. Those wishing to access such data should contact the relevant Commonwealth agency.

However, courses that are identified as 'pre-entry' that are designed to lead to further training rather than employment (ie pre-apprenticeships) are not included in the calculations²². Adult and community education courses are also not counted in these figures as they do not relate to training for a labour market outcome to an occupation. Occupational outcomes (as defined by ANZSCO) are assigned at the course level for all courses and qualifications. These are the same occupational mappings used for funding and reporting of training delivery. Total VET activity (TVA) data from 2014 onwards is included. Western Australia VET enrolment data is used for the years prior to 2014.

Migration data is provided by the Australian Government Department of Home Affairs (DHA). As part of their data services, the DHA codes visa and migration outcomes by six digit ANZSCO, and no alterations were required nor undertaken by the Department. Data incorporated includes all long term and permanent skilled visas granted in addition to the long term temporary skills shortage (TSS) visa sub-class²³.

Data on secondary visa holders (partners and dependents of primary visa holders) is not available and therefore cannot be included in SPOL calculations. Data on those arriving under family, humanitarian or special eligibility streams is excluded. Data on long-term arrivals and departures no longer provides an accurate picture at the occupational level calculations following procedural changes applied by DHA to arrivals and departure processes for international travellers on 1 July 2017. This data is gradually being phased out of SPOL calculations.

²² This also includes the majority of training that occurs through VET delivery for secondary students.

²³ Historically this long term temporary visa was the '457 subclass.' 457 Visa subclass data is still incorporated into the calculations for the appropriate years. Despite the policy shift by the Australian Government this did not cause a data quality issue or a break in the series for SPOL purposes.



APPENDIX 6

Examples of other major data sources

Australian Bureau of Statistics

- Census 2006, 2011 and 2016 **(new)** data
- Monthly and quarterly labour force data
- State final demand / Gross state product data
- Average weekly earnings data
- Various other economic and labour market data sets used as supporting evidence

Department of Training and Workforce Development

- AVETMISS enrolment and delivery data
- Training record system (TRS) data
- EVAC submission information
- TVA data **(new)**
- Training package implementation and advice (as provided by Industry Training Councils)
- Regional workforce development plan information

Industry Training Councils

- SPOL survey returns, and related input

Commonwealth Department of Education and Training

- Higher education data

Commonwealth Department of Home Affairs

- Permanent skilled migration stream data
- Long term temporary skills shortage visa data
Note: Changes to the temporary skilled visa stream occurred after the data cut off for this SPOL iteration. Data reflecting changes to this part of the skilled migration program will be introduced for SPOL 2019
- Quarterly and annual migration reports

Commonwealth Department of Employment

- Survey of employers who have recently advertised (SERA)
- Survey of employers' recruitment experiences (SERE)
- Internet vacancy index (IVI)
- Employment projection data

Commonwealth Department of Industry

- Australian apprenticeships - National skills needs list

Victoria University

- Centre of policy studies' (CoPS) - CGE employment forecast data

Monash University (CEET)

- Net replacement rate data
- Job openings data (**new**)

State and Federal Treasury economic / labour market forecasts

Western Australia Treasury Economic Notes

Deloitte Access Economics

- Business outlook forecast data
- Investment monitor data

Chamber of Minerals and Energy (CME)

- State growth outlook
- Western Australian resource sector outlook

Housing Industry Forecasting Group (HIFG)

- Report on forecast dwelling commencements in Western Australia

National Institute of Labour Studies (NILS)

- A system for monitoring shortages and surpluses in the market for skills

* Please note this list is not necessarily comprehensive, and may change over time. Numerous other one-off occupational and/or sector specific publications, studies, articles and reports are also used for validation purposes as required.



Department of Training and Workforce Development

STATE PRIORITY OCCUPATION LIST

Scope, methodology and sources

September 2018

dtwd.wa.gov.au