



Determining the Future Demand, Supply and Skills Gap for Surveying and Geospatial Professionals: 2014 – 2024

> JANUARY 2015



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BIS Shrapnel for Consulting Surveyors National

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BIS Shrapnel welcomes any feedback concerning the forecasts or methodology used in this report as well as any suggestions for future improvement.

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EXECUTIVE SUMMARY

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This report provides an update to the initial report entitled *Determining the Future Demand, Supply and Skills Gap for Surveying and Geospatial Professionals 2012 to 2022* prepared by BIS Shrapnel and published by Consulting Surveyors National (CSN).

The reports inform the work of constituent members of CSN in regard to long term workforce planning and capability building. They also provide data that can be used in working with stakeholders and tertiary education providers in relation to course structure and student numbers, and provide a sound basis for engagement with government agencies, infrastructure bodies, other peak bodies and the like.

The initial report

In 2012, BIS Shrapnel was engaged to prepare a detailed economic outlook and undertake a workforce capability analysis for planned and forecast development requirements across Australia and in New South Wales and Victoria over the decade to 2012 to 2022. Development requirements included provision of land services, dwelling commencements, infrastructure development, office buildings, and mining projects. Specifically, BIS Shrapnel was asked to focus on the capabilities of surveying skills (differentiated by areas of specialisation), spatial scientists, surveying and spatial science technicians along with 'other' professional skills including planners, environmental scientists and engineers amongst others required by private sector surveying firms.

Undertaken during the second half of 2012, the report provided independent, detailed, thoughtfully researched and quantifiable responses to the following questions and tasks:

- What is the current demand for surveyors, geospatial specialists, and surveying and spatial technicians?
- Differentiate the current demand for surveyors by areas of specialisation ie Cadastrals, Construction Surveyors, Engineering Surveyors, Mining Surveyors and 'other' surveyors (comprising geodetic, hydrographic and photogrammetric surveyors) as well as by registered or licensed surveyors.
- Identify the current demand for 'other professionals' such as planners, environmental scientists, engineers, architects and ecologists at consulting surveying practices.
- What is the expected demand for the different categories of surveyors, geospatial specialists, and surveying and spatial technicians over 2013/14 to 2023/24?
- What is the expected demand for 'other' surveying-related occupations at consulting surveying practices over 2013/14 to 2023/24?
- Model the attrition of existing skilled surveying population, geospatial workforce, and surveying and spatial technicians for the next ten years due to ageing in particular retirements and death.
- Calculate the gap between future demand for surveying and geospatial workforce and the size of the existing workforce (once adjusted for attrition rates) by specialist occupation.
- Model future new supply of surveyors and surveying technicians.
- Will future new supply meet the workforce gap for surveyors and surveying technicians?
- If not, what are the expected skills shortages for surveyors and surveying technicians over the next 10 years?

The 2014 Update Report

This report builds on the initial report. The report validates the earlier projections, updates the base data and forecasts in the initial report and extends forecasts by two years to 2024. In addition, the update report includes — for the first time — workforce capability analysis for South Australia and Queensland. The updated report will help ensure that workforce planning of constituent members is informed by the most current data, and up-to-date information is available for use with industry stakeholders and tertiary providers.

Key Findings

The Australian economy continues to operate below its long-run average level due to weak non-mining business activity. While leading indicators of business investment are somewhat encouraging, the momentum necessary to push the economy onto a secure footing is still missing. Business confidence remains weak, capacity utilisation while improving is still low and the labour market remains fragile. Our forecast is for growth of 2.5 per cent in 2014/15. It's only when non-mining business investment and structural change associated with a lower dollar chime in that we'll see an acceleration taking us close to potential. And as growth broadens beyond mining, employment will pick up underwriting a strong second half of the decade. Only then will the Reserve Bank raise rates to dampen demand.

Meanwhile, total construction fell marginally last year after peaking in 2012/13. We expect construction activity to track lower over the next four years driven by declining resources construction. We expect mining construction which peaked in 2013/14 to fall by about 40 per cent over the next four years. This will drive engineering construction (ie non-building construction comprising transport, utilities and mining projects) lower, with weakness expected across both public and private sectors. Private non-dwelling building will record moderate growth with activity supported by few large projects in accommodation, warehouses, and aged-care sub-sectors.

In more positive news, the recovery in residential building is entrenched and will build momentum in undersupplied markets over the next two to three years. Western Australia was the first cab off the rank but that recovery is now running out of steam. Queensland and New South Wales remain strong and Victoria will peak early given oversupply in inner city apartments building. South Australia will also peak this year, while Tasmania is suppressed by a weak economy and oversupply. Australian Capital Territory and to a lesser extent Northern Territory will miss the current cycle as their markets are oversupplied. Altogether, offsetting cycles will keep total construction subdued over the next five years.

That being said, we expect construction to pick up next decade. Our view is that total building and construction will record much more stable growth of around one per cent per annum in the first half of next decade before increasing to 2.8 per cent per annum later in the decade. Ongoing population growth will require perpetual investment from both public and private sectors, to meet demands for housing, energy supply, and transport infrastructure. Improved financial positions, again for both sectors, will allow this investment to progress at a faster rate from 2020/21.

The overall demand for surveying skills is generally correlated with the construction cycle. Consequently, we expect the demand for surveyors to track lower over the next four years resulting in a small surplus of skilled labour over the next four to five years. However, a pick-up in construction next decade will lead to increased demand for surveying skills. This combined with a lower existing workforce due to ageing will open up a workforce gap for all surveying and surveying-related professionals. Based on current construction outlook and demographic profile

of surveyors, we estimate that there will be a shortage of nearly 7,000 surveyors and associated professionals by the middle of next decade. The gap is forecast to peak at 1,816 persons in 2020/21, and average 1,396 persons over the five years to 2023/24.

Indeed, most specialist surveying skills are likely to be in deficit (ie demand greater than existing workforce) next decade with the problem most acute for cadastral surveyors (see accompanying summary table). In fact, the demand for cadastral surveyors is likely to be greater than the existing workforce (once adjusted for attrition rates) over the next decade resulting in a positive workforce gap for the profession for each of the next 10 years.

However, there are differences across the states. New South Wales will have a skilled surveying labour deficit throughout the next ten years driven by shortfall in cadastral surveyors. Victoria will experience a larger workforce gap next decade due to shortfalls in cadastral and engineering surveyors. Queensland will generally have an excess of skilled surveying workforce reflecting surplus of mining surveyors. Notwithstanding, a small deficit is likely to emerge next decade. South Australia has a similar profile to Queensland although a deficit is projected from 2018/19.

New South Wales is expected to experience a steadily rising workforce gap over the next three years reaching a peak of 938 persons by 2016/17. Although this shortfall will temporarily decline in 2017/18 as labour demand eases, ongoing workforce attrition and a recovery in construction will cause the gap to widen thereafter, reaching 1,247 persons by 2020/21. At this peak level, the majority of the shortfall in labour will be cadastral surveyors, driven by an upswing in dwelling construction,

For Victoria, our expectation is for a total skilled labour workforce gap to also remain over the entire forecast period with the workforce gap getting larger towards the second half of the forecast horizon. Given the relatively soft outlook for construction and labour demand, the primary driver of this workforce gap is the ongoing attrition of the existing workforce. Cadastral surveyors will be in shortage throughout the majority of the forecast despite a soft demand outlook, as the rate of natural attrition causes the workforce to deplete faster than demand. On the other hand, construction surveyors are forecast to have a negative workforce gap (ie surplus of skilled labour) from 2015/16 as non-dwelling construction enters an extended period of weakness.

Queensland is forecast to have a negative workforce gap (ie a surplus of skilled labour) through to 2019/20, despite having an above-average rate of workforce attrition, which normally works to create shortages of labour. The primary reason for this weak outlook for labour demand is the collapsing engineering construction and mining industry. By 2016/17, when mining-related construction reaches a trough, there is forecast to be a surplus of nearly 400 mining surveyors. This weakness in total construction will spread across most other areas, including spatial scientists, technicians, and 'other' professionals, all of which are forecast to remain in surplus for a number of years.

For South Australia, our expectation is for total skilled labour workforce gap to remain negative (ie in a surplus position) over the first four years of the forecast period, through to 2017/18. Although the size of the existing workforce will be steadily declining, a weak construction outlook over the near term will see labour demand fall faster than labour supply, creating a situation of excess labour. But this surplus is forecast to turn into a deficit by 2018/19, and remain this way through the remainder of the outlook period, driven by a strong increase in engineering and mining construction.

New supply and capability shortfall

Based on current enrolments, completion rates and historical trends, we forecast there will be an average of around 130 graduates per year in Australia over the next 10 years. Similarly, we forecast new supply of around 65 technicians per annum over the next decade. Allowing for the new supply and differing labour productivity assumptions, we estimate that Australia's 'net capability position' (for total surveying workforce) will be in **deficit** early next decade.

To some, this may suggest that the issue of skills shortages is one which can be deferred until this period. In our view, this would be a mistaken interpretation of the model.

The demand for skilled labour in the immediate period before the capability shortfall years is most likely understated. While the capability shortfall appears early next decade, this does not necessarily mean that the shortfalls will be realised contemporaneously. For many occupations the demand for labour will necessarily precede the period where actual construction takes place. For example, the necessary design, measurement, calculations, plan and document presentation happens well before the construction phase.

Further, given the time taken to develop new engineering hires (particularly new graduates) to a point of high capability (typically 4-5 years) the model suggests that hiring should take place well before the emergence of capability shortfalls.

While capability shortfalls are not expected to arrive until next decade, this is not the time for constituent members to be complacent. In fact the present times represents an ideal opportunity for members to build up their stocks of competent surveying-related professionals ahead of the increased demand in about five years time.

Summary Table: Forecasts for Skilled Labour Demand and capability shortfalls for Surveyors and Surveying-Related Professionals: Australia

(Baseline Scenario of 1.5% labour productivity growth, forecasts as at June)

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Labour Demand by Specialist Occupation | Estimate | Forecasts | | | | | | | | | |
| Cadastral | 3,856 | 4,332 | 4,435 | 4,118 | 3,620 | 3,833 | 4,361 | 4,427 | 3,909 | 3,403 | 3,584 |
| Construction | 1,645 | 1,673 | 1,621 | 1,537 | 1,396 | 1,342 | 1,442 | 1,538 | 1,571 | 1,465 | 1,436 |
| Engineering | 1,570 | 1,393 | 1,353 | 1,359 | 1,459 | 1,520 | 1,431 | 1,432 | 1,378 | 1,438 | 1,514 |
| Mining | 1,300 | 999 | 823 | 742 | 761 | 801 | 902 | 923 | 921 | 823 | 851 |
| Other Surveyors | 441 | 411 | 386 | 374 | 367 | 368 | 392 | 396 | 382 | 368 | 373 |
| All Surveyors | 8,812 | 8,808 | 8,617 | 8,129 | 7,602 | 7,864 | 8,528 | 8,716 | 8,160 | 7,497 | 7,757 |
| <i>Registered/Licensed Surveyors</i> | 2,598 | 3,033 | 3,105 | 2,883 | 2,534 | 2,683 | 3,052 | 3,099 | 2,736 | 2,382 | 2,509 |
| Total Spatial Scientists | 3,576 | 3,448 | 3,291 | 3,147 | 3,019 | 3,053 | 3,210 | 3,257 | 3,126 | 3,040 | 3,058 |
| Total Technicians | 1,403 | 1,342 | 1,297 | 1,259 | 1,222 | 1,236 | 1,284 | 1,306 | 1,249 | 1,216 | 1,238 |
| Total 'Other' Professionals | 1,205 | 1,150 | 1,108 | 1,073 | 1,043 | 1,050 | 1,098 | 1,115 | 1,065 | 1,025 | 1,067 |
| Total Skilled Labour Demand | 14,997 | 14,748 | 14,314 | 13,609 | 12,886 | 13,203 | 14,119 | 14,393 | 13,600 | 12,777 | 13,120 |
| Existing Workforce (a) | | | | | | | | | | | |
| Cadastral Surveyors | 3,856 | 3,725 | 3,594 | 3,463 | 3,331 | 3,199 | 3,071 | 2,944 | 2,817 | 2,690 | 2,562 |
| Construction Surveyors | 1,645 | 1,633 | 1,621 | 1,608 | 1,596 | 1,583 | 1,566 | 1,548 | 1,530 | 1,512 | 1,493 |
| Engineering Surveyors | 1,570 | 1,539 | 1,508 | 1,476 | 1,445 | 1,414 | 1,379 | 1,343 | 1,308 | 1,273 | 1,238 |
| Mining Surveyors | 1,300 | 1,274 | 1,249 | 1,223 | 1,197 | 1,171 | 1,141 | 1,111 | 1,082 | 1,052 | 1,022 |
| Other Surveyors | 441 | 435 | 428 | 422 | 415 | 408 | 399 | 390 | 381 | 372 | 363 |
| All Surveyors | 8,812 | 8,606 | 8,400 | 8,192 | 7,984 | 7,775 | 7,556 | 7,337 | 7,117 | 6,898 | 6,678 |
| <i>Registered/Licensed Surveyors</i> | 2,598 | 2,476 | 2,355 | 2,233 | 2,111 | 1,989 | 1,887 | 1,786 | 1,684 | 1,582 | 1,481 |
| Spatial Scientists | 3,576 | 3,497 | 3,417 | 3,337 | 3,256 | 3,175 | 3,084 | 2,992 | 2,901 | 2,809 | 2,717 |
| All technicians | 1,403 | 1,378 | 1,353 | 1,328 | 1,302 | 1,276 | 1,246 | 1,216 | 1,186 | 1,156 | 1,125 |
| 'Other' Professionals | 1,205 | 1,183 | 1,160 | 1,137 | 1,114 | 1,090 | 1,061 | 1,032 | 1,003 | 974 | 944 |
| Total skilled labour | 14,997 | 14,664 | 14,329 | 13,993 | 13,655 | 13,317 | 12,947 | 12,577 | 12,207 | 11,836 | 11,465 |
| Workforce Gap | | | | | | | | | | | |
| Cadastral Surveyors | - | 607 | 841 | 655 | 289 | 634 | 1289 | 1483 | 1092 | 713 | 1021 |
| Construction Surveyors | - | 40 | 1 | (71) | (200) | (242) | (123) | (10) | 41 | (46) | (57) |
| Engineering Surveyors | - | (146) | (155) | (117) | 14 | 106 | 53 | 89 | 69 | 165 | 276 |
| Mining Surveyors | - | (275) | (426) | (481) | (436) | (370) | (239) | (188) | (161) | (229) | (171) |
| Other Surveyors | - | (24) | (43) | (48) | (48) | (40) | (7) | 6 | 1 | (4) | 9 |
| All Surveyors | - | 201 | 218 | (63) | (381) | 89 | 972 | 1379 | 1043 | 599 | 1079 |
| <i>Registered/Licensed Surveyors</i> | - | 556 | 750 | 650 | 423 | 694 | 1,165 | 1,313 | 1,052 | 800 | 1,028 |
| Spatial Scientists | - | (49) | (126) | (189) | (237) | (122) | 126 | 264 | 225 | 231 | 341 |
| All technicians | - | (36) | (56) | (69) | (80) | (41) | 38 | 90 | 63 | 60 | 113 |
| 'Other' Professionals | - | (33) | (52) | (64) | (71) | (40) | 36 | 82 | 62 | 51 | 123 |
| Total skilled labour | - | 84 | (15) | (384) | (769) | (114) | 1172 | 1816 | 1393 | 941 | 1655 |
| New Supply of Surveyors | - | 126 | 252 | 380 | 510 | 641 | 775 | 911 | 1,049 | 1,189 | 1,330 |
| New Supply of Technicians | - | 63 | 127 | 193 | 261 | 324 | 384 | 444 | 504 | 564 | 624 |
| Surveyors Capability Shortfall (c) | - | 75 | (34) | (442) | (891) | (552) | 197 | 468 | (6) | (590) | (252) |
| Technicians Capability Shortfall (c) | - | (99) | (183) | (262) | (341) | (365) | (346) | (354) | (441) | (504) | (511) |

(a) Existing workforce is generated by adjusting the size of the current skilled workforce for natural attrition rates such as retirements and death.

Source: BIS Shrapnel, ABS

(b) Workforce gap is calculated as labour demand less existing workforce.

(c) Capability shortfall is derived by subtracting new supply from workforce gap. A positive number implies a shortage of labour

Numbers in brackets imply an excess supply as new supply exceeds the forecast workforce gap.

CHAPTER ONE

Introduction

1. INTRODUCTION

In August 2014, BIS Shrapnel was engaged by Consulting Surveyors National (CSN) to update an earlier report on skills gap analysis for surveyors and surveying-related professionals. The reports inform the work of constituent members of CSN in regard to long term workforce planning and capability building. They also provide data that can be used in working with stakeholders and tertiary education providers in relation to course structure and student numbers, and provide a sound basis for engagement with government agencies, infrastructure bodies and other peak bodies.

This update report builds on the initial report. The report validates the earlier projections, updates the base data and forecasts in the initial report and extends forecasts by two years to 2024. In addition, the update report includes — for the first time — workforce capability analysis for South Australia and Queensland. The updated report will help ensure that workforce planning of constituent members is informed by the most current data, and up-to-date information is available for use with industry stakeholders and tertiary providers.

For the update report we use the same methodology as adopted in the initial report. Firstly, we relate our estimates of **'base year'** demand to an appropriate 'base year' activity indicator to derive a **'usage coefficient'** per unit of end use sector activity. We then apply this usage coefficient to our forecasts of the activity indicator to derive forecasts of future demand.

For this study:

- Base year demand is estimated as the skilled employment in the surveying and geospatial industry in 2013/14. The population of surveyors and geospatial workforce by industry division by state/territory was sourced from the 2011 Australian Bureau of Statistics (ABS) Census data. These data are then scaled up to 2013/14 using BIS Shrapnel's estimates of end use and usage coefficients.
- For this and earlier report, BIS Shrapnel was asked to consider surveying skills (by its main areas of specialisation), geospatial skills, surveying and geospatial technician skills as well as the demand for planners, engineers, environmental scientists, architects and ecologists at consulting surveying firms. The population data was disaggregated into various specialist areas using proportions obtained from a comprehensive industry survey.
- **"End use"** activity indicators chosen for the specialist occupations are as follows:
 - Private house commencements for cadastral surveyors
 - Private multi-residential and non-residential buildings for construction surveyors
 - Utilities and transport engineering construction for engineering surveyors
 - Mining and heavy industry construction plus mining exploration investment for mining surveyors
 - Total construction (ie sum of residential, non-dwelling building and engineering construction) for 'other' surveyors (comprising hydrographic, photogrammetric and geodetic surveyors), geospatial specialists, surveying or spatial science technicians and 'other' professionals employed at consulting surveying practices.
- For each occupation in each state and territory, a usage coefficient was calculated by dividing the population of each occupation by the pertinent end use activity segment in 2013/14.

- Forecasts of future skilled labour demand were then generated by applying the “fixed” coefficients to BIS Shrapnel’s projections of future activity in each end use activity segment. However, in this study, we have allowed for “dynamic” usage coefficients (ie coefficients which change over time). Effectively, this means that we have incorporated labour productivity growth assumptions into the model. Our baseline model output is based on the national average productivity growth of 1.5 per cent per annum. Nonetheless, we also present results for a 2 per cent and 0 per cent productivity assumption to allow for sensitivity testing.

The model therefore assumes that future changes in demand for skilled labour in the surveying and geospatial industry are driven by changes in the identified activity indicator.

However, the total skilled surveying and geospatial workforce requirement to meet future construction activity will inevitably be increased by the attrition of the existing workforce through ageing effects, particularly through retirement. To allow for **workforce attrition**, we included assumptions regarding the approximate age profile of the workforce and the likelihood of retirement (both of which are based on the results of our national industry survey).

We then compared the expected demand for skilled labour with our projected levels of existing workforce. The difference between the total labour demand and the size of the existing workforce is referred to as the ‘**workforce gap**’ in this report. The gap, when positive, will need to be met by additional supply if projected levels of end use sector activity are to be achieved.

The final part of our methodology relates to estimating the potential new workforce supply, which will predominantly be driven by new graduates. Given data on current enrolments and completions in Geomatic Engineering (Surveying), Diploma and Advanced Diploma in surveying, projections of future graduate supply at the professional and para-professional level have been made.

Although domestic graduates provide the main source of new labour supply, it is also worth noting the potential impact of immigration on skilled labour supply. The Bureau for Assessment of Overseas Qualifications (BAOQ) assesses the suitability of overseas academic qualifications for licencing within Australia and New Zealand, and has noted generally increasing numbers of applications over the past three years. The surveying profession remains on the shortlist of Skilled Occupations List (SOL) meaning that immigrants are able to obtain a 457 visa for work in Australia. New Zealand is also a key source of skilled immigrants, due to reciprocal recognition with Australia, with a large number of these coming from the University of Otago. Immigration can be particularly useful in times of labour shortages as these workers are more likely to be willing and able to move to where the work is, rather than domestic workers which are more likely to be reluctant to uproot their families and/or lifestyles.

Unfortunately, we cannot analyse these inflows of labour in any meaningful fashion, given we do not know which states they eventually migrate to. In addition, forecasting the supply of immigrants depends not only on the demand for labour in Australia, but also on a myriad of factors affecting the overseas economies where these immigrants come from. Nonetheless, it is useful to bear in mind that immigration can be an important area of labour supply, and can help fill gaps in the domestic workforce where situations of labour shortages arise.

The estimated total labour requirement or ‘workforce gap’ less the supply of additional skilled labour via new graduates is defined in this report as the ‘**net capability position**’. If positive, it translates into a ‘capability shortfall’. The presence of a capability shortfall implies that the surveying and geospatial industry needs to attract additional labour above that expected to be sourced from new graduates (for example, through immigration or via other labour supply

boosting initiatives such as increasing productivity or reducing the rate of workforce attrition) if it is to achieve forecast levels of future construction activity or Australia's development requirements. A negative capability shortfall implies a situation of 'capability excess/surplus'. In other words, the available skilled labour exceeds the future skilled labour workforce gap.

For a full description of BIS Shrapnel's methodology, refer to our initial report entitled *Determining the Future Demand, Supply and Skills Gap for Surveying and Geospatial Professionals 2012 to 2022* published by the Consulting Surveyors National.

The structure of the report is as follows:

- **Chapter 2** presents the output of the skills demand and supply model for Australia and discusses some of its implications for the surveying industry and the broader economy. BIS Shrapnel's estimate of the size of the current skilled surveying and geospatial workforce in Australia — the effective starting point of the model — is presented first. This is followed by a discussion of the key determinants of skilled labour demand. Finally, model output is presented showing how these forecasts translate into a total requirement for skilled labour for surveyors and geospatial professionals. Any gaps in skilled workforce are subsequently quantified followed by a calculation of a capability shortfall (or deficit) for the industry.
- **Chapters 3, 4, 5 and 6** present the results of the skills demand model for New South Wales, Victoria, South Australia and Queensland respectively. As there is no data on the flow of new graduates into the surveying and geospatial industry by state and territory, we do not calculate a capability shortfall (or surplus) at the state level.
- **Chapter 7** presents the consulting surveyors' case study results and addresses how surveying firms have changed in the last 10 years and what surveying firms will look like in 10 years time. This chapter was authored by Dr. Veronica Bondarew, Chief Executive Officer of Consulting Surveyors National, and first appeared in the previous *Determining the Future Demand, Supply and Skills Gap for Surveying and Geospatial Professionals 2012 to 2022* report.
- **Bibliography**
- **Appendix**

Each chapter is preceded by a discussion of the macroeconomic environment. This sets the scene for the economic parameters on which the underlying labour demand drivers are based and includes a brief commentary of the logic and key drivers of our macroeconomic forecasts.

Sources of data

The ABS is also the primary data source for employment, real gross value added, investment (including engineering construction) data, and for a range of other economic variables.

Forecasts of the economic variables in this report were mostly sourced from BIS Shrapnel reports, including *Economic Outlook* and *Long Term Forecasts: 2014 – 2029* report. Forecasts of the underlying activity indicator (ie the main determinants of skilled labour demand) were also sourced from BIS Shrapnel reports including *Engineering Construction: 2013/14 to 2027/28*, *Building in Australia 2014–2029*, *Long Term Building Work Done Forecasts*, *Mining and Heavy Industry Construction in Australia 2013/14 – 2027/28*, *Mining in Australia 2014 – 2029* plus other unpublished forecasts and from BIS Shrapnel internal research.

The workforce attrition rates, the size of surveying population by specialist occupation and the size of 'other' professionals at consulting surveying firms are based on the industry survey.

CHAPTER TWO

Forecasts of Labour Demand, Workforce Gap and Capability Shortfall for Australia

2. FORECASTS OF LABOUR DEMAND, WORKFORCE GAP AND CAPABILITY SHORTFALL FOR AUSTRALIA

2.1 The economic environment

The Mining Investment Boom has peaked and will decline from now

Australia's solid economic performance over the last decade was largely underwritten by an investment boom in the resources sector. An investment boom made possible by the high commodity prices and strong Chinese and Asian demand for bulk commodities. However, the surge in resources investment resulted in a significant reallocation of resources (capital and labour) away from the non-mining industries to the mining and mining-related sectors.

High commodity prices drove the Australian dollar above parity with the US dollar, creating competitive challenges and enormous pressure on other trade-exposed industries including agriculture, manufacturing, tourism, education, finance and business services. This was part of the structural change brought about by the escalation in the resources investment, "making room" for the mining investment boom. Ultimately, higher commodity prices and the associated mining investment boom as well as the rise in the Australia dollar delivered Australia strong but uneven composition of growth last decade and early this decade.

The mining investment boom peaked in 2013/14. As a result, resources investment will now make negative contributions to investment and real GDP growth. That said, we anticipate a soft landing in the resources construction market. In other words, we don't expect activity to collapse completely.

Commodity prices while retreating remain high from a long run historical perspective and will support the investment decisions for a number of projects expected to commence over the short-to-medium term. This, in turn, will keep minerals investment at healthy levels over the next four years. Further, a strong pipeline of work driven by oil and gas construction, with several large LNG (liquefied natural gas) projects now ramping up off the North West Coast and a range of projects around Gladstone, Queensland will place a floor under the level of work. And, eventually, further (smaller) mining investment cycles will play out in response to global demand, prices and movements in the Australian dollar.

We wait for recovery in non-mining business investment and structural change associated with a lower dollar to underpin solid growth in the second half of the decade.

The peak in the mining boom puts Australia's economy in a transition phase. We are looking for the next growth drivers to come through and take over from the mining sector. But this 'handover' is unlikely to be as successful as those in the last decade when growth switched basically 'on cue' from housing construction, to minerals investment, later (around mid-decade and following the GFC) to public sector, then to mining investment subsequently. We think the next set of drivers will be slow to come through. The rebalancing, the reversing of high commodity prices, and hence reversing of high Australian dollar-induced structural change to more broadly based growth will take time. The Australian dollar remains still 'too high' from a competitiveness perspective.

Meanwhile, the Australian economy is operating below capacity. Nonetheless, the ingredients of positive (albeit below long-run average) growth remain in place.

Real GDP growth in the interim will be driven by net exports. We expect the world economy to continue to gather momentum and won't pull the rug from under us. Countries important to us, especially China, are expected to continue to grow at a solid pace. Meanwhile, imports will be

soft in the near term consistent with the peak of mining investment boom as well as weak domestic demand. We anticipate net exports will add at least 1 per cent to growth over each of the next four years.

Further, the long-awaited recovery in dwelling investment is now entrenched. Having been delayed due to weak housing market sentiment and excessive caution by investors, the expectation of low interest rates for an extended period combined with a substantial deficiency of residential stock is driving a solid increase in dwellings construction. This will build momentum from here. But this recovery will not be uniform between regions, with sizeable stock deficiencies set to drive the markets in parts of Queensland and New South Wales in particular. Private non-dwelling building should also post, albeit moderate, growth over the next few years with major projects in retail, warehouses and accommodation sectors offset by declines after the current boom in hospital building.

The key to the broadening of growth will be the recovery in non-mining business investment. However, that is still 18 months to two years away. Ever since the GFC hit, most non-mining business enterprises have been facing weak demand, weak profits and weak confidence. Even the stronger ones have been cutting costs, preserving cash and deferring investment. It will be tightening capacity and improved confidence that drives a recovery in non-mining business investment.

Table 2.1: Australia – Key Economic Indicators, Financial Years

| Year Ended June | | | | | | | | | | Forecasts | | | | |
|--|------------|-------------|------------|-------------|-------------|-------------|--------------|-------------|-------------|------------|-------------|-------------|------------|--|
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | |
| Selected Expenditure Categories | | | | | | | | | | | | | | |
| Private Investment | | | | | | | | | | | | | | |
| – Dwellings | -0.2 | 1.8 | -1.4 | 1.2 | 2.2 | -2.2 | -0.2 | 5.0 | 7.0 | 3.0 | -1.8 | -5.5 | 2.0 | |
| – New Non-Dwelling Construction (+) | 13.1 | 6.4 | 12.1 | -10.2 | 11.4 | 37.2 | 14.9 | -2.2 | -6.3 | -5.6 | -7.6 | -8.1 | 5.5 | |
| – New Non-Dwelling Building (+) | 10.7 | 11.7 | -3.9 | -14.4 | 0.5 | 9.6 | 9.1 | 3.0 | 7.5 | 2.9 | -2.9 | -8.2 | 1.3 | |
| – New Engineering Construction (+) | 15.5 | 1.3 | 29.2 | -7.0 | 19.0 | 53.6 | 17.3 | -4.3 | -12.0 | -9.8 | -10.3 | -7.9 | 8.1 | |
| Total New Private Investment (+) | 5.2 | 8.3 | 1.2 | -2.2 | 5.3 | 14.9 | 5.1 | -1.8 | 0.4 | 1.3 | -0.4 | -3.4 | 5.3 | |
| New Public Investment (+) | 4.7 | 10.6 | 8.1 | 22.6 | -2.7 | -4.0 | -10.4 | 0.7 | -3.5 | 6.5 | 12.0 | 6.2 | 2.4 | |
| Gross National Expenditure (GNE) | 5.1 | 6.0 | 0.6 | 2.2 | 4.2 | 5.0 | 1.8 | 0.8 | 1.8 | 3.1 | 2.7 | 1.4 | 3.7 | |
| GDP | 3.8 | 3.7 | 1.7 | 2.0 | 2.2 | 3.6 | 2.6 | 2.9 | 2.5 | 3.4 | 3.5 | 2.9 | 3.4 | |
| Inflation and Wages | | | | | | | | | | | | | | |
| CPI (Yr Avg)- RBA/Treasury forecasts (*) | 3.0 | 3.4 | 3.1 | 2.3 | 3.1 | 2.3 | 2.3 | 2.0 | 3.0 | 2.8 | 2.5 | 2.5 | 2.5 | |
| Wage Price Index (Jun on Jun)(**) | 4.0 | 4.2 | 3.8 | 3.1 | 3.8 | 3.7 | 2.9 | 2.6 | 2.7 | 3.1 | 3.5 | 3.6 | 3.9 | |
| Wage Price Index (Yr Avg)(**) | 3.9 | 4.1 | 4.1 | 3.1 | 3.8 | 3.6 | 3.3 | 2.6 | 2.6 | 2.9 | 3.4 | 3.7 | 3.4 | |
| Average Weekly Earnings (Yr Avg) | 3.6 | 4.9 | 5.5 | 5.6 | 4.2 | 4.3 | 4.6 | 3.0 | 3.3 | 3.9 | 4.5 | 4.9 | 4.3 | |
| Employment | | | | | | | | | | | | | | |
| – Employment Growth (Yr Avg) | 3.0 | 3.1 | 1.7 | 0.9 | 2.4 | 1.2 | 1.2 | 0.8 | 1.1 | 1.9 | 2.0 | 0.8 | 1.3 | |
| – Employment Growth (May on May) (%) | 3.3 | 2.7 | 0.9 | 1.6 | 2.2 | 1.7 | 0.9 | 0.9 | 1.2 | 2.0 | 1.9 | 0.5 | 1.8 | |
| – Unemployment Rate (May) (%) | 4.3 | 4.3 | 5.8 | 5.2 | 5.0 | 5.2 | 5.6 | 5.8 | 6.2 | 5.8 | 5.5 | 5.9 | 5.6 | |
| Labour Productivity Growth | | | | | | | | | | | | | | |
| – Total | 0.8 | 0.6 | 0.0 | 1.0 | -0.1 | 2.4 | 1.4 | 2.1 | 1.4 | 1.5 | 1.4 | 2.0 | 2.1 | |
| – Non-farm | 1.3 | 0.5 | -0.3 | 1.1 | -0.2 | 2.4 | 1.5 | 2.1 | 1.5 | 1.5 | 1.5 | 2.0 | 2.1 | |
| Exchange Rates | | | | | | | | | | | | | | |
| – US\$ per A\$ (Yr Avg) | 0.79 | 0.90 | 0.75 | 0.88 | 0.99 | 1.03 | 1.03 | 0.92 | 0.88 | 0.86 | 0.83 | 0.77 | 0.80 | |

Source: BIS Shrapnel, ABS and RBA

+Expenditure on new assets (or construction work done). Excludes sales (or purchases) of second hand assets.

*Headline CPI forecasts based on Reserve Bank of Australia's forecasts to calendar year 2015 and then Commonwealth medium term projections.

** Based on Ordinary Time Hourly Rates of Pay

The other major change will be a structural change back towards the trade-exposed industries as and when the Australian dollar falls. While in some cases the loss of industry will be irreversible, the lower dollar will improve the competitiveness of agriculture, trade-exposed manufacturing, mining, tourism, education, finance and business services.

While growth will look good, boosted by minerals production, the labour market will remain weak in the near-term. Loss of jobs associated with mining investment will keep employment growth subdued. Hence we expect interest rates to remain at current low levels over 2014/15.

Our forecast is for growth of 2.5 per cent in 2014/15. It's only when non-mining business investment and structural change chime in that we'll see an acceleration taking us close to potential. And, as growth broadens beyond mining, employment will pick up underwriting a strong final third of this decade. Only then will the Reserve Bank raise rates to dampen demand.

The upshot is that we are a long way from stable, balanced growth or what feels like a healthy economy. The mining boom brought with it a negative structural shift in the non-mining-related part of the economy. And that will reverse. Certainly, continuation of strong cycles in investment will continue to drive cyclical shifts in the economy. But most importantly, a lower dollar will allow Australia to build its industrial and services base with a resumption of non-mining investment underwriting a stronger economy in the medium-term.

The value of the Australian dollar is generally driven by two key factors:

- **Commodity prices.** As mineral and agricultural commodities make up over 70 per cent of Australia's exports, they have a direct impact on the demand for the Australian dollar through exporters converting foreign currency returns. In addition, high commodity prices have encouraged record mineral investment in recent years, which is boosting Australian growth above the rest of the developed world, further lifting the currency.
- **Interest rate differentials.** A larger interest rate differential with the rest of the world, particularly the US, will boost the value of the Australian dollar. This is due to the 'carry trade' market, where participants borrow money in low interest rate currencies and invest elsewhere at higher interest rates, such as in Australia.

The record strength of the Australian dollar over the three years to 2012/13 is unlikely to be seen again over the forecast period. The Australian dollar has shed over 15 per cent since April 2013, when it was last at parity with the US dollar, to sit at around \$US0.85 at the time of writing. We believe the dollar will average around \$US0.87 over the next two years.

We now believe the dollar will not regain parity with the US dollar. In other words, we expect the dollar will now trend around a level supported by its fundamentals, rather than being overvalued due to excessive investor confidence, as prevailed over the three years to April 2013.

Now that investor weight of money is largely removed as a driver of the currency's value, the largest risk facing the dollar is the growth outlook in the Asia region, particularly China. Because the currency is so sensitive to commodity price fluctuations, a significant shift in minerals demand (through Chinese growth accelerating or slowing more than expected) will have a direct effect on the value of the dollar. In short, bad news on the Chinese economy usually pushes the A\$ down (and vice versa), while bad news on the US economy usually pushed the A\$ up, because investors view that as a negative for US interest rates.

Further price declines in commodities such as coal and iron ore, will contribute to further declines in the exchange rate, however this will be offset to some degree by price rises in non-ferrous metals and agricultural prices until 2016/17. Additionally, we expect US interest rates to

begin to rise through calendar year 2015. As overseas economies recover, their interest rates will also rise faster in comparison to Australian rates, putting further downward pressure on the Australian dollar.

During 2017/18, we are forecasting a larger fall in the dollar, to around US\$0.77. This will be driven by further declines in key commodity prices, as world economic growth rates slow. Although mineral demand is likely to remain elevated due to solid growth in the Asia region, in particular China, growth in world supply is expected to outstrip this demand. Consequently, this will apply downward pressure on commodity prices, and hence the currency. Additionally, forecast RBA interest rate cuts will contribute to a larger interest rate differential favouring the rest of the world for higher returns, especially the United States.

There remains a high probability of the currency ‘overshooting’ on the way down below prevailing trade and interest rate fundamentals over the short-to-medium term, particularly if the currency drops quickly and gathers strong downward momentum. However, should it overshoot, the currency is expected to gradually return toward its fundamental value, on which our forecasts are based. Eventually, the dollar will attain around US\$0.80 during 2018/19, before rising further to US\$0.87 in 2019/20, supported by further growth in commodity prices, as well as a return to relatively high interest rates in Australia compared to overseas.

Australian Economic Outlook

Having gone through a structural change with the mining boom shifting activity and labour towards servicing high levels of mining investment, that investment has now peaked and will enter a period of sustained, albeit orderly, decline. That means dismantling the capacity to service high levels of resources investment and redeploying resources to the non-mining sectors. It means a structural shift back towards balanced growth.

The driving force of the structural change — away from domestic trade-exposed industries towards the mining-related sectors — was the currency. The high dollar impacted on competitiveness creating enormous pressure on other trade-exposed industries including agriculture, manufacturing, tourism, education, finance and business services. As a result, investment outside the mining sector has been bumping around the bottom of the cycle since the post-GFC collapse. The next stage is for a recovery in non-mining spending, especially non-mining business investment. However, the Australian dollar is still too high from a competitiveness point of view. This, combined with low capacity utilisation suggest that a generalised pick up in non-mining business investment is still 12 to 18 months away. As a result, the Australian economy sits in a soft patch and is likely to remain weak for another 12 months at least. But there is little chance of a collapse with growth to be underwritten by resources exports due to increased production capacity, a legacy of the recent mining investment boom.

Meanwhile, there are cyclical forces at play.

- Residential investment is usually the first sector to recover after a downturn, and it has finally picked up strongly.
- Government investment has been falling, and continues to fall, as governments focus on budgets. We expect another year of declining activity before the next round of projects boosts activity.
- The next stage is a more solid recovery in growth and employment underwritten by recovery in non-mining business investment. However, given still low capacity utilisation, this appears to be 12 to 18 months away.

That means that the Australian economy will remain soft, and employment growth softer, until the structural shift and cyclical upswings underwrite stronger growth in the second half of the decade. The next 12 to 18 months will be characterised by:

- Continued tight business conditions - cutting costs and deferring investment.
- Tight government expenditure
- Further rises in unemployment
- Subdued wage pressures and further labour productivity increases, offsetting the inflationary impact of falls in the dollar
- A sustained period of low interest rates until growth picks up.

We expect the economy to build momentum from late 2015 with growth returning to trend over 2015/16 and 2016/17. Growth could ease in 2017/18 as interest rates rise, but quickly return to trend reflecting more broadly based balanced growth in the final third of the decade.

The difficult period is now – waiting for a lower dollar and structural change to come through and waiting for non-mining business investment to recover.

Consumer expenditure to grow in line with incomes

Household consumption expenditure growth slowed sharply in the immediate aftermath of the global financial crisis as people cut spending and sharply increased savings. That came after the spending binge of the previous decade when the banks turned mortgages into lines of credit allowing households to borrow against the value of their home to boost current expenditure. And they did, sharply reducing savings ratios. Increased concern about high household debt was brought to a head by the GFC and concerns about job security. The decline in household consumption expenditure growth was more marked than the decline in real household disposable income with the household saving rate rising to its highest level since the 1980s.

Over the past three years, households have stayed cautious, keeping savings high and only very slightly loosening the purse strings. Through this period growth in consumption expenditure has been in line with growth in household disposable income.

We expect that to continue over the next few years. Households have built up a considerable savings buffer after several years of high savings ratios. While household income growth is now softening, improved financial security will see expenditure continue to pick up. With the Australian dollar now lower, the ongoing growth in household consumption expenditure is expected to translate into increased retail turnover and activity in Australia over the next few years.

We expect interest rates to remain around current relatively low levels until strength in the broader economy causes the Reserve Bank to begin to increase interest rates from the second half of calendar year 2015 and through 2016 back towards neutral levels. This would dampen consumer spending from 2016/17. Overall, household consumption expenditure is forecast to average growth of 2.9 per cent per annum over the five years to 2018/19.

Over the longer term, population growth is expected to be the primary driver of household expenditure. As such, slowing population growth will see household consumption expenditure growth moderate slightly over the following decade, averaging 2.8 per cent per annum between 2019 and 2029. Although the economy is expected to remain healthy through this period, we do not expect a return to the debt-driven increases in consumption that occurred through the late 1990's and early 2000's when growth rates often approached and exceeded 5 per cent.

Offsetting cycles will keep investment subdued

Private investment will be characterised by offsetting cycles. The mining investment boom which underwrote the strength in Australia's GDP growth last decade peaked last year and will detract from investment growth over the next four years. We estimate that mining and heavy industry construction will decline by 41 per cent over the next four years. It is important to note that we expect an orderly decline, rather than activity falling off the cliff. Projects already under construction, and their outstanding activity, will place a floor under the level of work, ensuring investment remains around historically strong levels.

On the bright side, the long-awaited recovery in dwellings investment is now entrenched. This upswing has been delayed due to weak housing market sentiment and excessive caution by investors. However, with the expectation of low interest rates for an extended period, and a growing deficiency of stock, a solid increase in dwellings building is now well under way and will build momentum from here. But this recovery will not be uniform between regions, with sizeable stock deficiencies set to drive the markets in parts of Queensland and New South Wales in particular.

Private non-dwelling building is also likely to experience solid growth over the next few years, although the outlook varies across states. Strong growth in retail building in line with improving economic conditions will see this sector momentarily usurp offices as the largest sector. Activity will also be supported by significant projects in the accommodation, warehouses, and aged care sub-sectors. The longer term outlook is positive, as improving demand across non-mining industries will see capacity constraints emerge and prompt the next round of investment in commercial and industrial buildings.

The maturing of the mining investment boom will see further declines in private plant and equipment investment in the near-term. However, the downturn will be softened somewhat as service industries equipment investment picks up from the bottom of the cycle. Broad-based growth in equipment investment will return when capacity constraints emerge as demand picks up. That we think is another 18 months to 2 years away. The net result is a soft period for total private investment over the next five years.

Government spending affected by fiscal consolidation

The completion of the last of the post GFC stimulus in particular health projects and belt tightening to control budget deficits and debt will be a drag on investment in the short-term. However, we expect a recovery in the second half of the decade. This will be underwritten by the next round of infrastructure projects as governments at all levels embrace the process of 'asset recycling' where mature assets are taken off the balance sheet to finance new ones.

State Government finances in Queensland and Western Australia in particular will be boosted by increased royalties as the large mining projects come on stream, but the other states will remain dependent on the Commonwealth Government, and may not fare so well.

Strong external demand will underwrite Australia's GDP growth

The outlook for Australia's exports, in particular resources exports, is largely dependent on the prospects of the Chinese economy as China alone accounts for a nearly a third of Australia's merchandise exports.

China's economic growth is expected to remain solid, supported by near-term targeted stimulus measures and ongoing medium-term economic reforms aimed at reorienting growth toward domestic consumption and away from investment and exports. Overall, we expect economic growth in China to remain between 7 and 7½ per cent over the next three years.

The level of infrastructure in China however remains well below that in developed countries. This suggests that infrastructure investment encompassing municipal infrastructure, utilities, transportation and social infrastructure such as schools and hospitals is likely to remain strong well into the next decade and possibly beyond. As infrastructure investment is intensive in its use of steel which in turn requires iron ore and coking coal as inputs, the prospects of Australia's bulk commodity exports remains bright.

Meanwhile, the expected improvement in world economic growth rates over the next two years coupled with the lower exchange rate, will facilitate a recovery in export volumes of non-commodity manufactures. Even though the Australian dollar has fallen over 10 per cent from above parity since April 2013, improvements in manufacturing exports will still depend on future world economic conditions. We expect manufacturing year average export growth rates to reach 2.8 per cent in 2014/15, picking up even further in 2015/16. This recovery will gain more speed over the medium term as world economies return to trend economic growth rates, and the dollar falls toward (and below) US\$0.80.

Overall, total exports of goods and services are forecast to increase at a robust annual compound growth rate of 5.7 per cent over the next five years, compared to 4.6 per cent growth over the past five years.

Labour shortages to re-emerge in the second half of 2016

The labour supply will be critical for medium-term economic growth potential, given relatively low unemployment rates (ie there is not a large pool of spare labour currently available). We expect the labour force to grow at slightly below total population growth over the next 15 years — labour supply is currently roughly in line with population growth. This is in contrast to previous decades where the baby boomers, immigration and increased participation rate provided a significant boost to the working age population. In the long term, growth in labour supply is expected to contract as the 65 years and over category grows strongly and total population growth slows.

Employment growth has been subdued since mid 2011 reflecting a weakening in employers' demand for labour due to a prevailing orthodoxy of cost cutting including labour costs. More recently, the slowdown in mining investment — and the transition to less labour-intensive production phase of the mining boom — have weighed on the demand for labour in mining and mining-related sectors such as employment services firms, engineering & technical services firms and vehicle and equipment leasing providers.

The (subdued) pace of employment growth of 1.1 per cent over the past three years has not kept pace with the growth in the labour force (the number of people working or available and actually looking for work) — which has been around 1.5 per cent annually. This has resulted in the unemployment rate rising from 5.0 per cent in May 2011 to 6.1 per cent in August 2014.

Employment growth will remain weak over the next 12 months as trade-exposed businesses continue to focus on cost-cutting to deal with problems of competitiveness associated with the high Australian dollar. Other businesses' demand for labour will also be weak due to slower growth in output. With the labour force expected to continue to outpace employment growth, the unemployment rate is forecast to remain above 6 per cent until mid 2015.

However, employment growth should pick up from the second half of 2015 and average over 2 per cent over calendar year 2016. This will see the unemployment rate drop to 5.3 per cent by the end of 2016, before again rising to a peak of 5.8 per cent by early 2018 when the economy slows.

Overall, we expect employment growth to average 1.4 per cent per annum over the next five years. However, the labour force will grow more slowly with lower immigration and an aging population restricting labour supply and constraining employment and GDP growth.

In the medium to longer term, continued solid employment growth should see the unemployment rate cycle between 4.5 and 5.5 per cent, with any further decrease in the unemployment rate moderated by increases in migration and/or higher interest rates. An unemployment rate much below 5 per cent - which is thought to be the non-accelerating inflation rate of unemployment (NAIRU) - would cause a rise in wage inflation, as employers bid up wages for scarce skilled labour in a tightening labour market.

Main risks to outlook

There is a risk that we could have a bigger collapse in mining investment. Our assumption is for an orderly decline in resources investment but a drastic deterioration in the prospects of mining projects could trigger a bigger fall in mining investment and a recession in Australia. However, we see this as a low probability (tail) event as the Federal Government has scope to loosen fiscal policy to support growth in Australia if needed.

There is a risk that the dollar will fall further or more quickly than currently anticipated. But this would be a positive outcome for many Australian industries, including the perpetually weak manufacturing sector, as well as other trade-exposed industries such as agriculture, tourism and education.

There is a risk that our forecast recovery in non-mining business investment will take longer to come through, which means that the economy will stay softer for longer. If the recovery does not come through, we expect the Reserve Bank to keep interest rates low even longer than our current forecast to support economic recovery.

Longer term, the main risk to Australia's growth prospects relate to the fundamental drivers of growth – lower population growth and a failure for labour productivity growth to maintain its long-term average. However, we expect Australia's relatively high level of income to continue to attract migrants. Furthermore, as the positive benefits of the terms of trade and increased labour supply of the past decade or two start to wane, we expect both governments and businesses to make a more concerted effort to invest in productivity – much as occurred during the 1980s and 1990s.

2.1.1 Medium Term Issues

The Australian economy is subject to strong internally generated cyclical swings. In addition, Australia's market economy orientation and non-interventionist policy means that the economy has to adjust to short-term external forces beyond our control with little regard to the longer term consequences. The commodities demand and price boom with the associated rise in the Australian dollar driving structural change is a case in point. The financial engineering boom followed by the GFC-induced correction was another.

A decade ago, the Australian economy was just recovering from the overinvestment of the 1980s debt-driven investment boom and the subsequent financial crisis and recession. It took a long time to absorb the excess capacity created during the boom. But capacity constraints eventually drove a recovery in business investment early last decade, spreading through to balanced growth in the economy by mid-decade.

The minerals boom, and the consequent minerals investment boom, left everything else in abeyance. Since that time, underwritten by the strong rise in the Australian dollar, we have built up our capability to service much higher levels of minerals investment at the expense of trade-

exposed activity, focused in regions servicing those major projects. The boost to activity from strong mining investment, albeit just starting to decline, has been the primary driver of growth in the economy and masked the weakness of other sectors. That was aided by the boost from the Government's GFC (global financial crisis) stimulus package, now still being wound back and lower interest rates.

We went through a process of structural change, shifting labour and operational resources towards mining investment and away from non-mining, and particularly non-mining trade-exposed export and import-competing, industries. This has resulted in a corresponding shift between regions. Those regions servicing mining investment, and the capital cities where much of that took place, prospered largely at the expense of non-mining-related activities and regions.

Many workers involved in those projects work on a fly-in/fly out rotation, boosting associated residential, hospitality, retail and transportation services. The cities servicing those projects have boosted their capacity to undertake design, construction, project management, legal, financial, accounting and other services, requiring increased facilities such as office space to house that activity and flowing on to stimulate the broader economy.

The main transmission mechanism for the shift of resources towards minerals investment was the rise in the Australian dollar. The resultant reduction in international competitiveness underwrote the process of structural change mentioned above, with the hollowing out of trade-exposed industries 'making room for the minerals boom'. Hence, the continued loss of industry, regular announcements of job losses and shifting of activities offshore. These businesses are under enormous competitive pressure. Typically, in what has become an increasingly global economy, the decision whether to remain operating in Australia is made when the next major investment or retooling decision has to be made. Hence the protracted adjustment period.

That structural change process is ongoing as the impact of the still too high Australian dollar continues to work its way through the system.

Nor has the weakness only been felt in the non-mining trade-exposed sectors. Much of the rest of the economy, sheltered from the impact of the high dollar, is still suffering from the consequences of the GFC. Weak confidence, revenue and profits continue to impact on business psychology. Further, cost-cutting and cash preservation is deferring and delaying investment. The weakness of non-mining business investment, coupled with long lead times between investment and capacity coming on stream, is setting up Australian industry for a period of tight capacity through the middle of the decade, leading to a surge in investment. But not yet. There is still sufficient capacity to cater for another 18 months to two years of growth, with weak confidence delaying the next round of investment. Hence the current weakness of the non-mining economy.

The 'new normal' of weak demand and profits driving cost-cutting 'productivity initiatives' is a child of the long period of weakness of non-mining-related industries since the GFC. This psychology is self-fulfilling, perpetuating the weakness of confidence, demand and profits. But it also contains the seeds of the next upswing. Eventually, inadequate investment will lead to capacity constraints, underwriting the next phase of investment. Indeed, investment delayed will require a catch-up to increase capacity to levels required to service demand, later adopting new labour-saving technologies to improve efficiency and allow companies to service market shifts. As the cycle moves into the investment phase, the psychology of business will shift from survival to growth mode.

Rolling investment cycles will continue to dominate as drivers of Australia's economic growth

The boost to government investment associated with the stimulus package is still being wound back aggressively.

The extraordinary stimulus to GDP from minerals investment growth is over. That contribution will turn negative from now on as minerals investment recedes from peak levels. Even so, minerals investment remains extraordinarily high, at a level adding substantially to our capacity to produce and export. That is both a strength and a weakness, the risk being that a substantial decline will have a major negative impact on demand and activity. Meanwhile, growth in resources production and exports is sustaining GDP growth, but with a lesser effect on employment.

And now a phase of residential investment has begun, with activity strengthening through the middle of the decade.

After that, the main driver of growth will be non-mining business investment. We do not think it will pick up pace for another year or two. However, once it picks up momentum, it will constitute a long and strong upswing. Some sectors, notably commercial property, look like peaking in some cities around the end of this decade, though others will turn down earlier. The delay to the commencement of this investment is setting the preconditions for a strong cyclical upswing.

We are a long way from stable, balanced growth. It looks as though the continuation of strong cycles in investment will continue to drive cyclical shifts in the economy.

The next structural shift

In any case, the next structural shift will come as the dollar falls further. That will again be a painful process involving substantial change at the industry and regional levels, with declining minerals investment offset by strong growth in minerals production and a recovery in other parts of the economy. Most likely, the dollar will fall when commodity prices fall. The extent of structural change will depend on the extent to which the dollar falls. That will offset part of the negative impact of the fall in mining investment and partially reverse the structural change we have been going through, with an improvement in the competitiveness of industries currently hit by the high dollar. It means a boost to manufacturing, agriculture, tourism, education, finance and business services. But we are unlikely to go back to where we started. The question is the extent to which industry lost in the current episode is irreversible. Manufacturing may never recover lost ground — unless new highly capital intensive technologies change the game. Services are likely to be the major beneficiaries.

2.2 Estimate of surveying and geospatial workforce

Table 2.2 presents BIS Shrapnel's estimate of the size of the skilled surveying and surveying-related workforce in Australia in 2013/14. The aggregate figures for surveyors, spatial scientists, and surveying and spatial science technicians were sourced from 2011 ABS Census data and scaled up to 2013/14 based on movements in underlying end-use activity. The size of the specialist surveying occupations is based on the results of BIS Shrapnel industry research. Similarly, the population of planners, engineers, environmental scientists employed at consulting surveying firms is based on the industry survey.

Surveyors comprise 58 per cent of the skilled surveying and geospatial workforce nationwide, with spatial scientists and surveying and spatial science technicians making up 24 and 9 per cent respectively. We estimate that cadastral surveyors account for just over 40 per cent of all surveyors at the Australia level. This is followed by construction surveyors (19 per cent),

engineering surveyors (18 per cent), mining surveyors (15 per cent) and other surveyors (5 per cent). In addition, we estimate that 30 per cent of all practicing surveyors are licenced. This means that there are approximately three non-licenced surveyors practicing for every licenced surveyor at the national level.

Table 2.2: Estimate of the Size of Surveying and Geospatial Workforce by specialist occupation by state, as at 2013/14

| Specialist Occupation | NSW | VIC | QLD | SA | WA | TAS | NT | ACT | Total |
|--|--------------|--------------|--------------|------------|--------------|------------|------------|------------|---------------|
| Cadastral | 1,696 | 558 | 693 | 210 | 439 | 112 | 77 | 72 | 3,856 |
| Construction | 396 | 393 | 453 | 78 | 309 | 7 | 2 | 8 | 1,645 |
| Engineering | 446 | 338 | 324 | 100 | 326 | 16 | 2 | 16 | 1,570 |
| Mining | 154 | 54 | 541 | 72 | 457 | 21 | 1 | 0 | 1,300 |
| Others | 77 | 125 | 117 | 17 | 88 | 10 | 0 | 7 | 441 |
| Total Surveyors | 2,769 | 1,468 | 2,128 | 477 | 1,619 | 166 | 82 | 104 | 8,812 |
| <i>o/w Registered/Licensed Surveyors</i> | <i>927</i> | <i>417</i> | <i>562</i> | <i>152</i> | <i>244</i> | <i>98</i> | <i>112</i> | <i>86</i> | <i>2,598</i> |
| Total Spatial Scientists | 844 | 658 | 865 | 213 | 663 | 108 | 83 | 143 | 3,576 |
| Surveying Technicians | 368 | 172 | 291 | 58 | 147 | 30 | 19 | 20 | 1,103 |
| Spatial Technicians | 92 | 43 | 73 | 38 | 37 | 8 | 5 | 5 | 300 |
| Total Technicians | 460 | 215 | 363 | 96 | 183 | 38 | 23 | 25 | 1,403 |
| Planners | 120 | 72 | 89 | 17 | 55 | 7 | 4 | 5 | 369 |
| Engineers | 155 | 116 | 141 | 5 | 86 | 10 | 7 | 7 | 527 |
| Environmental Scientists | 35 | 26 | 36 | 19 | 23 | 3 | 3 | 2 | 147 |
| Other (include Architects) | 31 | 55 | 30 | 23 | 17 | 2 | 2 | 1 | 161 |
| Total Other Professionals (a) | 342 | 270 | 296 | 65 | 181 | 22 | 16 | 15 | 1,205 |
| Total | 4,414 | 2,611 | 3,652 | 850 | 2,646 | 333 | 204 | 287 | 14,997 |
| <i>o/w: of which</i> | | | | | | | | | |

Source: BIS Shrapnel, ABS, CSN

2.3 Outlook for key determinants of skilled labour demand

2.3.1 Private house commencements: key determinant of demand for cadastral surveyors

The latest building activity release for June quarter 2014 saw the number of new dwelling commencements fall 6.9 per cent compared to the previous quarter, driven by a drop in the other dwellings sector. Despite this drop, it is the other dwelling sector, and high-density commencements in particular, that have been driving the market. On the other hand, private detached house starts have lagged behind somewhat, finishing 2013/14 at 102,400, which is only marginally above their ten year average of 100,300.

However, strong growth in private dwellings has emerged over the first half of 2014, and approvals data suggest that momentum in this sector is set to build in coming quarters. Hence, with more scope for growth off a still subdued base, we expect to see strong growth in detached houses over the medium term. Leading indicators suggest that growth in the New South Wales and Queensland markets will continue and this fits with our expectations based off our longer term analysis of population.

Whilst the undersupplied markets of New South Wales and Queensland (and to a lesser extent Victoria) are forecast to show continued growth for another two years, those states/territories coming off recent highs are expected to see activity fall back. Western Australia, the A.C.T. and Northern Territory will see dwelling starts contract in 2014/15. South Australia, and Tasmania will grow in 2014/15 before posting declines in 2015/16. These falls will essentially offset the strength in New South Wales and Queensland, resulting in flat national commencements in 2015/16.

The dominant storyline in the next two years is of low interest rates unlocking pent up demand. Interest rates sit at their most expansionary levels in half a century, with the RBA cash rate at 2.50 per cent., and forecast to remain that way for some time yet. We expect a continued expansionary stance from the RBA, with rates not expected to begin rising again until late 2015. We remain confident that the RBA’s current stance coupled with the evident underlying demand will drive a record upturn in housing construction over the next few years.

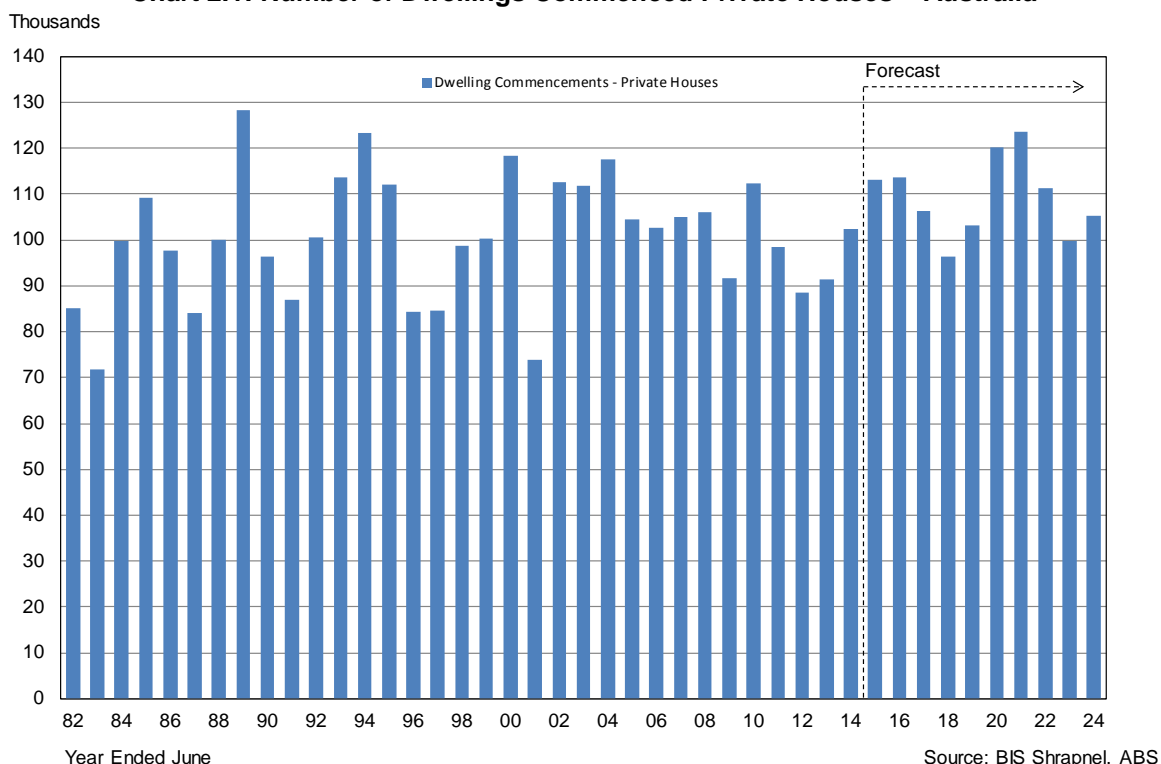
As the economy returns to strength and inflationary pressures begin to emerge, the RBA is expected to begin raising rates again in late 2015. By 2016/17 interest rates will begin to reach levels high enough to curtail dwelling commencements, and national commencements are predicted to decline by 7 per cent.

The downswing will really start to bite in 2016/17 (down a further 9 per cent) with falls in activity forecast across virtually all states and territories in both fiscal years. The largest falls will be experienced in the oversupplied states as they move back towards trend, although activity in New South Wales and Queensland will remain at stronger levels than what they have experienced historically.

In terms of downside risks to the positive outlook, they are fewer now than a year ago. The pessimism that pervaded after the GFC is receding. Households are beginning to show signs of being less cautious with their spending habits. Economic volatility is smoothing itself out. The fall in household wealth after the GFC that left consumers feeling poorer has been substantially reversed by improved property and stock prices. Lacklustre house price growth has given way to housing market buoyancy.

Some constraints may yet be felt. Household debt ratios remain historically high, constraining households’ ability to borrow like they did prior to the GFC. A range of state government stamp duty incentives and first home buyer grants have expired or been narrowed dramatically. First home buyers in particular have been slow to return as changes in policy incentives have weakened demand from this segment, particularly in New South Wales and Queensland.

Chart 2.1: Number of Dwellings Commenced Private Houses – Australia



Source: BIS Shrapnel, ABS

Overall, we expect to see private house commencements average 106,500 per annum over the next five years. This is a significant improvement on the past five years which were hit hard by the lasting impacts of the GFC, but is still only marginally above the historical average. Further growth is therefore expected over the five years to 2023/24, to address persistent undersupply in some markets, and allow for an expanding population.

2.3.2 Private multi-residential construction and non-dwelling building: key determinant for construction surveyors

Private multi-residential construction

Analysis by BIS Shrapnel into emerging trends in the residential market, supported by recent Census data indicates that other dwellings (both medium and high density) will increasingly account for a larger proportion of dwelling demand over the forecast period.

This shift reflects several key trends:

- *housing affordability* - strong growth in property and land prices has seen the cost of buying a new home increase considerably over time. This is pushing people away from detached housing towards smaller and more affordable dwellings, namely higher density dwellings
- *preferences* - demand for inner and middle ring living is rising as a lack of amenities plus added travel costs make the city fringe greenfield sites less desirable, specifically in Australia's largest cities
- *household structure* - the number of lone person and couple only households is growing and such households tend to be concentrated more in other dwellings
- *age demographics* - an ageing population is driving downsizer demand, as empty nesters downsize to more appropriately sized and easy to maintain dwellings

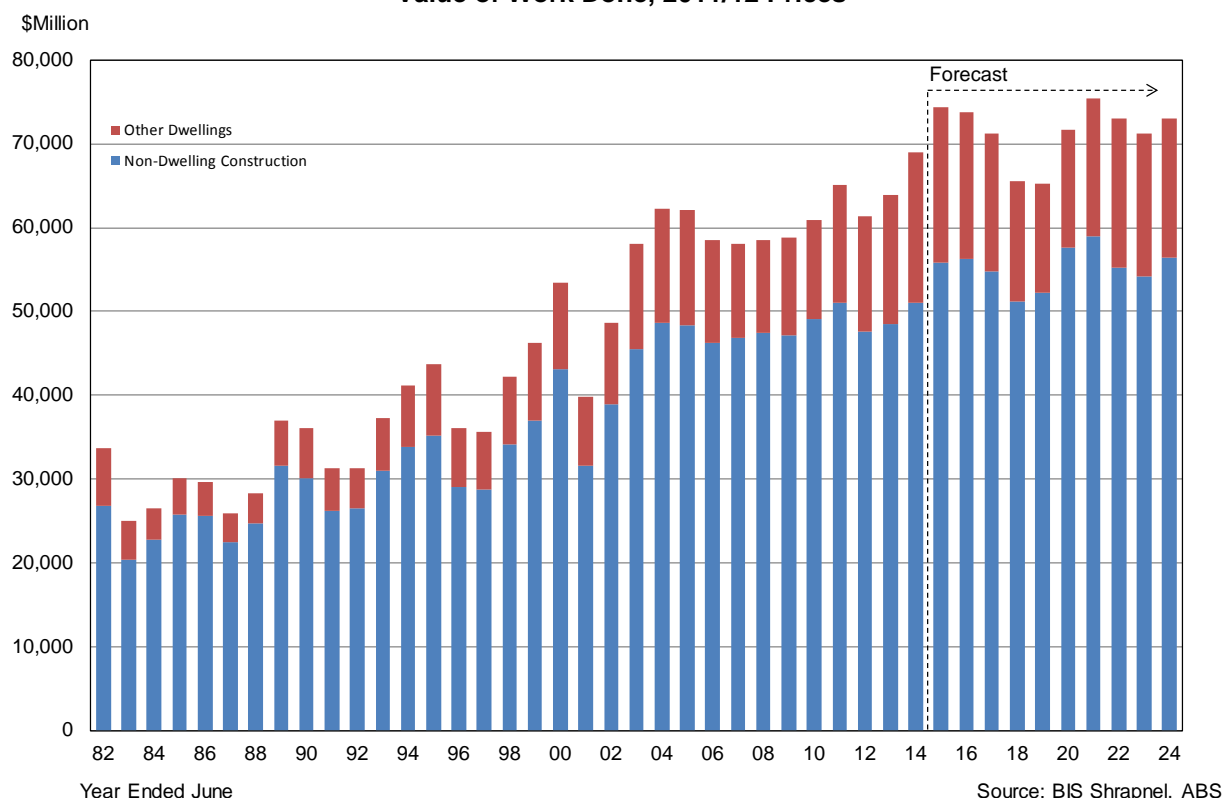
All of these trends are forecast to continue and strengthen, supporting an ongoing shift to other dwelling construction over the long term.

The GFC saw private other dwellings' share of total private dwelling commencements fall in most states in 2009. Access to finance became much more difficult with significant pre-commitment requirements becoming commonplace. The share has since lifted considerably across most markets as debt conditions have eased for developers. Significant high density developments in Sydney and Melbourne in particular have boosted activity, whilst private house development has remained relatively weaker.

The above mentioned factors are all important in explaining the longer term trend. In the shorter term, the jump in higher density development has been underpinned by investor activity in the market, particularly demand from Asian investors. This segment of the market has returned to strength much faster than demand from owner-occupiers, with first home buyers in particular remaining weak. Investors tend to prefer other dwellings to detached houses and their current strength in the market helps explain the jump in other dwellings' share of activity.

Overall, the next five years are going to yield a strong result for other dwellings, with average activity of \$15.9 billion per year, compared to \$14.5 billion per annum over the past five years. However, a significant cycle is taking place within this period. Activity is expected to peak at \$18.1 billion in 2014/15, before steadily falling over subsequent years to a low of \$13.1 billion by 2018/19. This will be driven by weakness in the Victoria market in particular, which has recently been supported by a boom in inner Melbourne apartment projects, but will fall back sharply over the next few years.

**Chart 2.2: Other residential buildings and non-dwelling building– Australia
Value of Work Done, 2011/12 Prices**



Non-dwelling building

Total non-residential commencements expanded 6 per cent in 2013/14, propelled by a number of major hospital projects, and education buildings through Queensland and Western Australia. Commercial and industrial building rose only mildly, as growth across many sub-sectors was largely offset by a sharp weakening in resource related building such as accommodation camps and operation buildings.

This is expected to translate into solid growth in work done terms, rising by a cumulative 11 per cent over the next two years. However, there are significant differences in the outlook for the private and public sectors. Commercial and industrial work, which is generally funded by the private sector, is expected to post solid growth over the next two years, driven by the accommodation sector in particular, due to projects such as the Crown Towers in Perth, and the International Convention Centre Hotel in Sydney. Generally improving economic conditions should also help the retail, offices and warehouses sectors over the near term.

On the other hand, the social and institutional sectors, which are generally publicly funded, are expected to decline over each of the next four years. As the most recent budget papers suggest, public sector building investment is forecast to wane considerably over the forecast horizon, especially for health and education. After such a massive commitment over the past few years with initiatives like the BER, both the Federal and State Governments are likely unwilling to commit to further growth in education funding. As a result, the education sector (by far the largest component of public expenditure) is expected to continue declining for each of the next three years.

On the other hand, the health sector is set to suffer a payback period after reached a record level in 2013/14. The high recent levels of investment have provided reasonable increases to capacity in many cities, and given recent movements to slash Government spending, funding for health building will be scaled back considerably over the coming years. This is expected to translate do double-digit declines in work done each year until 2017/18.

Overall, non-dwelling construction is forecast to increase over the next two years, to a record \$56.3 billion, driven by a general recovery across the commercial and industrial sectors. Heavy declines will then set in as public finances dry up, although annual average activity over the next five years will still be higher than the previous five year period.

2.3.3 Utilities and transport engineering construction: key driver of demand for engineering surveyors

Roads activity saw a 2.3 per cent fall in 2012/13, and the decline accelerated to a fall of a further 13 per cent fall in 2013/14. On the private side, access roads will see heavy declines over the next two years as mining investment winds down. Toll roads work done has plummeted since construction on Airport Link in Queensland wound down, and is expected to remain soft over 2014/15 before the commencement of construction on East West Link and the M1 to M2 Link drives strong growth over the four years to 2018/19. On the public side, Nation Building Program projects have been completed or are nearing completion, without enough major projects coming through to fill the gap. Simultaneously, Queensland's flood-related construction is winding down. However, the presence of the WestConnex project and roads relating to the second airport in Sydney will be sufficient to drive total public activity upward beyond 2014/15, to a peak of \$13.5 billion in 2018/19.

Average annual activity over the next five years is forecast at around \$17.8 billion, slightly higher than the previous five-year period which averaged \$16.7 billion. Meanwhile, **Bridges** work will be bumpy over the next five years, owing to its relatively small size and sensitivity to individual projects.

Railway construction has fallen by 7 per cent per annum over the past two years, leaving activity well below the 2011/12 peak of \$9 billion. The recent boom was driven by multiple iron ore and coal-related projects, mainly in Queensland and Western Australia, as well as major public projects in New South Wales and Victoria. Further declines are expected over the next three years, although activity will remain around historically strong levels. This will be largely due to falling mining-related rail construction, as the mining-boom era projects approach completion. However, public activity will actually rise strongly over each of the next five years, supported by the Regional Rail Link in Victoria and the North West Rail Line in New South Wales. However, this will not be enough to offset falling private activity until 2017/18.

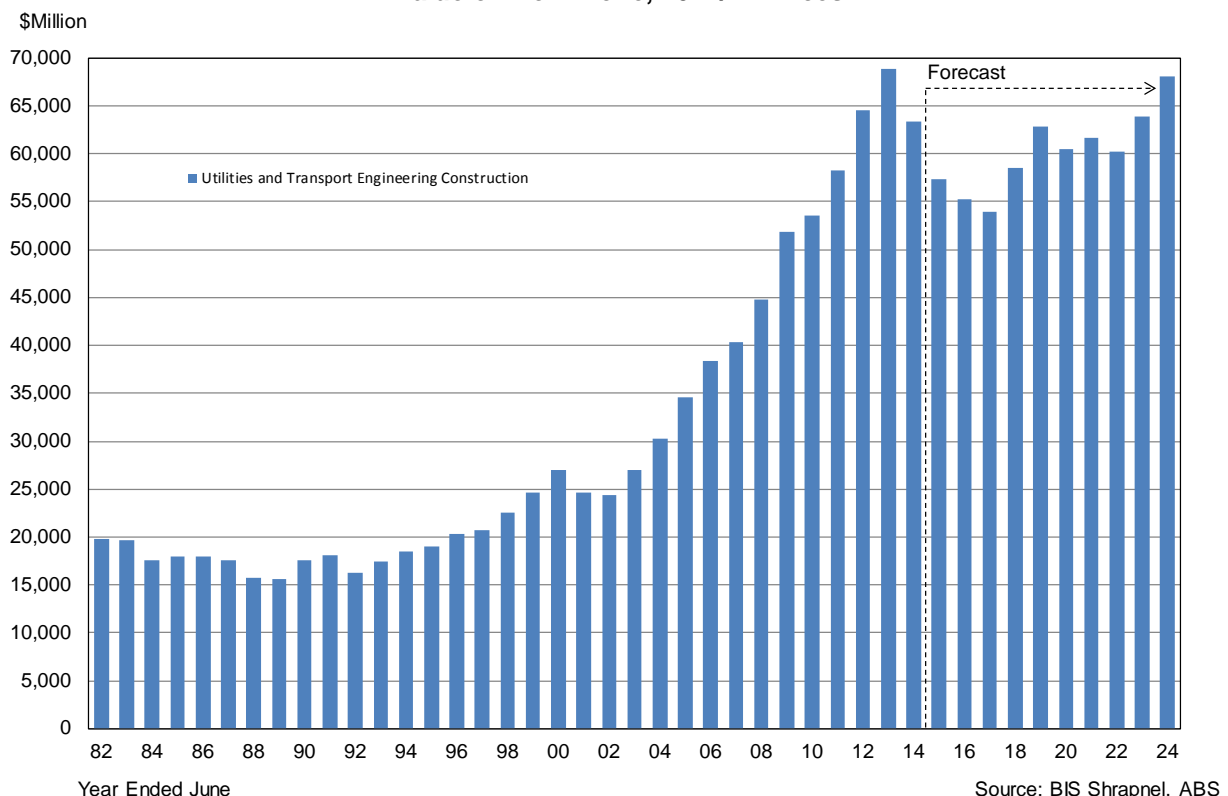
Harbours work done nearly tripled over the three years to 2012/13, reaching a massive \$5.7 billion. This came on the back of several mining-related projects, mainly in Queensland and Western Australia. Although large declines are expected over the next few years, construction is forecast to remain at historically high levels. In Western Australia, ongoing works at Roy Hill and Cape Lambert ports, as well as new and ongoing ports works at Port Hedland, will expand iron ore export capacity. In Queensland, ongoing works at Wiggins Island and Hay Point, as well as new works at Abbot Point, will support increased exports of coal and LNG. The Victorian Government's \$1.6 billion Port Capacity Project and Stage 1 of Port Bonython in South Australia will also provide solid contributions. Overall, we are forecasting annual average activity of around \$2.8 billion over the five years to 2018/19. Although this is well down on the \$4.3 billion experienced over the past five years, it is stronger than any level of activity prior to 2010/11.

Electricity sector construction activity rose by 17 per cent in 2012/13, to a peak of \$13.7 billion. This follows a doubling in work done over the past decade, as a result of substantial additions to capacity in the 2000s, against a backdrop of generally increasing transmission and distribution work. However, activity fell by 13 per cent in 2013/14 as the current round of periodic investment started to come to an end, and we are forecasting further steep declines in work done over the next three years. This is based on falling electricity demand (in response to higher electricity prices and loss of industry), further energy efficiency measures, lower manufacturing consumption and reduced resource-related electrical projects. In addition to this, the new Federal Coalition government appears less in favour of the existing Renewable Energy Target (RET) and may make moves to adjust the target in their first Budget. This heightened uncertainty is currently making some renewables projects untenable, whilst leaving question marks over several other projects.

On the positive side, electricity network refurbishment, extension and augmentation programs directed at improving reliability levels, and measures to address ageing asset profiles will keep electricity-related activity ticking over. However, due to the uncertainty surrounding renewable energy projects, as well as the end of the current round of investment, we are forecasting annual average activity of around \$8.1 billion over the five years to 2018/19, well down on the \$12 billion recorded during the previous five-year period.

Water and sewerage works attained a peak value of \$9.6 billion in 2010/11, following a surge in investment for large water projects. However, the sector has since seen a cumulative decline of 40 per cent over the past three years, as works on desalination plants in Victoria, South Australian and Western Australian were completed, or neared completion. We expect water and sewerage activity to continue to decline over 2014/15 and 2015/16, as a gap in major projects emerges.

**Chart 2.3: Utilities and Transport Engineering Construction – Australia
Value of Work Done, 2011/12 Prices**



From 2016/17, activity should exhibit solid growth over the three years to 2018/19. Apart from the second stage of the GM-W Connections Project in Victoria, nothing of the scale of the recent desalination projects has been committed to within the forecast horizon. However, activity will be supported at historically high levels by a multitude of treatment plant upgrades, dam expansions, and pipelines, with some mining-related works in Queensland and Western Australia contributing. A stronger residential market will also underpin work done, but overall, work done over the next five years is going to be well down on the levels of the previous five years.

Pipelines (which exclude water and sewerage pipes) is another sector which has significantly benefitted from the mining boom. Activity doubled over the two years to 2013/14, to \$5 billion. This has been predominantly due to extensive investment in upstream gas field development and gas transportation, as massive LNG projects in Northern Territory and Queensland get underway. We expect further, albeit weaker, growth in 2014/15, driving activity up to a record peak of \$5.2 billion, as works on the Inpex Ichthys pipe to Darwin escalate. Other LNG projects, non-LNG oil and gas projects, and new electricity gas-fired power stations will also boost activity. However, past 2014/15, we expect work done will start to decline. From mid-decade, as several major pipeline developments near completion, we could see a collapse in activity. Over the two years to 2017/18, we are forecasting a cumulative decline of around 70 per cent, before rising only slowly through the remainder of the decade.

Telecommunications activity jumped 10 per cent over both 2012/13 and 2013/14 following a reflecting a ramp up in NBN work done. Following the change in Federal Government (and change to a “Fibre to the Node” style NBN), the estimated cost of construction has been revised downwards over the life of the project. Despite this, we are forecasting a strong total upward trend over the entire five-year forecast horizon, as work done on the NBN accelerates and as investment in increased network capacity and coverage increases in order to meet population and usage growth.

2.3.4 Mining and heavy industry construction: determinant for mining surveyors

Mining and heavy industry has been the largest engineering construction sector since 2005/06. The mining investment boom, particularly in oil and gas, coal and iron ore-related projects, saw activity skyrocket, and by 2013/14, it accounted for 49 per cent of total work done. Movements in mining and heavy industry construction are therefore the principal driver of activity in the engineering construction market.

In 2013/14, activity rose by a further 3 per cent to a record \$59.8 billion, with the oil and gas and other minerals (including iron ore) sectors the key drivers. However, we expect that mining and heavy industry will see an orderly decline from 2014/15, as the mining boom moves from the investment phase to the production phase. Over the four years to 2017/18, we are forecasting a cumulative fall of 41 per cent. Despite this, activity will remain at historically high levels, given the unprecedented growth recorded over recent years.

The sheer magnitude of LNG projects such as Wheatstone and Gorgon in Western Australia, Ichthys in Northern Territory, and Australian Pacific, Gladstone and Curtis in Queensland, will underpin strong levels of mining and heavy industry activity into the future. In addition to this, work done will be supported by key committed projects in other sectors, such as the Grosvenor coal project in Queensland and the Roy Hill and Nyidinghu iron ore projects in Western Australia.

Our outlook is reinforced by our expectation of continued strength in commodity prices over the forecast horizon, despite periods of decline. This will be driven by rising global demand, as the US recovery gains traction and the Eurozone pulls itself out of recession. In particular, China,

our biggest commodity export market, is forecast to maintain growth around the mid-7 per cent range. Although growth is likely to be notably weaker than the past decade, it should be enough to maintain high demand for Australian commodities.

Over the five years to 2018/19, we are forecasting average annual mining and heavy industry activity of around \$42.5 billion, only slightly down on the \$45.7 billion of the previous corresponding period. Work done is expected to remain around this average level over the five years to 2023/24, at approximately \$42.7 billion, although this is still extraordinarily high in historical terms.

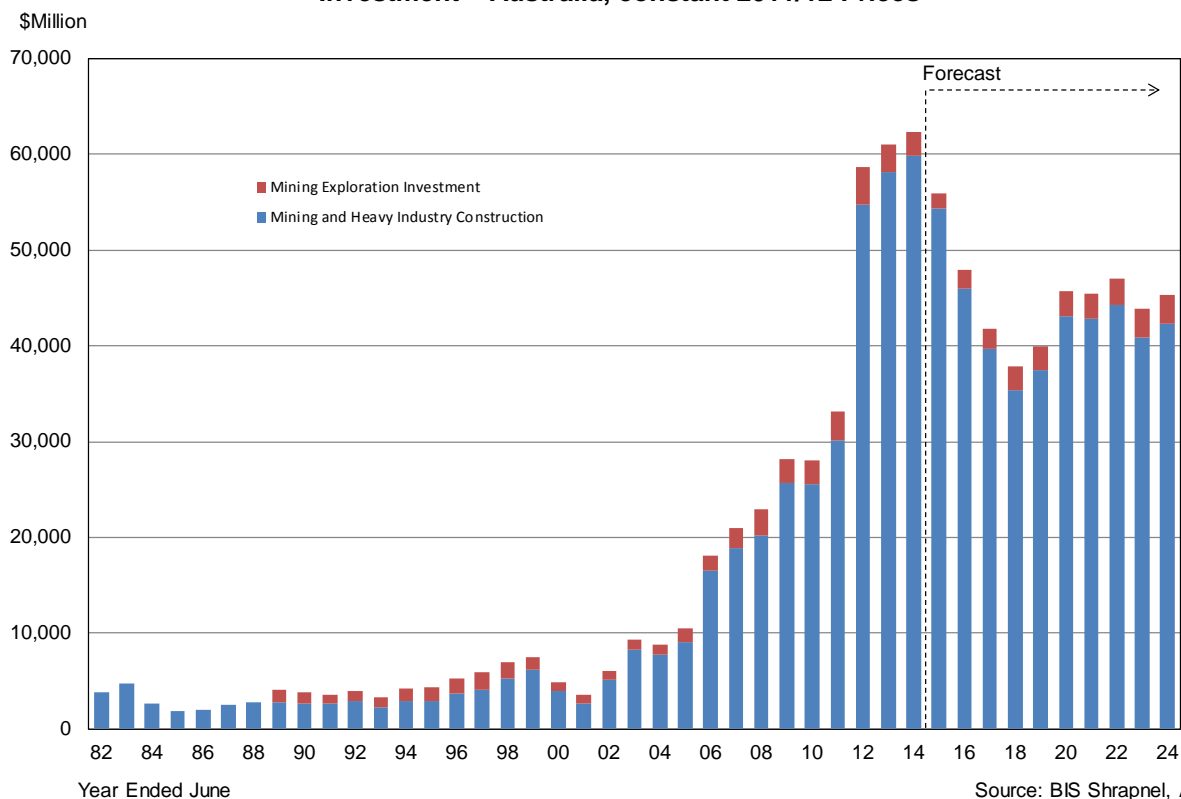
Mining exploration investment

Exploration activity in Australia was relatively stable between 1988/89 and 2003/04, oscillating around \$2 billion per annum (in constant prices), with the exception of a few years in the late 1990’s. Oil and gas and gold exploration were the primary contributors during this time, but the discovery of vast iron ore deposits (in Western Australia) and coal (in Queensland) has changed the industry significantly.

In line with significant price growth, both coal and iron ore have experienced rapid increases in exploration activity through to 2011/12, peaking at \$834 million and \$1.2 billion respectively. However, the subsequent drop in commodity prices has seen exploring expenditure halve by 2013/14 for both of these commodities.

In 2013/14, total mining exploration investment was \$2.4 billion, with iron ore and gold the largest components. We expect to see further declines over 2014/15, to just \$1.6 billion, driven by further weakness in iron ore as prices remain weak. But a recovery from this trough is expected through the rest of the forecast period, and this is going to be spread across most

Chart 2.4: Mining and Heavy Industry Construction Work Done and Mining Exploration Investment – Australia, constant 2011/12 Prices



Source: BIS Shrapnel, ABS

locations and commodities. New South Wales is expected to see steady growth in coal exploration, while base metals including copper and silver, lead and zinc are also likely to rebound from their current lows. Victoria is expected to remain very small in terms of exploration expenditure, but an emerging market for mineral sands is forecast to see state-wide activity rise through the decade.

Queensland is going to retain its position as the second-largest state in terms of exploration expenditure, behind only Western Australia. Exploration in Queensland will continue to be underpinned by the coal industry, and a recovery in prices will see activity rebound from here. South Australia is also expected to experience a long run of growth beyond the trough of 2014/15, and this will be driven by a recovery in copper-related exploration, which has fallen particularly heavily over recent years.

Overall, nationwide exploration activity is forecast to average \$2.2 billion per annum over the next five years, which is well below the \$3 billion reached over the past five year period.

2.3.5 Total construction: determinant for technicians labour demand, spatial scientists, and other professionals at consulting surveying firms

The last decade saw strength in all the major categories of construction, but cycles were not synchronised. First came the private sector, initially with a boom in residential construction followed by strong generalised business investment in particular minerals investment. Later (around mid-decade), came the escalation of public sector investment which was initiated by the emergence of infrastructure bottlenecks across Australia. It was the strong growth in investment through this period which underwrote the strength of the Australian economy in the period leading up to the global financial crisis (GFC).

The GFC, however, triggered a collapse in confidence (hitting business spending) and a severe credit squeeze which affected the availability and cost of debt and equity finance. The stalling of finance saw the real value of commencements in private non-dwelling construction halved, sector by sector. Nonetheless, Australia did not experience the precipitous downturn in total construction that was widely anticipated.

Work on mining projects underway before the GFC hit sustained robust growth in mining investment. In addition, swift implementation of the government stimulus saw public sector investment rising strongly from already record levels to offset weaker private sector investment through 2009/10. As Federal stimulus projects reached completion in 2010/11, private investment came through once again to take up the baton as the key driver of investment growth in 2011/12.

This continued through to 2013/14, when mining investment peaked. We expect non-mining business investment to pick up slowly over the next two years before strengthening later in the decade. Meanwhile, the recovery in residential investment is well under way. Conversely, public investment has been falling and continues to fall. We expect another year of declining investment before the next round of projects boosts activity. But overall activity over the next four years will be hindered by falling engineering construction, particularly due to the mining industry.

Private investment will be characterised by offsetting cycles. The mining investment boom which underwrote the strength in Australia's GDP growth last decade peaked in 2013/14 and will detract from investment growth over the next four years. We estimate that mining and heavy industry construction will decline by 41 per cent over the next four years. It is important to note that we expect an orderly decline, rather than activity falling off the cliff. Projects already under construction, and their outstanding activity, will place a floor under the level of work, ensuring investment remains around historically strong levels.

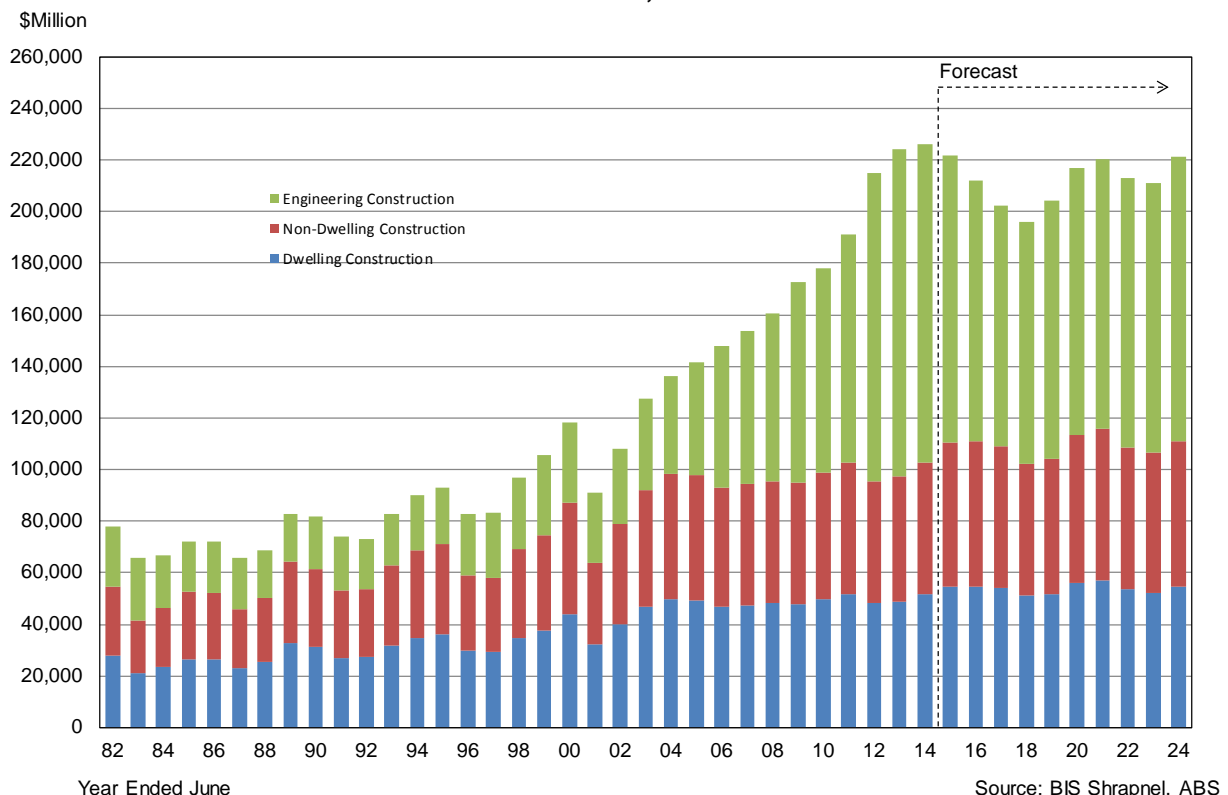
On the bright side, the long-awaited recovery in dwelling investment is now entrenched. This upswing was delayed due to weak housing market sentiment and excessive caution by investors. However, with the expectation of low interest rates for an extended period, and a growing deficiency of stock, a solid increase in dwelling construction is now well under way and will build momentum from here. But this recovery will not be uniform between regions, with sizeable stock deficiencies set to drive the markets in parts of Queensland and New South Wales in particular.

Private non-dwelling building is likely to experience solid growth over the next few years, although the outlook varies across states. Strong growth in retail building in line with improving economic conditions will see this sector usurp offices as the largest sector. Activity will also be supported by significant projects in the accommodation, warehouses, and aged care sub-sectors. The longer term outlook is positive, as improving demand across non-mining industries will see capacity constraints emerge and prompt the next round of investment in commercial and industrial buildings.

The maturing of the mining investment boom will see further declines in private plant and equipment investment in the near-term. However, the downturn will be softened somewhat as service industries equipment investment picks up from the bottom of cycle. Broadly based growth in equipment investment will return when capacity constraints emerge as demand picks up. That we think is another 18 months to 2 years away.

On the public side, the completion of the last set of post GFC stimulus, in particular health projects, and belt tightening to control budget deficits and debt will be a drag on investment in the short-term. However, we expect a recovery in the second half of the decade. This will be underwritten by the next round of infrastructure projects as governments at all levels embrace the process of ‘asset recycling’ where mature assets are taken off the balance sheet to finance next round of projects.

**Chart 2.5: Total Construction by Category – Australia
Value of Work Done, 2011/12 Prices**



The net result is a soft period for total investment over the next five years. Longer-term, investment is expected to be much more stable. Ongoing population growth will require perpetual investment from both the private and public sectors, to meet demands for housing, energy supply, and transport infrastructure. Improved financial positions, again for both sectors, will allow this investment to progress faster than in the current environment.

2.4 Forecasts of skilled labour demand

The outlook for the key determinants of labour demand as described above generally translates into falling demand for skilled labour over the next four years, before entering a period of recovery around the turn of the decade. Over the forecast period (ten years to 2023/24) annual labour demand is expected to average 13,677 persons per annum, which is some 10 per cent below today's level of 14,997 persons.

As shown in table 2.3 (which is based on productivity growth of 1.5 per cent per annum), total skilled labour demand is forecast to steadily fall through to 2017/18. At a trough of just 12,886 persons, this represents a cumulative decline of 14 per cent from today's level. The primary driver of this decline is mining surveyors, which are going to be hit hard by the forthcoming fall in mining construction. Over the next four years, nationwide demand for mining surveyors is forecast to fall by 40 per cent, in line with large declines in mining construction (primarily oil and gas, but also coal and iron ore). Although dwelling construction is forecast to rise over the next three years, increasing demand for cadastral surveyors, this mild growth will be more than offset by the declining across the mining sectors, pulling total labour demand down.

A recovery is then expected over the three years to 2020/21. Once again, demand for cadastral surveyors will rise through this period, as dwelling construction reaches record levels by 2020/21. Demand for engineering and mining surveyors will also improve, as the next significant round of mineral projects commences. However, peak labour demand of 14,393 persons in 2020/21, will still be below today's level. This reflects that current levels of activity are raised significantly above historical levels, and are not expected to be seen again for some time.

Under weaker productivity growth assumptions, the demand for labour is correspondingly higher. For example, with a zero productivity growth assumption, the peak becomes 16,002 persons in 2020/21, which is higher than today's level. However, under a 2 per cent per annum productivity growth, the peak in the same years drops to 13,892 persons.

Chart 2.6: Forecasts for Demand for Cadastral Surveyors and Total Surveyors – Australia

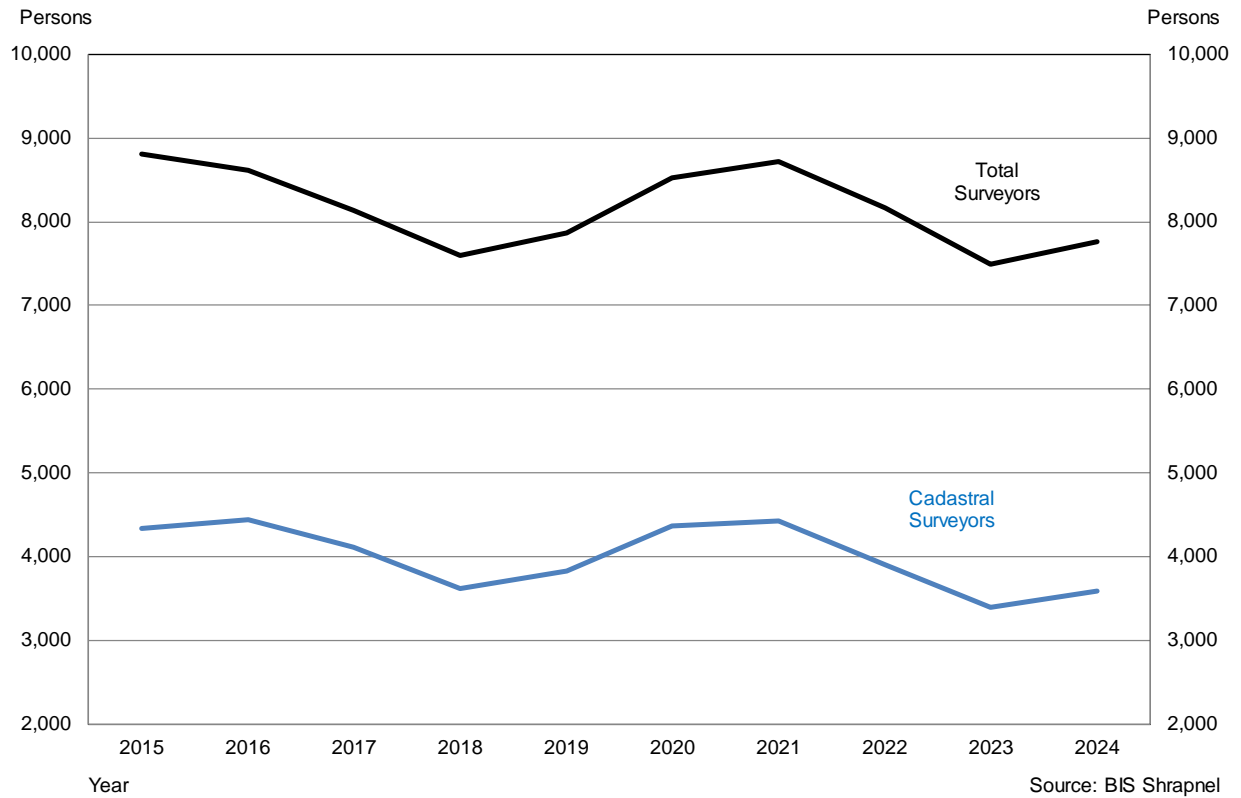


Chart 2.7: Forecasts for Demand for Surveyors by area of Specialisation– Australia

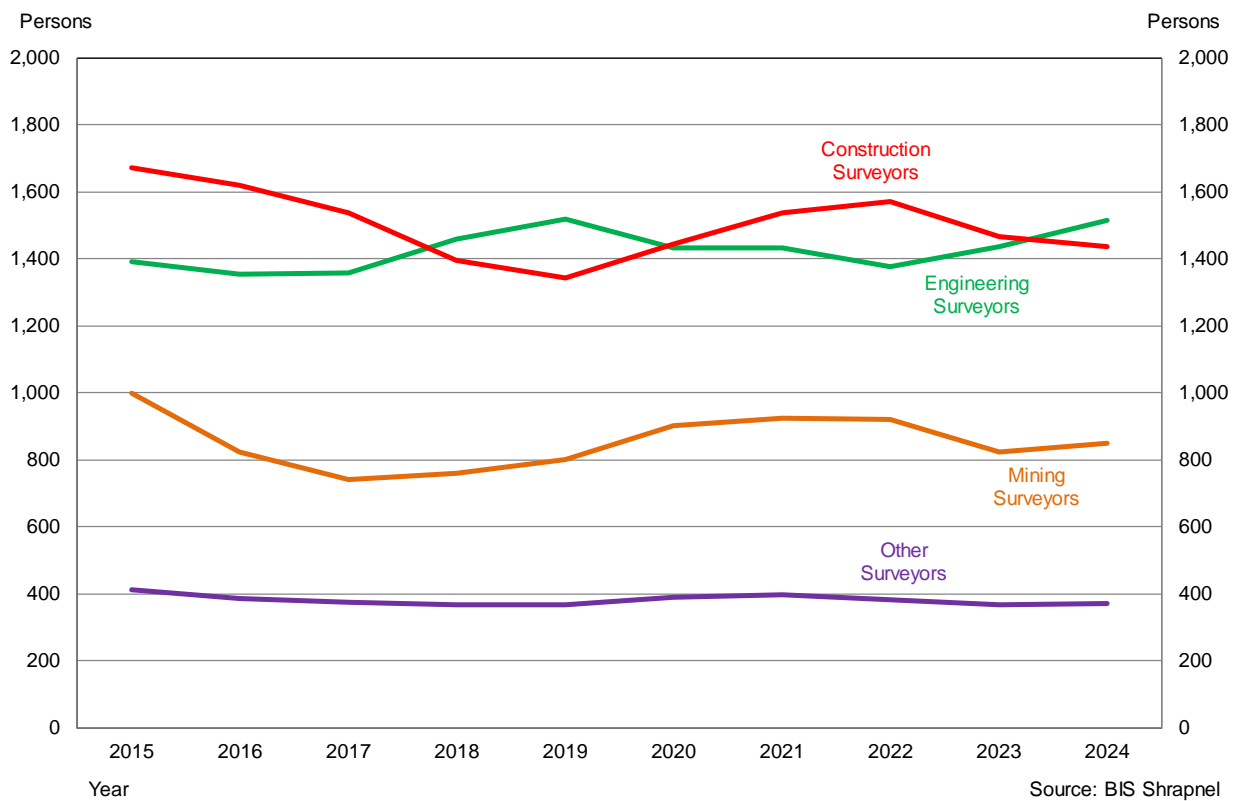


Chart 2.8: Total Skilled Labour Demand under Different Productivity Assumptions – Australia

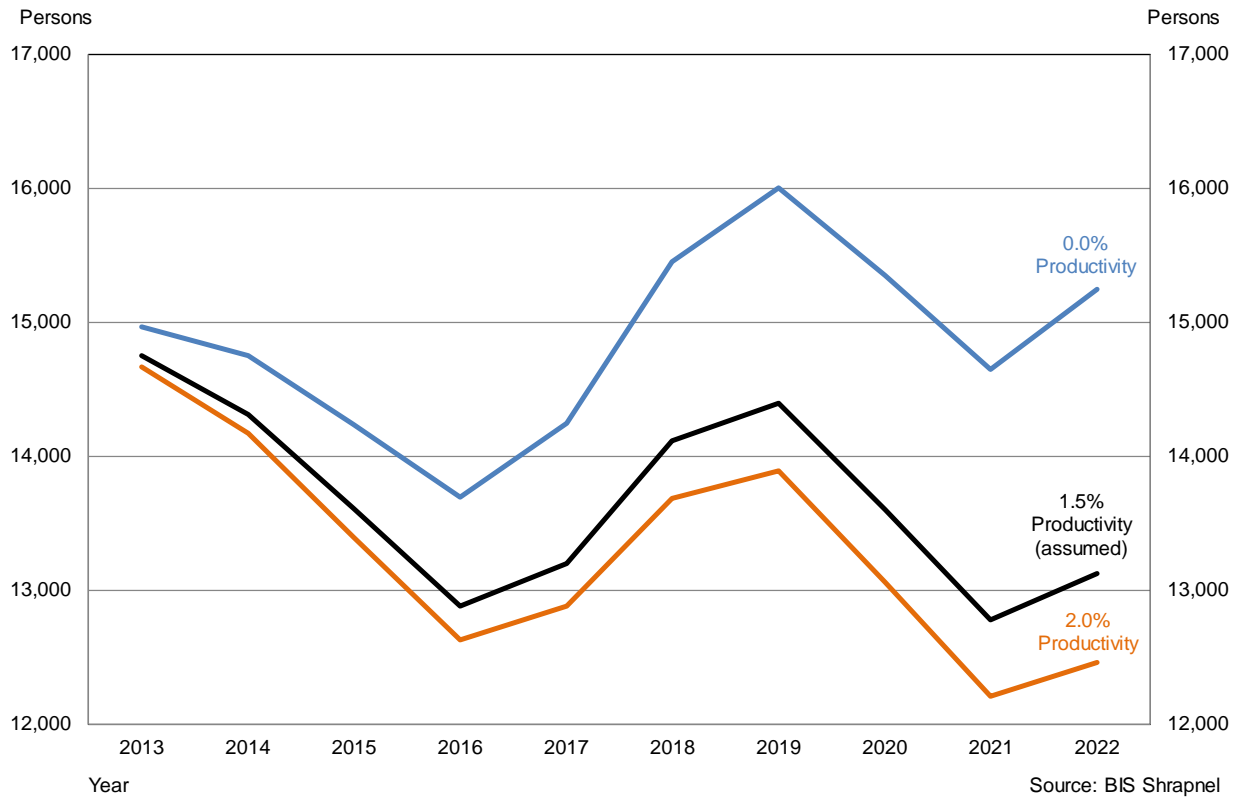


Table 2.3: Forecasts for Skilled Labour Demand and capability shortfalls for Surveyors and Surveying Related Professionals: Australia*(Baseline Scenario of 1.5% labour productivity growth, forecasts as at June)*

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Labour Demand by Specialist Occupation | Estimate | Forecasts | | | | | | | | | |
| Cadastral | 3,856 | 4,332 | 4,435 | 4,118 | 3,620 | 3,833 | 4,361 | 4,427 | 3,909 | 3,403 | 3,584 |
| Construction | 1,645 | 1,673 | 1,621 | 1,537 | 1,396 | 1,342 | 1,442 | 1,538 | 1,571 | 1,465 | 1,436 |
| Engineering | 1,570 | 1,393 | 1,353 | 1,359 | 1,459 | 1,520 | 1,431 | 1,432 | 1,378 | 1,438 | 1,514 |
| Mining | 1,300 | 999 | 823 | 742 | 761 | 801 | 902 | 923 | 921 | 823 | 851 |
| Other Surveyors | 441 | 411 | 386 | 374 | 367 | 368 | 392 | 396 | 382 | 368 | 373 |
| All Surveyors | 8,812 | 8,808 | 8,617 | 8,129 | 7,602 | 7,864 | 8,528 | 8,716 | 8,160 | 7,497 | 7,757 |
| <i>Registered/Licensed Surveyors</i> | 2,598 | 3,033 | 3,105 | 2,883 | 2,534 | 2,683 | 3,052 | 3,099 | 2,736 | 2,382 | 2,509 |
| Total Spatial Scientists | 3,576 | 3,448 | 3,291 | 3,147 | 3,019 | 3,053 | 3,210 | 3,257 | 3,126 | 3,040 | 3,058 |
| Total Technicians | 1,403 | 1,342 | 1,297 | 1,259 | 1,222 | 1,236 | 1,284 | 1,306 | 1,249 | 1,216 | 1,238 |
| Total 'Other' Professionals | 1,205 | 1,150 | 1,108 | 1,073 | 1,043 | 1,050 | 1,098 | 1,115 | 1,065 | 1,025 | 1,067 |
| Total Skilled Labour Demand | 14,997 | 14,748 | 14,314 | 13,609 | 12,886 | 13,203 | 14,119 | 14,393 | 13,600 | 12,777 | 13,120 |
| Existing Workforce (a) | | | | | | | | | | | |
| Cadastral Surveyors | 3,856 | 3,725 | 3,594 | 3,463 | 3,331 | 3,199 | 3,071 | 2,944 | 2,817 | 2,690 | 2,562 |
| Construction Surveyors | 1,645 | 1,633 | 1,621 | 1,608 | 1,596 | 1,583 | 1,566 | 1,548 | 1,530 | 1,512 | 1,493 |
| Engineering Surveyors | 1,570 | 1,539 | 1,508 | 1,476 | 1,445 | 1,414 | 1,379 | 1,343 | 1,308 | 1,273 | 1,238 |
| Mining Surveyors | 1,300 | 1,274 | 1,249 | 1,223 | 1,197 | 1,171 | 1,141 | 1,111 | 1,082 | 1,052 | 1,022 |
| Other Surveyors | 441 | 435 | 428 | 422 | 415 | 408 | 399 | 390 | 381 | 372 | 363 |
| All Surveyors | 8,812 | 8,606 | 8,400 | 8,192 | 7,984 | 7,775 | 7,556 | 7,337 | 7,117 | 6,898 | 6,678 |
| <i>Registered/Licensed Surveyors</i> | 2,598 | 2,476 | 2,355 | 2,233 | 2,111 | 1,989 | 1,887 | 1,786 | 1,684 | 1,582 | 1,481 |
| Spatial Scientists | 3,576 | 3,497 | 3,417 | 3,337 | 3,256 | 3,175 | 3,084 | 2,992 | 2,901 | 2,809 | 2,717 |
| All technicians | 1,403 | 1,378 | 1,353 | 1,328 | 1,302 | 1,276 | 1,246 | 1,216 | 1,186 | 1,156 | 1,125 |
| 'Other' Professionals | 1,205 | 1,183 | 1,160 | 1,137 | 1,114 | 1,090 | 1,061 | 1,032 | 1,003 | 974 | 944 |
| Total skilled labour | 14,997 | 14,664 | 14,329 | 13,993 | 13,655 | 13,317 | 12,947 | 12,577 | 12,207 | 11,836 | 11,465 |
| Workforce Gap | | | | | | | | | | | |
| Cadastral Surveyors | - | 607 | 841 | 655 | 289 | 634 | 1289 | 1483 | 1092 | 713 | 1021 |
| Construction Surveyors | - | 40 | 1 | (71) | (200) | (242) | (123) | (10) | 41 | (46) | (57) |
| Engineering Surveyors | - | (146) | (155) | (117) | 14 | 106 | 53 | 89 | 69 | 165 | 276 |
| Mining Surveyors | - | (275) | (426) | (481) | (436) | (370) | (239) | (188) | (161) | (229) | (171) |
| Other Surveyors | - | (24) | (43) | (48) | (48) | (40) | (7) | 6 | 1 | (4) | 9 |
| All Surveyors | - | 201 | 218 | (63) | (381) | 89 | 972 | 1379 | 1043 | 599 | 1079 |
| <i>Registered/Licensed Surveyors</i> | - | 556 | 750 | 650 | 423 | 694 | 1,165 | 1,313 | 1,052 | 800 | 1,028 |
| Spatial Scientists | - | (49) | (126) | (189) | (237) | (122) | 126 | 264 | 225 | 231 | 341 |
| All technicians | - | (36) | (56) | (69) | (80) | (41) | 38 | 90 | 63 | 60 | 113 |
| 'Other' Professionals | - | (33) | (52) | (64) | (71) | (40) | 36 | 82 | 62 | 51 | 123 |
| Total skilled labour | - | 84 | (15) | (384) | (769) | (114) | 1172 | 1816 | 1393 | 941 | 1655 |
| New Supply of Surveyors | - | 126 | 252 | 380 | 510 | 641 | 775 | 911 | 1,049 | 1,189 | 1,330 |
| New Supply of Technicians | - | 63 | 127 | 193 | 261 | 324 | 384 | 444 | 504 | 564 | 624 |
| Surveyors Capability Shortfall (c) | - | 75 | (34) | (442) | (891) | (552) | 197 | 468 | (6) | (590) | (252) |
| Technicians Capability Shortfall (c) | - | (99) | (183) | (262) | (341) | (365) | (346) | (354) | (441) | (504) | (511) |

(a) Existing workforce is generated by adjusting the size of the current skilled workforce for natural attrition rates such as retirements and death.

Source: BIS Shrapnel, ABS

(b) Workforce gap is calculated as labour demand less existing workforce.

(c) Capability shortfall is derived by subtracting new supply from workforce gap. A positive number implies a shortage of labour

Numbers in brackets imply an excess supply as new supply exceeds the forecast workforce gap.

2.5 Workforce attrition and the workforce gap

The total skilled surveying and geospatial workforce *requirement* to meet future construction activity is inevitably higher than the labour demand generated by the model given attrition of the existing workforce ‘base’, primarily through retirement (but also through people leaving the workforce for other reasons).

Given the estimated age profile of the current total skilled labour demand workforce — and the assumed likelihood of retirement in each age group — we estimate that the current workforce will shrink by around 24 per cent over the next ten years from demographic factors alone. The difference between the (declining) existing workforce and total labour demand is the workforce gap. The workforce gap will need to be met by additional supply if forecast levels of end use sector activity are to be achieved. Possible sources of labour supply include:

- New graduates, and/or
- Net migration from overseas

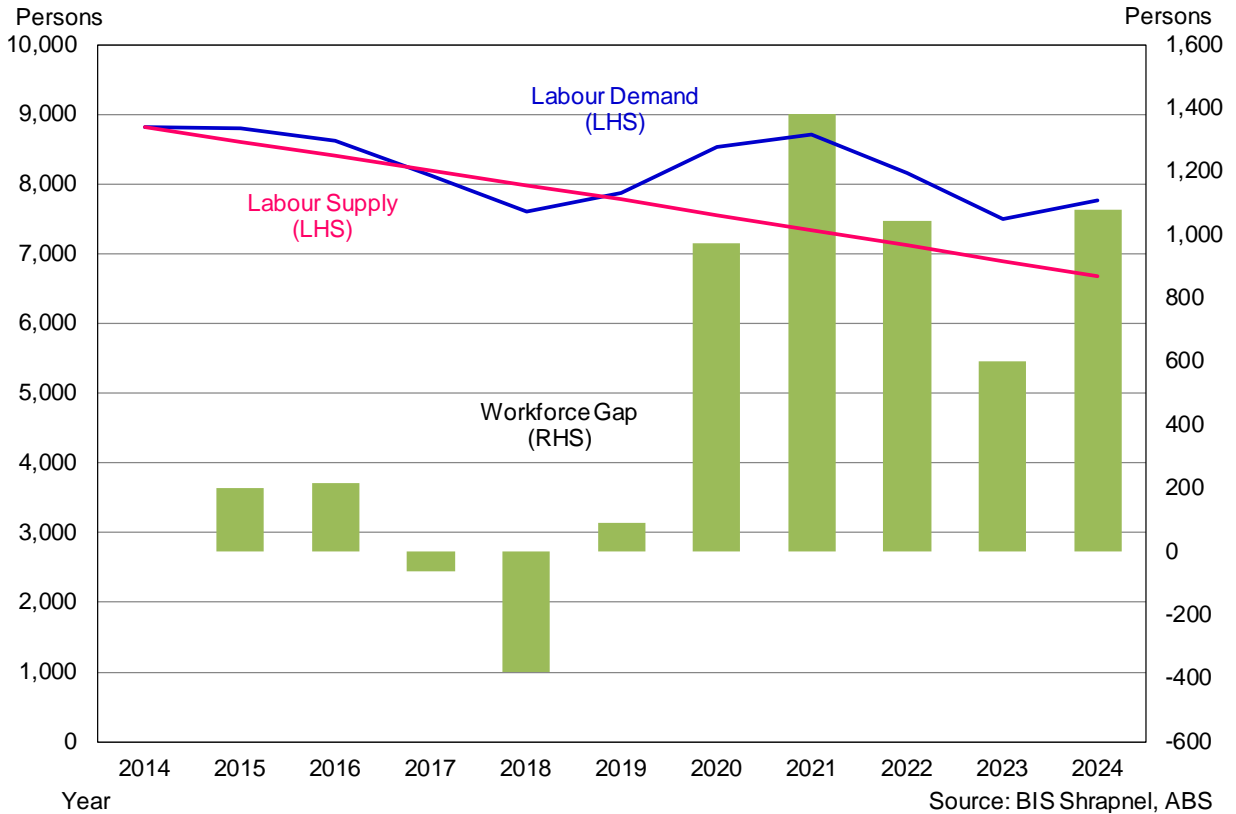
It should be noted again that while the existing skilled surveying workforce is expected to decline in personnel terms, the measure of skills and experience lost is likely to be far greater given that the retirees will be concentrated in relatively “high skill/experience” occupations. This report does not attempt to quantify this, potentially greater, loss but acknowledges that it is a key issue facing the surveying industry, in particular, and the broader construction industry.

Given the forecast shape of labour demand, and the attrition of the existing workforce, a small workforce gap is expected to emerge in 2014/15 as a small decrease in labour demand is more than offset by declines in the size of the existing workforce. However, the workforce gap is then expected to slip into negative (i.e. a surplus of labour) over the subsequent four years to 2018/19, as demand for labour steadily declines, as described in section 2.3. In 2018/19, the specialities with the largest surplus of labour are expected to be mining surveyors (370 persons), construction surveyors (242 persons), and spatial scientists (122 persons).

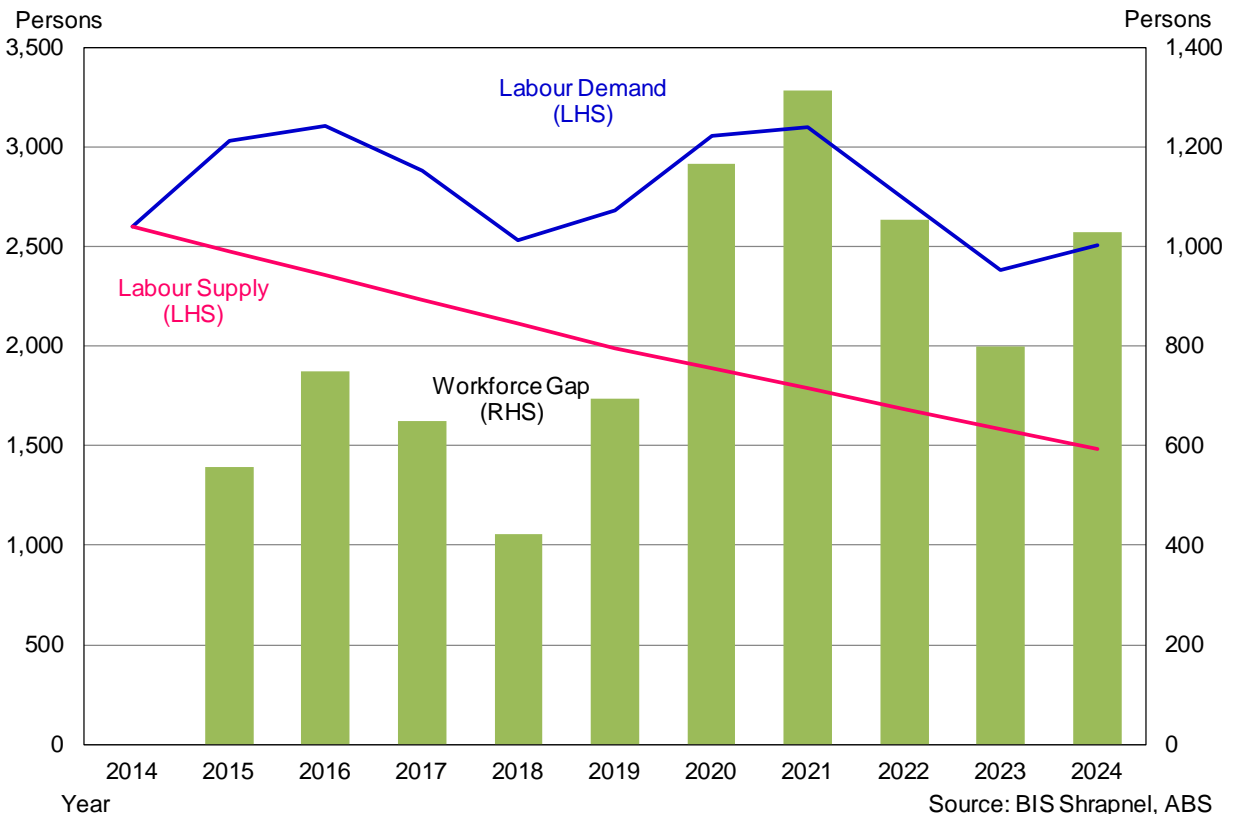
Beyond 2018/19, the workforce gap is expected to return to a positive level (i.e. indicating a deficit of labour) over the remaining five years, driven by solid levels of dwelling and non-dwelling construction, and a recovery in engineering construction. The gap is forecast to peak at 1,816 persons in 2020/21, and average 1,396 persons over the five years to 2023/24. This gap will be caused primarily by cadastral surveyors, while spatial scientists, technicians, and ‘other’ professionals will also have positive workforce gaps over this period.

The labour demand, labour supply and workforce gap for surveying and geospatial workforce as well as ‘other’ professionals is presented in table 2.3, while charts 2.9 to 2.14 also shows the labour demand, labour supply and workforce gap for a select group of specialist occupations.

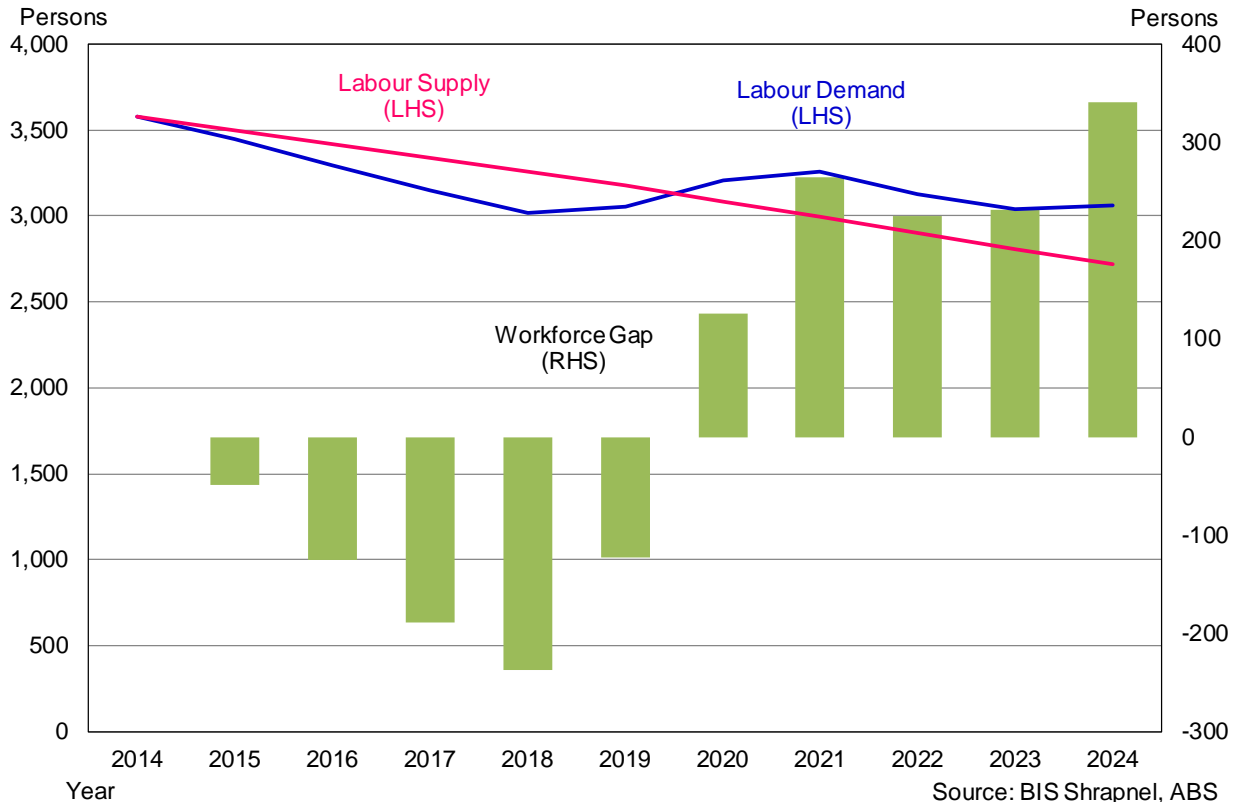
**Chart 2.9: Australia
Total Surveyors (1.5% Productivity Growth)**



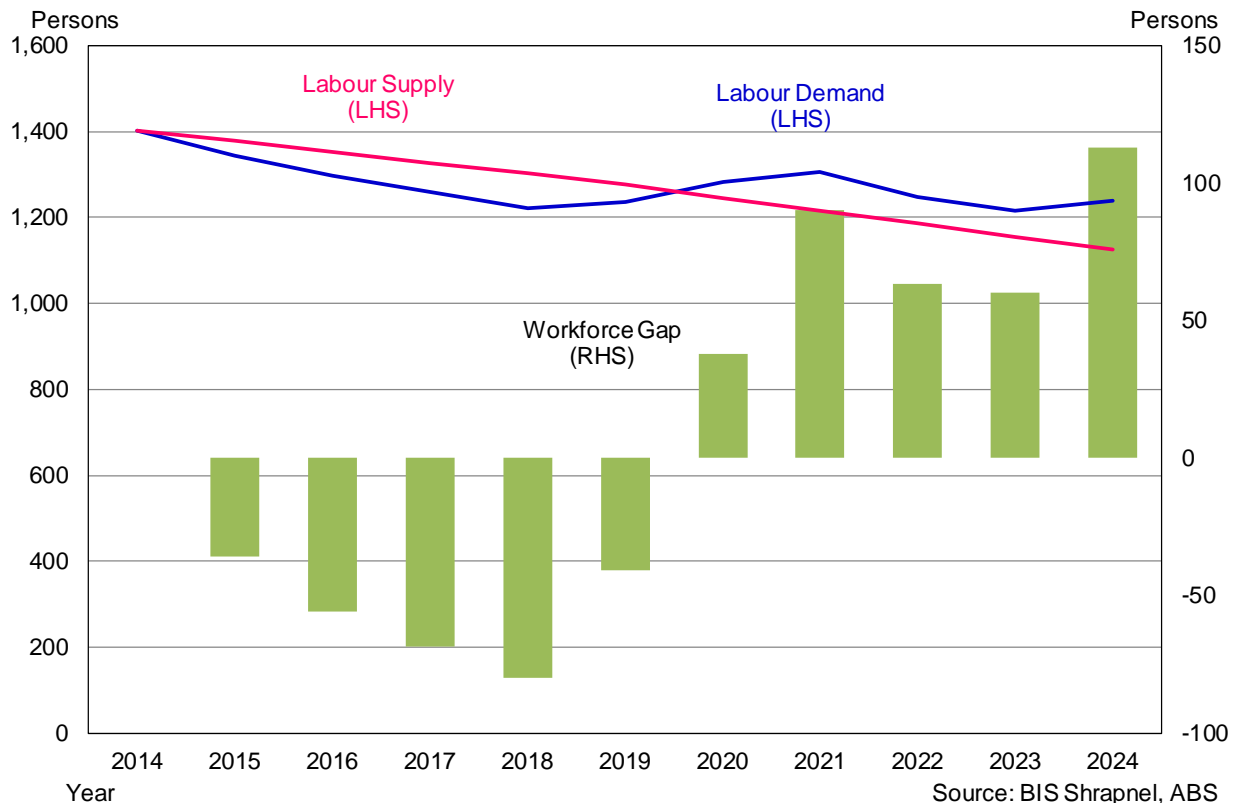
**Chart 2.10: Australia
Registered Surveyors (1.5% Productivity Growth)**



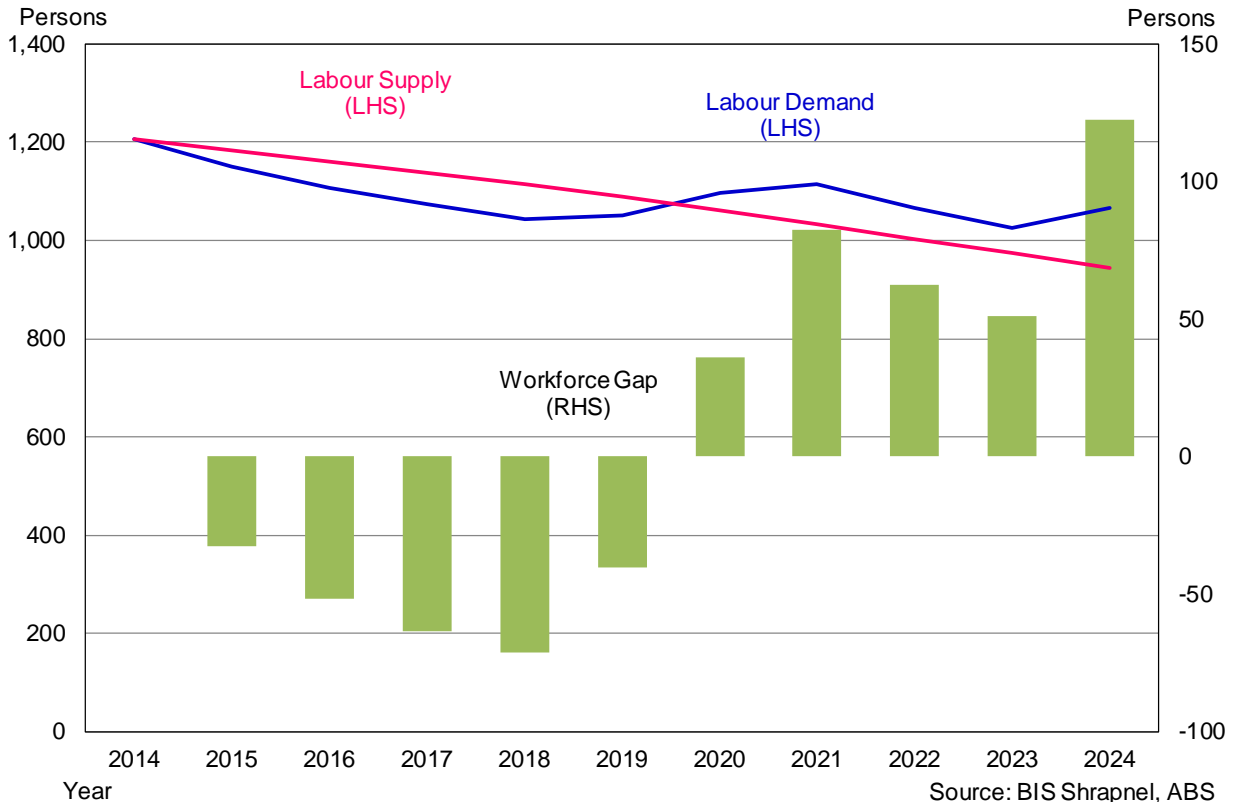
**Chart 2.11: Australia
Spatial Scientists (1.5% Productivity Growth)**



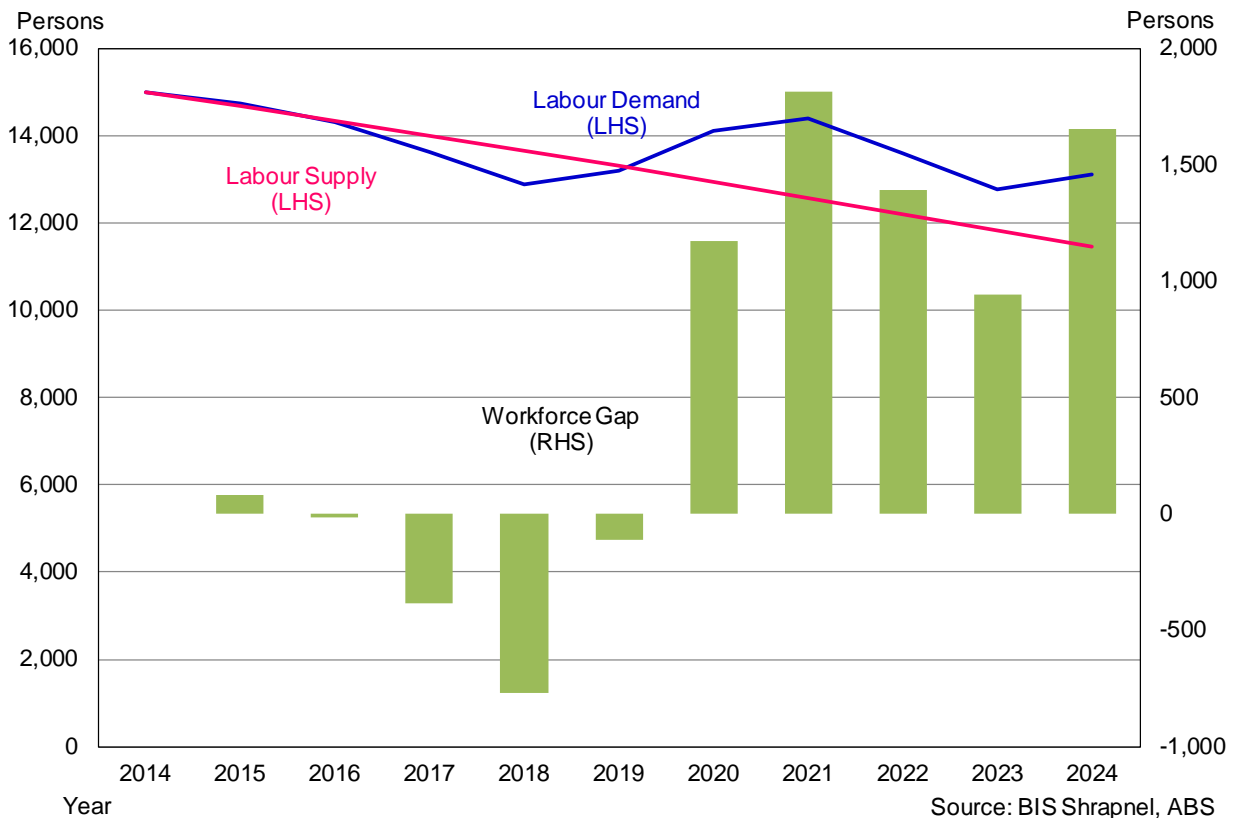
**Chart 2.12: Australia
Technicians (1.5% Productivity Growth)**



**Chart 2.13: Australia
'Other' Professionals (1.5% Productivity Growth)**



**Chart 2.14: Australia
Total Skilled Labour (1.5% Productivity Growth)**



2.6 Graduate supply and the capability shortfall

The total surveying and geospatial profession's workforce gap will need to be met by additional supply if forecast levels of construction activity or Australia's development requirements are to be achieved. Possible sources of labour supply include:

- New graduates
- Net migration from overseas, and/or
- Other labour supply boosting measures (eg increasing productivity or reducing the rate of workforce attrition)

All of these supply sources are important in meeting future surveying and surveying-related workforce requirements. In this report, however, we have attempted to quantify only the supply of new graduates to the surveying and geospatial industry. Any positive difference between the total sector workforce gap and the supply of new graduates represents the capability shortfall in the surveying and geospatial workforce.

In quantifying new graduate supply we have chosen to use data relating to Australian domestic undergraduate enrolments and completions in the fields of surveying as well as Diploma and Advanced Diploma completions in vocational training that lead to surveying and geospatial associate professional

Research suggests that after peaking in 2013, the number of undergraduate completions in surveying declined across Australia in 2014. This weakness has been seen across most states nationwide, and is consistent with data from Engineers Australia. The annual publication *The Engineering Profession: A Statistical Overview* shows that Geomatic commencements steadily declined through to 2010, which corresponds with lower graduate levels four years later, in 2014.

Based on current enrolments, completion rates and historical trends, we forecast there will be an average of around 130 graduates per annum in Australia over the next 10 years. Similarly, we forecast new supply of around 65 technicians per annum over the next decade. The proportion of the workforce gap not covered by new graduate supply represents the capability shortfall.

Given our projections of the workforce gap and graduate supply, we estimate that Australia's 'net capability position' for surveyors will be in a position of surplus for the majority of the forecast period. Aside from the current financial year (ie 2014/15), the only other years to have a deficit of surveyors will be 2019/20 and 2020/21. The outlook for technicians consists of an even greater surplus, which is expected to persist over the entire outlook period. Overall, over the next 10 years, we are forecasting an average surplus of 202 surveyors, and 340 technicians.

However, this outlook is sensitive to the assumed productivity growth rate. If productivity were to improve by less than the assumed 1.5 per cent per annum, we would see a reduction in the size of the capability surplus.

2.7 Interpretation of results

The capability model described here suggests that based on forecast levels of construction activity and taking into account labour lost through workforce attrition, future skilled surveying labour supply will generally be more than sufficient to complete the forecast level of construction activity over the next ten years. This means that, in theory, a capability surplus will arise.

The primary reason for this surplus is the outlook for construction activity. The attrition of the existing workforce and supply of new labour through education will continue to be relatively

stable. But the fall in nationwide construction, particularly over the next four years, will see labour demand drop below the expected supply of labour, creating a surplus of skilled labour. Even when construction recovers across all sectors and causes a sizeable upswing through 2019/20 and 2020/21, construction and labour demand will still be below today's levels.

However, we do expect to see a shortage of skilled labour around this time, as the upswing in construction is met by ongoing attrition of the existing workforce. This is forecast to cause a peak shortage of 468 surveyors in 2020/21, which is equal to around 5 per cent of total surveying labour demand.

Note that the issue of this shortfall should not be left until it arrives. The time taken to develop new surveying hires (particularly new graduates) to a point of high capability — which is understood to be around 4-6 years — suggests that hiring should occur in advance to help meet the future capability requirement. This thought gains momentum when it is also considered that the demand for surveying skills tends to precede that of construction work done. For example, the necessary design, measurement, calculations, plan and document presentation can happen well before the construction phase. This means that, ideally, labour hiring should take place well before the emergence of capability shortfalls.

CHAPTER THREE

Forecasts of Labour Demand and Workforce Gap for New South Wales

3. FORECASTS OF LABOUR DEMAND AND WORKFORCE GAP FOR NEW SOUTH WALES

3.1 The New South Wales economy

In 2013/14, New South Wales posted 3.0 per cent growth in State Final Demand (SFD), second only to the LNG-driven Northern Territory and well above the national average of 1.2 per cent. Gross State Product (GSP) is also estimated to have seen an improvement on the previous year's growth, assisted by a rise in net exports.

The New South Wales economy struggled over much of the 2000s and into the early-2010s, tending to trail rival Victoria and the national average. While Victoria implemented a well-planned development strategy (by releasing affordable land in central and well-connected locations, supporting the burgeoning office market, and providing incentives for business investment), New South Wales suffered under the lack of land available for development and excessive government-imposed infrastructure charges. These reduced the financial feasibility of business and property investment in the state (and particularly Sydney) over this period.

Consequently, over the decade to 2013/14, total construction contribution to New South Wales' GSP (including dwelling and non-dwelling building and engineering construction) averaged just 0.5 per cent per annum. This compared with construction contributing an average of 2.2 per cent per annum to Australia's GDP over the same period (although it should be noted that this included construction related to the mining boom). However, between 2014/15 and 2016/17, we expect a turnaround in this trend, with New South Wales' construction contribution forecast to exceed 1.5 per cent while construction is likely to detract from Australia's GDP growth, largely due to steep declines in mining-related engineering construction.

Indeed, construction in New South Wales has already begun to recover, led by the upswing in residential investment. Growth in total dwelling investment in 2013/14 is estimated to have exceeded 9 per cent. Other dwellings were the biggest contributor, posting double-digit growth while houses saw slower, but still positive, growth. Alterations and additions are also estimated to have recorded their first year of positive growth since 2010/11, albeit more modest growth than new dwellings.

The momentum in the residential sector will only continue to build. We believe that there currently exists a stock deficiency in excess of 50,000 dwellings – well over a year's worth of dwelling completions at the current rate. Consequently, we expect activity to escalate over the next three years, peaking in 2016/17 and supported by low interest rates. Strong growth is forecast across houses, other dwellings and alterations and additions.

Non-residential building activity is also estimated to have expanded considerably during 2013/14, driven by double-digit growth in both the commercial and industrial and the social and institutional sectors. Retail and wholesale trade, factories, and offices are benefitting from higher levels of economic activity while a pipeline of publicly-funded projects are supporting growth in education and health facilities investment. The Barangaroo development will continue to underpin activity, while construction on the new Sydney Convention and Entertainment Centre (to commence this year) and the new Northern Beaches Hospital (scheduled commencement in 2015/16) should ensure that we see another few years of positive growth in non-residential investment before it turns around later this decade.

In addition to this, New South Wales will be the first cab off the rank with regard to the next round of infrastructure spending. A lot of this spending will be funded by asset sales; specifically, the privatisation of Port Botany and Port Kembla, the long-term lease of Port of Newcastle, and the prospective long-term lease of 49 per cent of the state's electricity network.

The \$8.3 billion North West Rail Line, the multi-stage WestConnex, the \$3 billion NorthConnex, and the Anzac Parade Light Rail development are just some of the major projects that will be ramping up over the next three years. Although New South Wales will face some exposure to the decline in mining investment over the coming years via its coal sector, the negative impact will be minor compared with mining-intensive Queensland and Western Australia. Falling electricity-related construction, following a period of elevated investment in the sector, will also dent engineering activity, particularly in 2014/15. Overall, we expect a second consecutive year of falling engineering construction before a sustained recovery begins in 2015/16, driven mainly by the public sector.

The current period of construction-driven economic growth has had positive spill-over effects into other industries, meaning that New South Wales' unemployment rate is among the lowest in the country at around 5.7 per cent (s.a.) as at June 2014. On the downside, employment in property and business services (i.e. rental, hiring, and real estate services, professional, scientific, and technical services, and administration and support services) fell considerably through 2012/13 and has seen very little recovery since then. This is where Melbourne has a competitive edge over Sydney (discussed below). Although we expect employment in these industries to improve from mid-decade on the back of the impending recovery in non-mining business investment, Victoria will likely continue to outpace New South Wales in the long run.

The relatively solid labour market, along with higher confidence and low interest rates, aided an acceleration in private consumption expenditure (PCE) growth to 3.1 per cent over 2013/14. Retail turnover saw a 4.9 per cent rise over the same period; the state's strongest result in almost a decade.

In the near-term, the New South Wales economy will continue to be driven by construction. This should soon be bolstered by the beginning of a recovery in non-mining business investment. Accordingly, we are forecasting New South Wales to continue to outpace most other states and territories over the next few years, with peak SFD growth of almost 5 per cent expected around 2015/16.

3.2 Estimate of the surveying and geospatial workforce

The majority of the skilled surveying and geospatial workforce in New South Wales consists of surveyors (over 60 per cent), while spatial scientists and surveying and spatial science technicians accounting for 19 and 11 per cent respectively. Of the surveying profession, Cadastral surveyors are by far the most common, making up over 60 per cent of all surveyors. Research suggests that around one third of all practicing surveyors in New South Wales are registered (see table 3.1 on page 56).

3.3 Outlook for key determinants of skilled labour demand

3.3.1 Private house commencements

Since the mid-2000s dwelling construction in New South Wales has been relatively subdued, and consequently a significant stock deficiency has emerged. This deficiency has created significant pressure in residential markets across New South Wales, driving price and rental growth and making Sydney the least affordable capital city in Australia. Coupled with a few other factors, this affordability constraint has helped limit the entry of first home buyers.

However, more positive results are beginning to emerge. New South Wales is set to lead the national recovery. Although growth is being driven by the high density sector, detached house starts are not far behind, with growth of 35 per cent over the past two years.

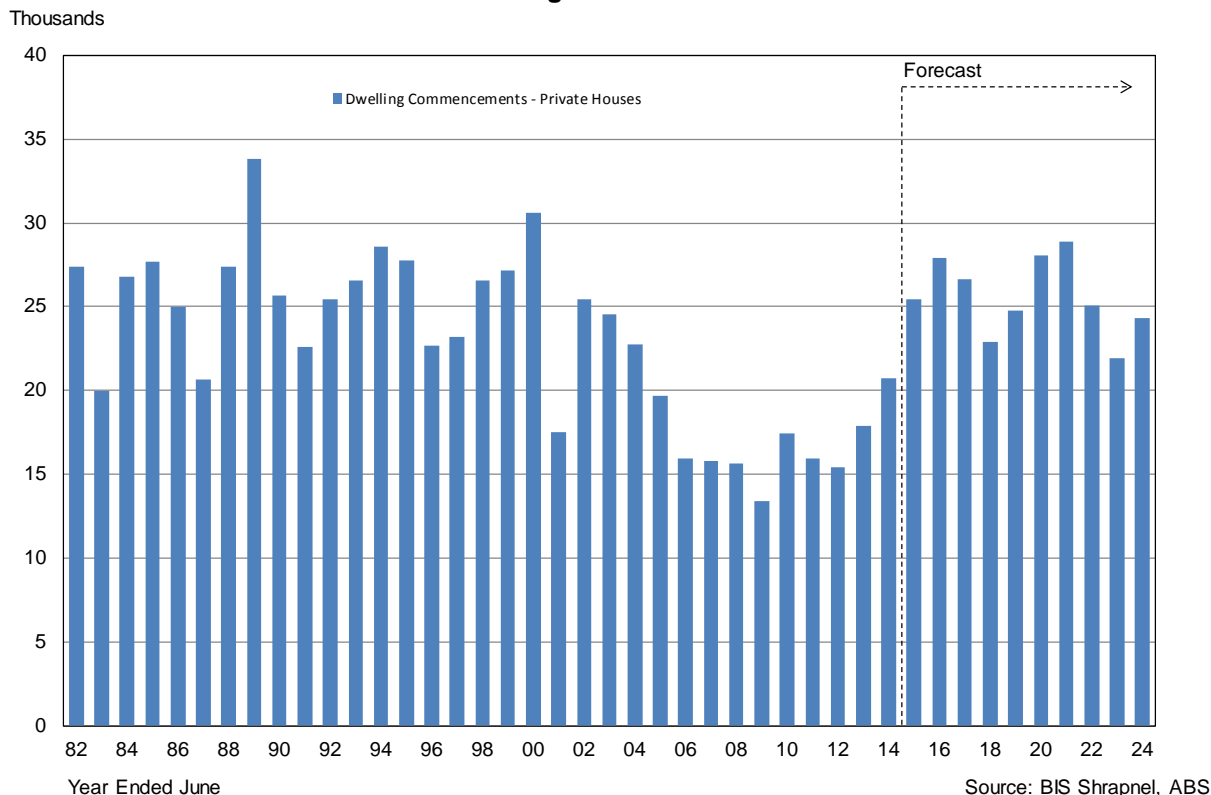
The vast majority of this growth has been experienced in Greater Sydney, with regional New South Wales experiencing much more modest growth. After a sustained period of underbuilding Sydney accounts for the vast majority of the dwelling undersupply across New South Wales and is one of the tightest property markets in the country. Regional New South Wales has not experienced the same strong population growth and exhibits much more balanced property markets and less impetus for a strong pickup in residential building.

The tightness in Sydney’s property market has resulted in strong house price growth across the state capital, which has in turn encouraged very strong demand from the investor segment of the market. With house price growth in Sydney forecast to continue at healthy rates we expect demand from investors to remain a key force in the market. Upgrader/downsizer demand is following closely behind and will also continue to be buoyed by strength in the property market.

First Home Buyer (FHB) demand remains near all time lows, but it has begun to trend upwards in the most recent data. It appears that the market has mostly adjusted to the change in First Home Owner Grant (FHOG) policy but it will take time for FHBs to return to the market in more significant numbers. We expect to see this play out over the forecast period.

With all segments of demand expected to exhibit strength over the forecast period we are forecasting strong, sustained levels of dwelling commencements. Detached houses are set to continue their strong growth trajectory and steadily increase to 25,450 commencements for 2014/15. Further growth to nearly 28,000 commencements in 2015/16 will be the strongest level of activity since 1999/2000, and commencements are forecast to cycle around these high levels over the rest of the forecast period.

Chart 3.1: Number of Dwellings Commenced Private Houses – NSW

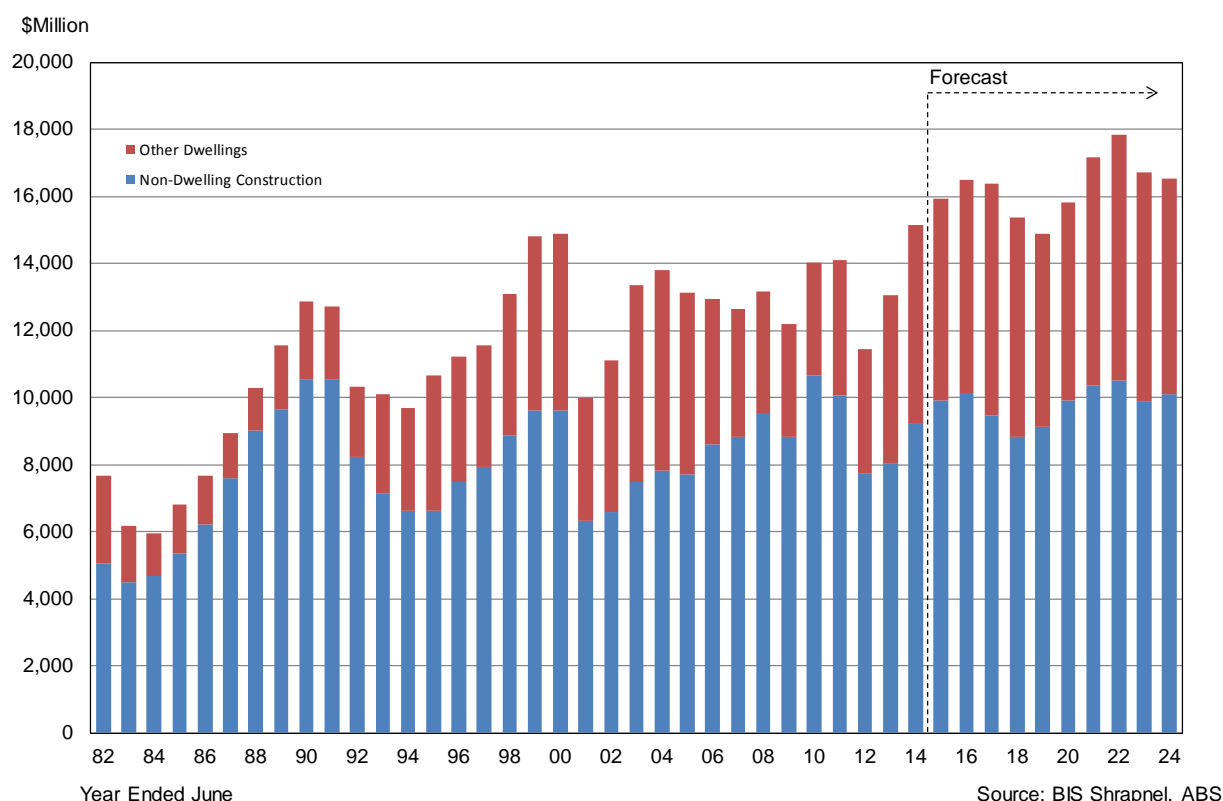


3.3.2 Private multi-residential construction and non-dwelling building construction

Private multi-residential construction

New South Wales has traditionally been by far the largest market for high density dwellings, although Queensland actually took this title over the past few years. Geography, affordability and infrastructure issues continue to push people into higher density households in Sydney. As a result, there has been a solid rise in the share of high density in New South Wales over the past few years, from 42 per cent of total commencements in 2009/10, to 54 per cent in 2013/14. Our forecasts of private multi-residential of ‘other’ dwellings construction is provided in chart 3.2.

**Chart 3.2: Other residential buildings and non-dwelling building– NSW
Value of Work Done, 2011/12 Prices**



Non-dwelling building construction

Non-residential building in New South Wales has oscillated around a relatively flat trend since the late 1980’s. After being hit by the GFC in 2008/09, non-residential starts lifted strongly in 2009/10, thanks primarily to a surge in education building related to BER (Building the Education Revolution) stimulus. Activity remained above \$10 billion in 2010/11, before collapsing in 2011/12 as the stimulus measures eased.

Work done has since rebounded to \$9.2 billion in 2013/14, supported by growth in the retail sector, with commencement of the \$310 million Macquarie Centre Extension and \$250 million Westfield Miranda Expansion providing a significant boost.

Reflective of a wide pipeline of major projects, New South Wales is forecast to expand over the next two years in 2014/15. Commercial & industrial building is driving the improvement, with relatively broad growth across the sub-sectors. Economic conditions and general confidence should continue their gradual improvements; providing an impetus for private investment.

Commencement of the third and largest Barangaroo office tower will spur a big outcome for offices whilst the \$250 million Sydney International Convention Centre Hotel will do likewise for accommodation. Social & institutional building is forecast to hold flat, but with significant variability amongst the sub-sectors. Commencement of the \$880 million New Sydney Convention and Entertainment Centre will also provide a considerable boost for entertainment & recreation, although health and education related building will continue to ease back significantly.

Overall, non-residential building is forecast to average \$9.5 billion per annum over the next five years. Although up only slightly from the \$9.2 billion experienced over the previous five years, this is a solid result considering the absence of temporary stimulus projects in the forthcoming period.

3.3.3 Utilities and transport engineering construction

Engineering construction across the utilities and transport sectors peaked at \$18.6 billion in 2012/13, driven by historically high levels of activity on roads, rail and electricity. However, activity fell by 12 per cent in 2013/14, as work fell across all of these major sectors. Construction is forecast to recover from here, reaching a peak of \$20.8 billion by 2018/19. This is going to be driven by growth in the road and railways sectors in particular, while telecommunications will also experience elevated levels of work.

Roads construction is expected to fall further over 2014/15, due to the completion of projects such as the \$1.7 billion Hunter Expressway. Because the project has been a key driver of road construction over recent years, its completion will leave a void in activity that is not easily filled. However, the commencement of the \$11.6 billion WestConnex project will drive the next upswing in road construction.

Although the project is expected to commence with preliminary works in 2014/15, it will really ramp up in 2015/16, with annual activity of well over \$1 billion. In addition, there will be a significant amount of work on roads relating to the recently-confirmed Second Sydney Airport, including the Western Sydney Airport Motorway, and The Northern Road. As a result, total public activity will continue to grow to a peak of \$5.9 billion in 2018/19, coinciding with the maximum annual level of work on WestConnex and airport roads. Privately funded road construction is also expected to remain elevated over the next five years, supported by construction of the \$3 billion F3-M2 Link in Sydney.

Railways construction reached a trough in 2013/14, although a significant recovery will ensue through to 2017/18. This upswing in activity will reach a peak of \$3 billion in 2017/18, driven by the NSW Long-Term Transport Master Plan, which identified the key rail projects which will deliver improved services, transport access to the key population growth areas and improve efficiency of freight networks. Specifically, the \$8.3 billion North-West Rail Line will provide the bulk of this activity (which is comprised of around \$4 billion in civil work), supported by the \$1.6 billion Sydney CBD Light Rail projects, and the \$1.3 billion second stage of the South West Rail Link.

The electricity sector has had a strong run of construction growth, averaging \$3.7 billion per annum over the last five years. However, we expect to see electricity investment fall heavily over the next five years, shedding a cumulative 36 per cent by 2018/19. There are a number of reasons for this forecast.

The Australian Energy Market Operator (AEMO) forecasts that NSW will not require new baseload capacity until the 2020s, removing the impetus to invest in new capacity. In addition, the Federal Government is less in favour of renewable energy schemes, and has strongly

indicated that these schemes will be delayed or watered down. This has adversely affected industry confidence and the feasibility of several wind farm projects in particular. We therefore expect that many proposed wind farms and solar plants will not get up during the next five years.

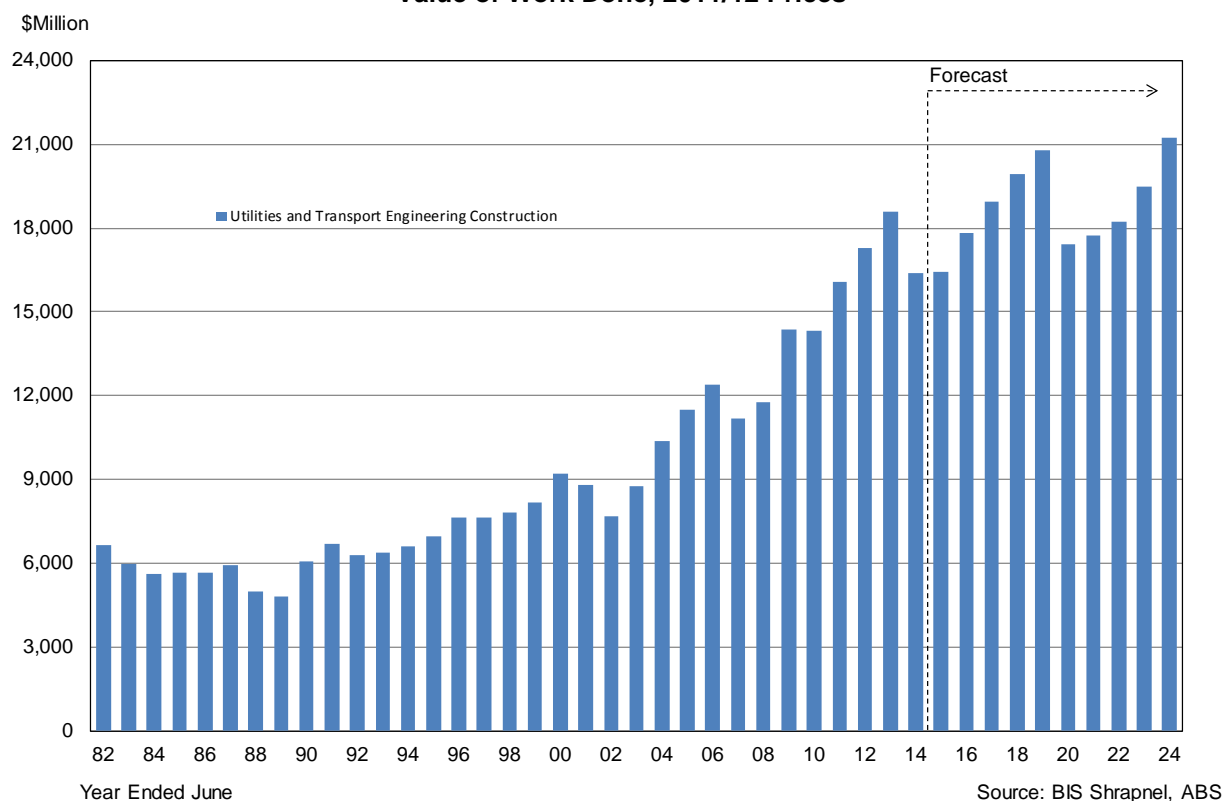
Further, the most recent determinations (by the Australian Energy Regulator) for Ausgrid, Endeavour Energy, and Essential Energy support this negative outlook for the electricity sector. All three companies have had their permitted capital expenditure on the electricity distribution network cut heavily over the five years to 2018/19.

The water and sewerage sectors are expected to post strong growth over the next four years. . This will be driven by the return of several major projects across both sectors. Water activity will be driven by the \$800 million Hawkesbury-Nepean Flood Mitigation program – the 23 metre raising of the Warragamba dam wall which has been endorsed by Infrastructure NSW. Sewerage activity is also expected to rise, supported by required infrastructure upgrades for the Bayswater B power station, as well as higher public funding for the Priority Sewerage Program.

Overall, engineering construction is likely to ease off from its peak beyond 2018/19. However, the demands of an expanding population and congested and aging infrastructure will drive the next upswing in construction. Sydney’s continued status as a world city will continue to drive demand for new and improved infrastructure, particularly in the vital transport segment.

Road construction will remain the largest sector of engineering construction, supported by all three stages of the WestConnex project, and the assumed commencement of the long-awaited F6 extension by the mid 2020s. On the rail side, our long-term forecasts currently include an extension to the North-West Rail Link, along with construction of a 2nd Sydney Harbour rail crossing.

Chart 3.3: Utilities and Transport Engineering Construction – NSW
Value of Work Done, 2011/12 Prices



3.3.4 Mining and heavy industry construction

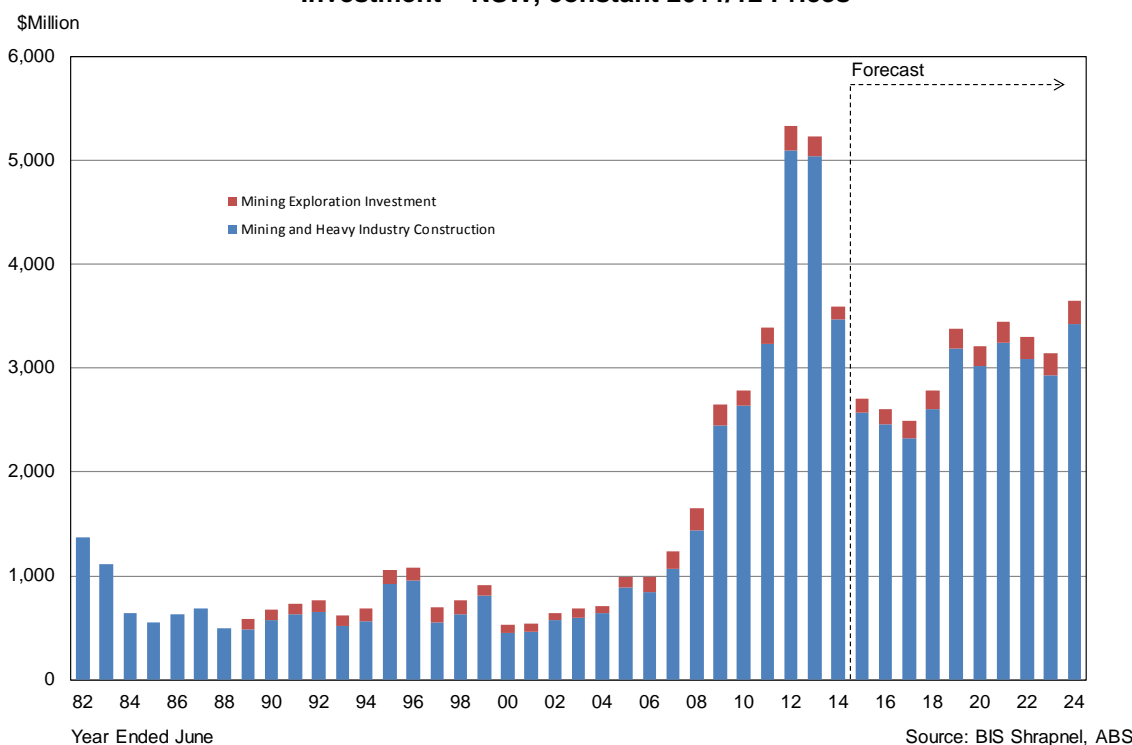
Mining and Heavy industry construction is the second largest engineering construction segment, and has experienced tremendous growth since 2006/07, rising almost fivefold to over \$5.0 billion in 2011/12 and 2012/13. The majority of construction work has occurred in the coal sector following a strong investment program into new production capacity as the industry responded to record price signals. The coal industry accounted for 60 per cent (\$3 billion) of mining and heavy industry investment in 2012/13, while other minerals was the next largest subsector, accounting for 25 per cent (\$1.3 billion).

However, activity dropped heavily across both industries over 2013/14, causing total mining and heavy industry construction to fall to \$3.5 billion. This weakness will be driven by the completion or winding down of several significant projects. On the coal side, this includes Xstrata’s Ulan West and Ravensworth North mines, as well as the port handling facilities by Port Waratah and NCIG. In terms of other minerals, the key driver of the current decline in activity is the completion of the \$2 billion Cadia East gold mine.

Total mining and heavy industry construction is expected to fall to \$2.3 billion in 2016/17, before steadily recovering through the remainder of the decade. With little non-coal investment on the horizon, coal is going to become even more significant as a share of mining and heavy industry construction work in New South Wales. Key projects during this time are going to be the development of the Watermark, Caroonna, and Mount Pleasant mines, which are all valued at over \$1 billion. Outside the coal sector, the primary cause of activity is the \$1 billion Dubbo Zirconia mine, which is expected to commence in 2016/17.

The near term declines mean that total mining and heavy industry construction over the next five years is going to be lower than the previous five year period, at \$2.7 billion per annum compared to \$3.7 billion per annum respectively. However, the eventual commencement of the aforementioned coal projects will support activity at solid levels through the remainder of the forecast period.

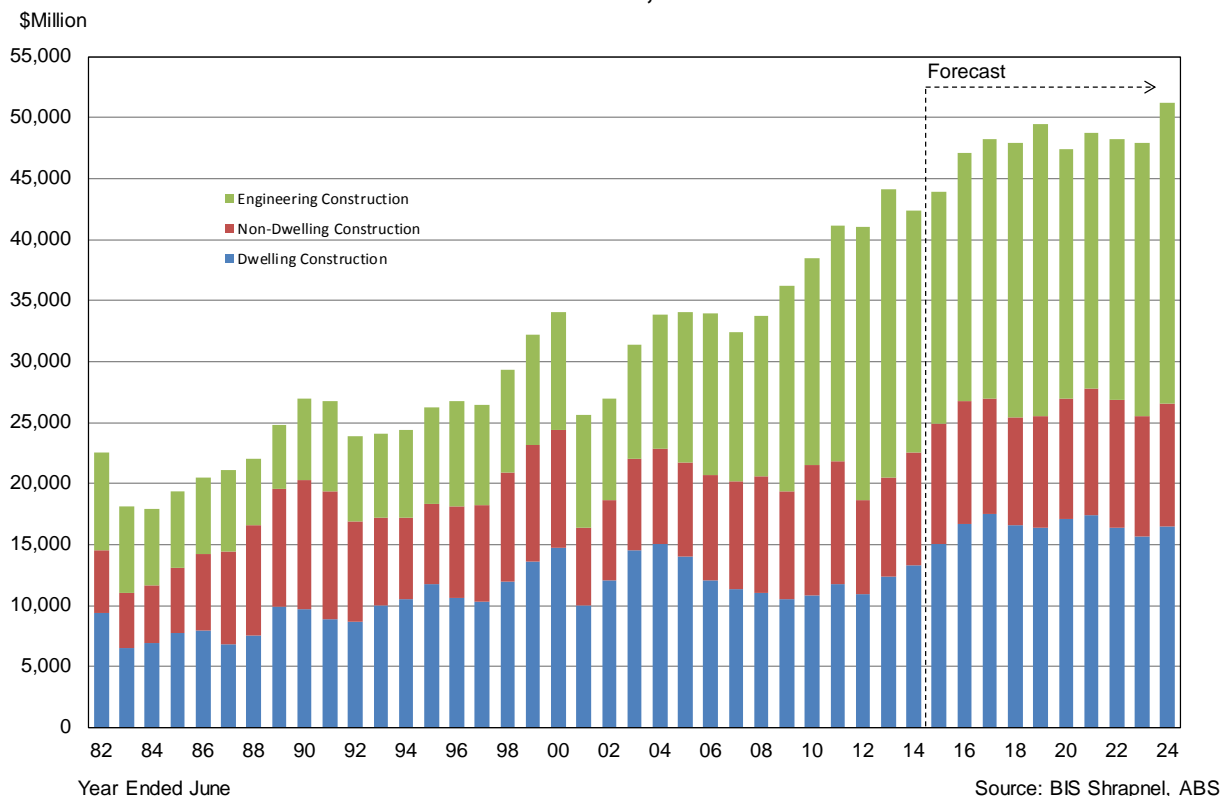
Chart 3.4: Mining and Heavy Industry Construction Work Done and Mining Exploration Investment – NSW, constant 2011/12 Prices



3.3.5 Total construction

Overall, construction activity in New South Wales is forecast to rise steadily over the next five years, at an average rate of 3.4 per cent per annum. As described above, this is going to be primarily driven by engineering and dwelling construction, while non-residential building will essentially plateau (albeit with a cycle within the next five years). By 2018/19, total construction is forecast to be \$50 billion, which is a record level. Activity is then expected to stabilise around these historically strong levels over the following five years to 2023/24, with non-residential building eventually returning to growth, and offsetting declines across the engineering construction sector.

**Chart 3.5: Total Construction by Category – NSW
Value of Work Done, 2010/11 Prices**



3.4 Forecasts of skilled labour demand

Solid growth in construction activity over the next few years will convert into strong increases in demand for skilled labour. From 4,411 persons in 2013/14, total skilled labour demand is forecast to increase to over 5,000 persons through 2015/16 and 2016/17, supported by activity across all key sectors, including engineering, non-dwelling, and dwelling construction.

However, demand is expected to then trend downward. Although total construction is forecast to continue rising through to 2018/19, most of this growth will be in the less surveyor-intense category of engineering construction. This means that rising demand for engineering surveyors, spatial scientists, technicians, and other professionals will be more than offset by declines in cadastral and construction surveyors as both dwelling and non-dwelling construction softens.

A recovery will then ensue through the remainder of the 2010's, underpinned by both residential and non-residential construction required for an expanding population. Table 3.1 below shows the demand for skilled surveying professionals over the ten years to 2023/24, based on 1.5 per cent productivity growth.

Chart 3.6: Forecasts for Demand for Cadastral Surveyors and Total Surveyors – NSW

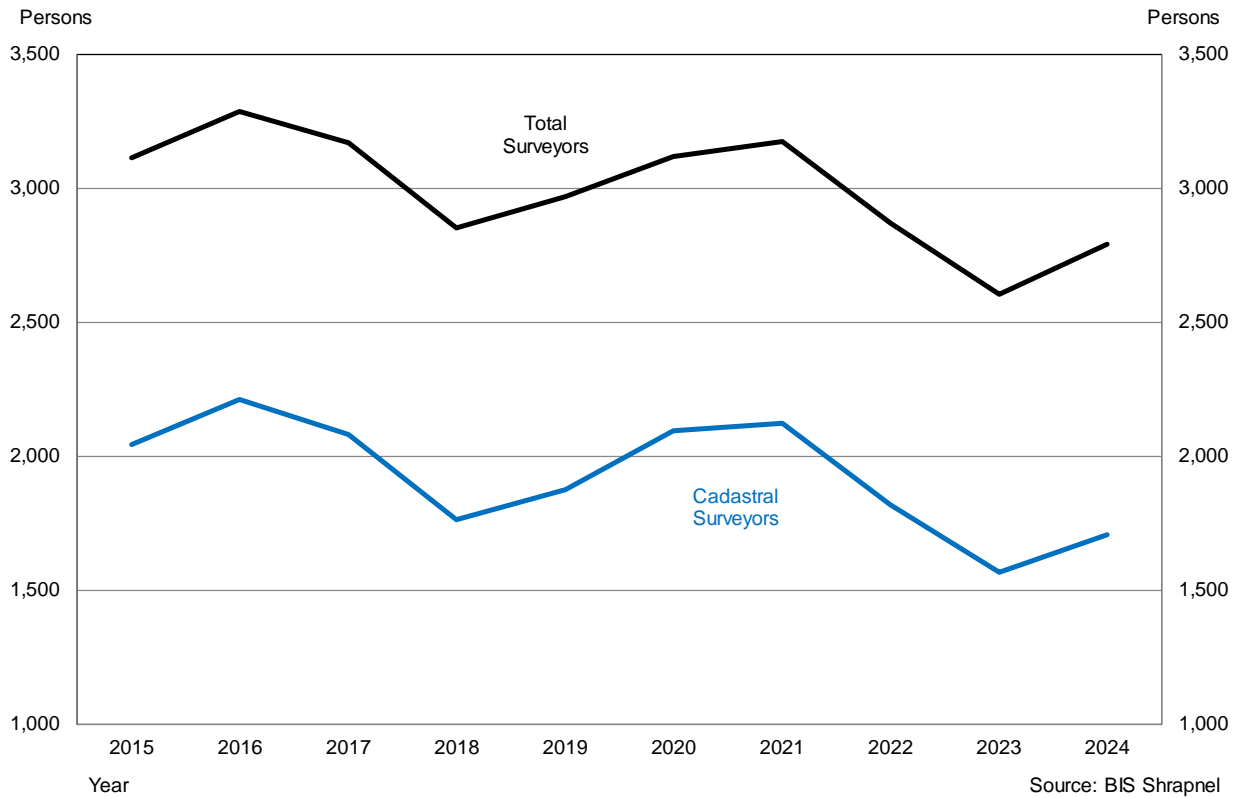


Chart 3.7: Forecasts for Demand for Surveyors by area of Specialisation– NSW

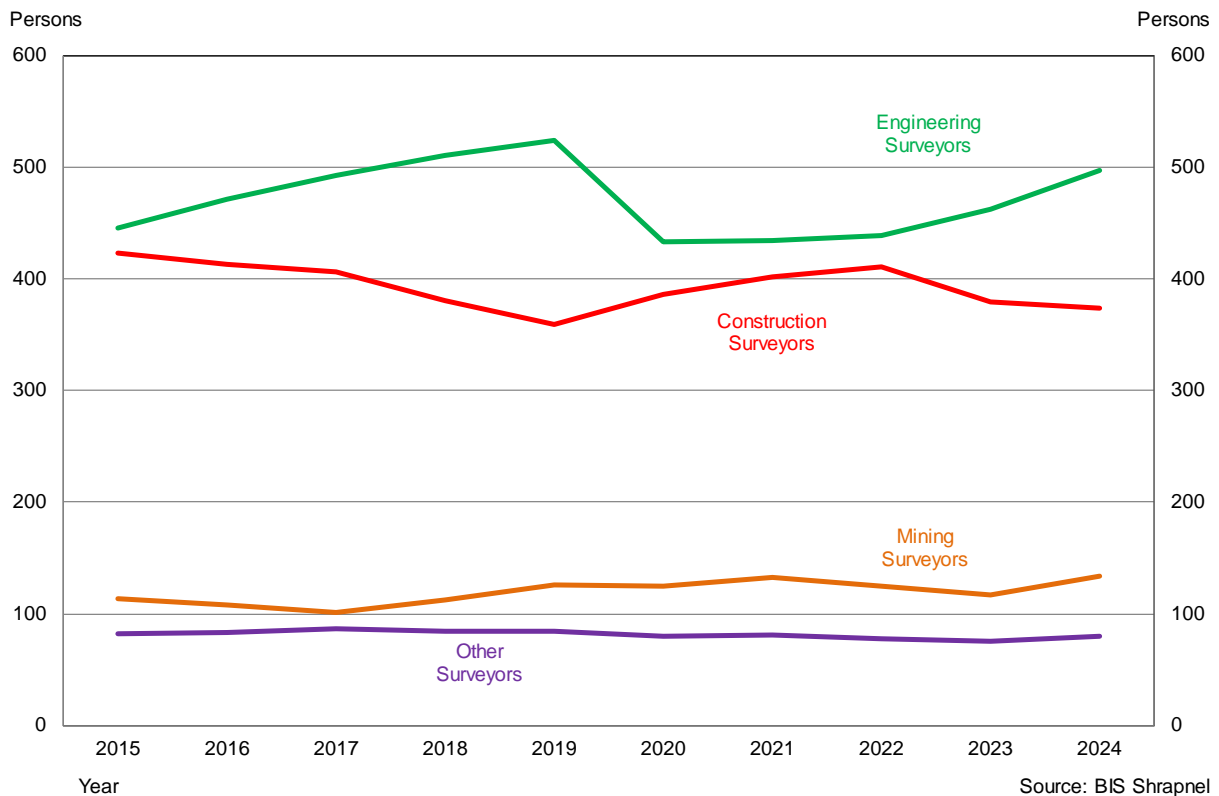


Table 3.1: Forecasts of Demand for Surveyors and Surveying-Related Professionals and Workforce Gap – New South Wales*(Baseline Scenario based on 1.5% labour productivity growth, forecasts as at June)*

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Labour Demand by Specialist Occupation | Estimate | Forecasts | | | | | | | | | |
| Cadastral | 1,696 | 2,046 | 2,212 | 2,082 | 1,764 | 1,877 | 2,093 | 2,124 | 1,819 | 1,568 | 1,709 |
| Construction | 396 | 418 | 418 | 412 | 381 | 359 | 386 | 402 | 411 | 379 | 374 |
| Engineering | 446 | 446 | 471 | 493 | 511 | 525 | 433 | 434 | 439 | 462 | 497 |
| Mining | 154 | 114 | 108 | 102 | 112 | 126 | 125 | 132 | 125 | 117 | 134 |
| Other Surveyors | 77 | 83 | 84 | 87 | 85 | 84 | 80 | 81 | 78 | 76 | 80 |
| All Surveyors | 2,769 | 3,106 | 3,293 | 3,175 | 2,853 | 2,970 | 3,118 | 3,173 | 2,872 | 2,603 | 2,793 |
| <i>Registered/Licensed Surveyors</i> | 927 | 1,227 | 1,438 | 1,457 | 1,235 | 1,314 | 1,465 | 1,487 | 1,273 | 1,098 | 1,196 |
| Total Spatial Scientists | 844 | 866 | 919 | 951 | 932 | 923 | 883 | 889 | 857 | 833 | 876 |
| Total Technicians | 460 | 471 | 500 | 518 | 507 | 503 | 481 | 484 | 467 | 454 | 477 |
| Total 'Other' Professionals | 342 | 350 | 372 | 385 | 377 | 373 | 357 | 360 | 347 | 337 | 355 |
| Total Skilled Labour Demand | 4,414 | 4,794 | 5,084 | 5,029 | 4,669 | 4,769 | 4,839 | 4,906 | 4,543 | 4,227 | 4,502 |
| Existing Workforce (a) | | | | | | | | | | | |
| Cadastral Surveyors | 1,696 | 1,638 | 1,580 | 1,521 | 1,463 | 1,404 | 1,348 | 1,292 | 1,236 | 1,180 | 1,124 |
| Construction Surveyors | 396 | 393 | 390 | 387 | 384 | 381 | 378 | 375 | 372 | 369 | 366 |
| Engineering Surveyors | 446 | 438 | 429 | 420 | 411 | 402 | 393 | 384 | 375 | 366 | 357 |
| Mining Surveyors | 154 | 151 | 148 | 144 | 141 | 138 | 135 | 132 | 129 | 126 | 123 |
| Other' Surveyors | 77 | 76 | 75 | 73 | 72 | 71 | 70 | 69 | 67 | 66 | 65 |
| All Surveyors | 2,769 | 2,695 | 2,621 | 2,546 | 2,472 | 2,397 | 2,324 | 2,252 | 2,180 | 2,107 | 2,035 |
| <i>Registered/Licensed Surveyors</i> | 927 | 886 | 845 | 804 | 763 | 722 | 686 | 651 | 615 | 580 | 544 |
| Spatial Scientists | 844 | 825 | 806 | 787 | 768 | 748 | 729 | 710 | 690 | 671 | 651 |
| All technicians | 460 | 451 | 443 | 435 | 427 | 419 | 410 | 402 | 393 | 385 | 376 |
| 'Other' Professionals | 342 | 335 | 329 | 322 | 316 | 309 | 303 | 296 | 290 | 283 | 276 |
| Total skilled labour | 4,414 | 4,307 | 4,199 | 4,091 | 3,982 | 3,873 | 3,767 | 3,660 | 3,553 | 3,446 | 3,339 |
| Workforce Gap | | | | | | | | | | | |
| Cadastral Surveyors | - | 408 | 632 | 561 | 302 | 473 | 745 | 832 | 583 | 389 | 585 |
| Construction Surveyors | - | 25 | 28 | 24 | (3) | (22) | 8 | 27 | 39 | 10 | 8 |
| Engineering Surveyors | - | 8 | 42 | 73 | 100 | 122 | 40 | 50 | 64 | 96 | 140 |
| Mining Surveyors | - | (37) | (40) | (43) | (29) | (12) | (10) | 0 | (4) | (9) | 11 |
| Other' Surveyors | - | 7 | 9 | 13 | 13 | 13 | 11 | 12 | 11 | 10 | 14 |
| All Surveyors | - | 411 | 672 | 628 | 382 | 574 | 794 | 921 | 692 | 496 | 758 |
| <i>Registered/Licensed Surveyors</i> | - | 341 | 593 | 653 | 472 | 592 | 779 | 836 | 658 | 518 | 652 |
| Spatial Scientists | - | 41 | 113 | 164 | 164 | 174 | 154 | 180 | 167 | 162 | 226 |
| All technicians | - | 20 | 57 | 83 | 81 | 84 | 71 | 83 | 73 | 69 | 101 |
| 'Other' Professionals | - | 15 | 43 | 62 | 61 | 64 | 54 | 64 | 57 | 54 | 78 |
| Total skilled labour | - | 487 | 885 | 938 | 687 | 896 | 1,072 | 1,247 | 990 | 781 | 1,163 |

(a) Existing workforce is generated by adjusting the size of the current skilled workforce for natural attrition rates such as retirements and death.

Source: BIS Shrapnel, ABS

(b) Workforce gap is calculated as labour demand less existing workforce. A positive number implies a shortage of labour

Numbers in brackets imply an excess supply as new supply exceeds the forecast workforce gap.

3.5 Workforce attrition and workforce gap

The total skilled surveying and geospatial workforce *requirement* to meet future construction activity is inevitably higher than the labour demand generated by the model given attrition of the existing workforce ‘base’, primarily through retirement and death (but also through people leaving the workforce for other reasons).

Given the estimated age profile of the current total skilled labour demand workforce — and the assumed likelihood of retirement and death in each age group — we estimate that the current workforce will shrink by around 24 per cent over the next ten years from demographic factors alone. The difference between the (declining) existing workforce and total labour demand is the workforce gap. The workforce gap will need to be met by additional supply if forecast levels of end use sector activity are to be achieved. Possible sources of labour supply include:

- New graduates, and/or
- Net migration from overseas

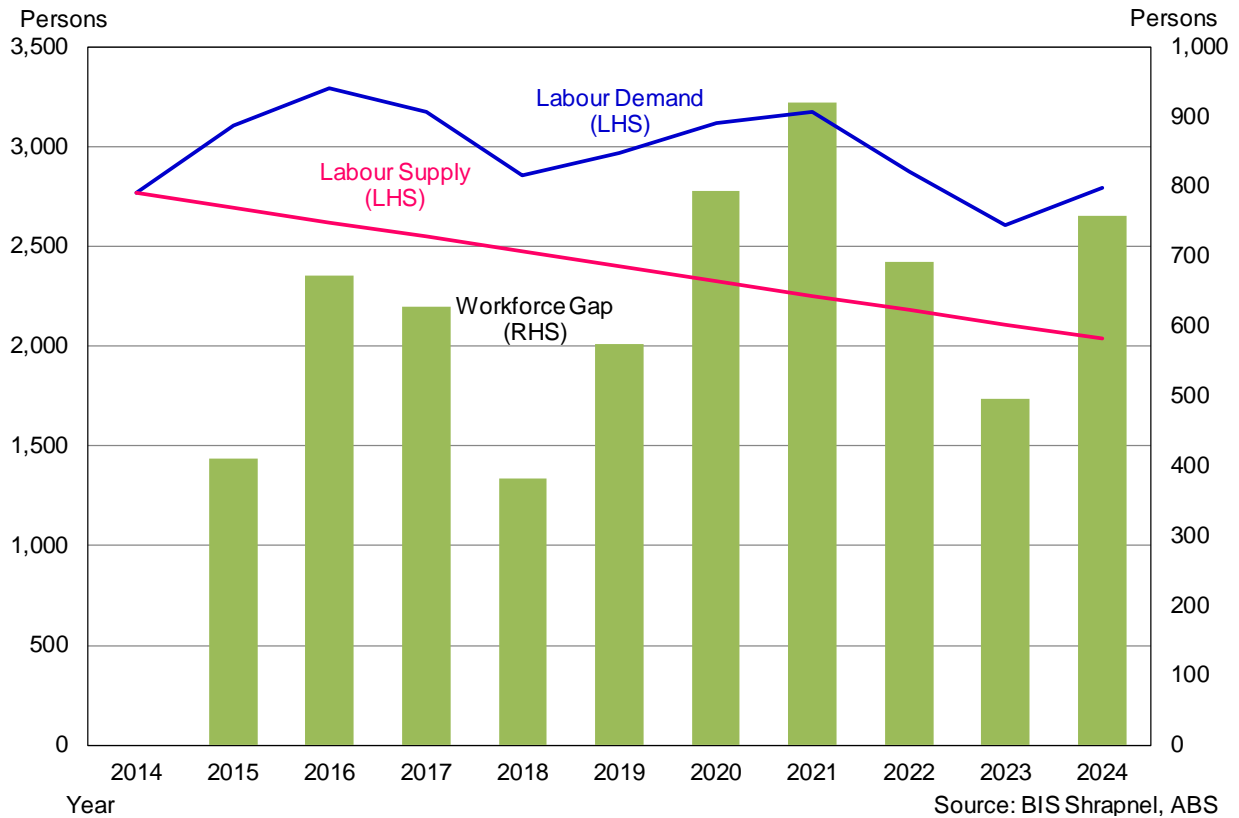
It should be noted again that while the existing skilled surveying workforce is expected to decline in personnel terms, the measure of skills and experience lost is likely to be far greater given that the retirees will be concentrated in relatively “high skill/experience” occupations. This report makes no attempt to quantify this, potentially greater loss, but acknowledges that it is a key issue facing the surveying and geospatial industry and the broader construction industry.

Given the forecast shape of labour demand, and the attrition of the existing workforce, the size of the total surveying and geospatial skilled workforce gap is expected to steadily climb over the next three years, reaching a peak of 938 persons by 2016/17. Although this shortfall will temporarily decline in 2017/18 as labour demand eases, ongoing workforce attrition and a recovery in construction will cause the gap to widen thereafter, reaching 1,247 persons by 2020/21.

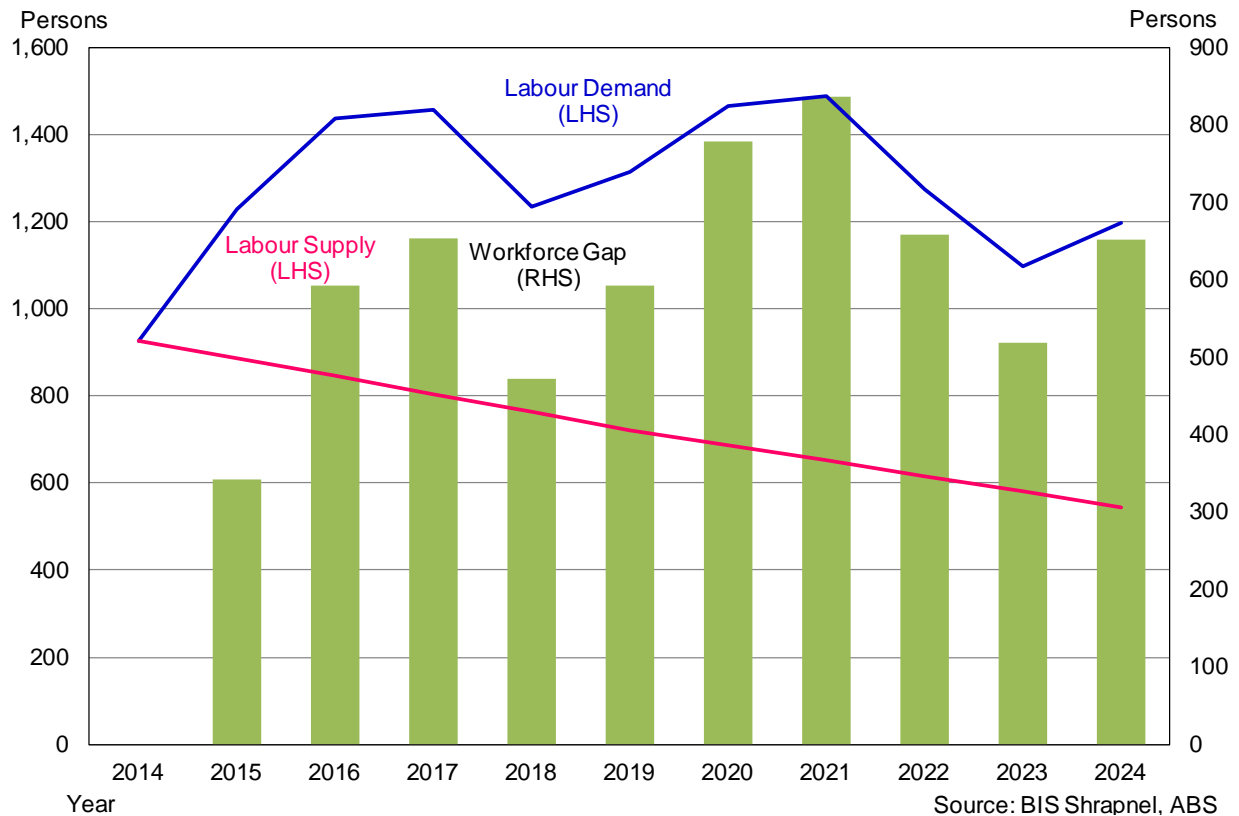
At this peak level, the majority of the shortfall in labour will be cadastral surveyors. This is due to the upswing in dwelling construction, as well as cadastral surveyors being the largest sub-sector of skilled labour. The workforce gap for cadastral surveyors is expected to reach 832 persons in 2020/21, while shortfalls will also exist across spatial scientists (180 persons), technicians (83 persons), and ‘other’ professionals (64 persons).

The labour demand, labour supply and workforce gap for New South Wales’ surveying and geospatial workforce is presented in table 3.1, and charts 3.8 to 3.13.

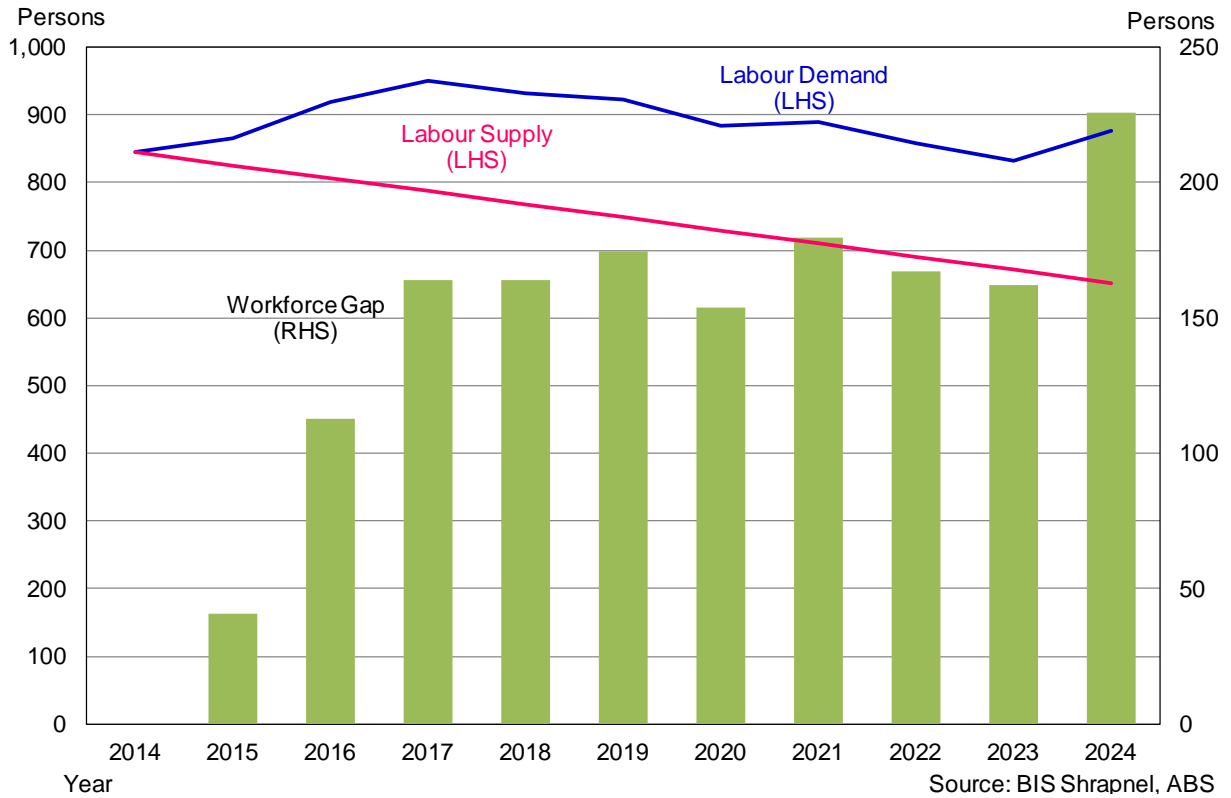
**Chart 3.8: New South Wales
Total Surveyors (1.5% Productivity Growth)**



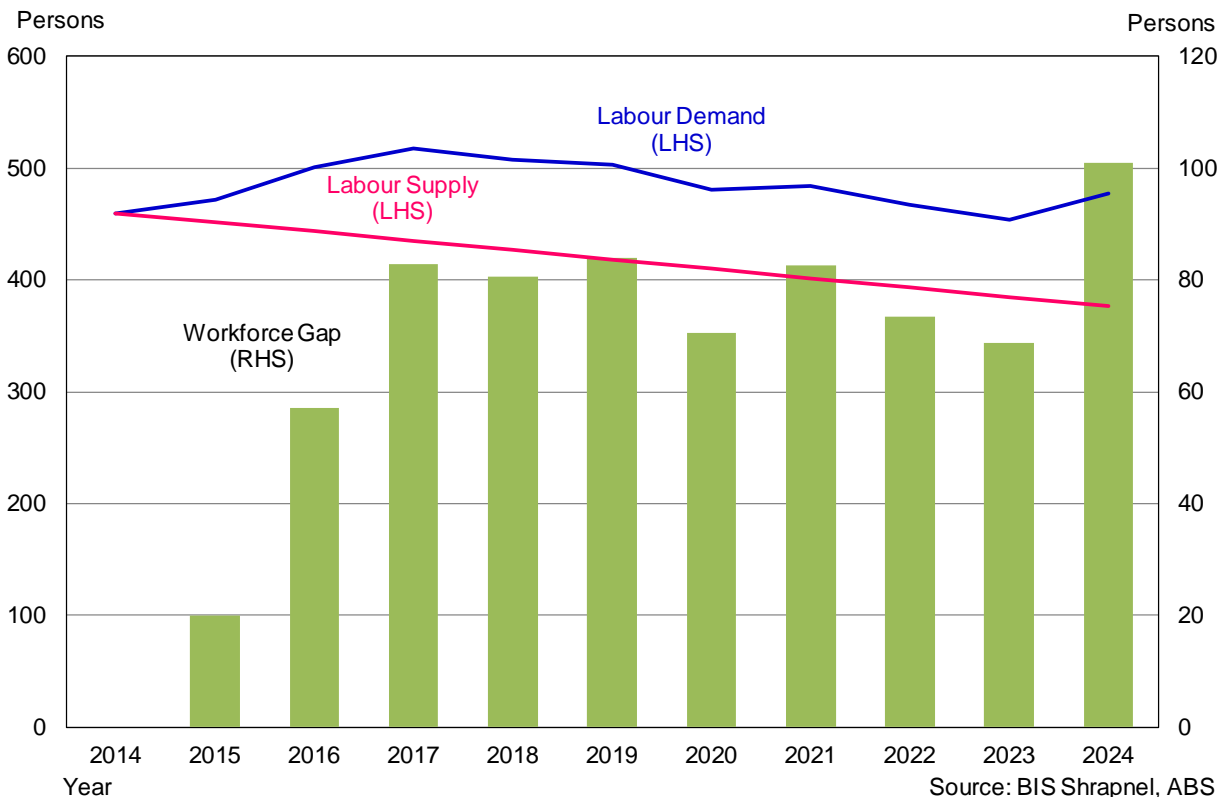
**Chart 3.9: New South Wales
Registered Surveyors (1.5% Productivity Growth)**



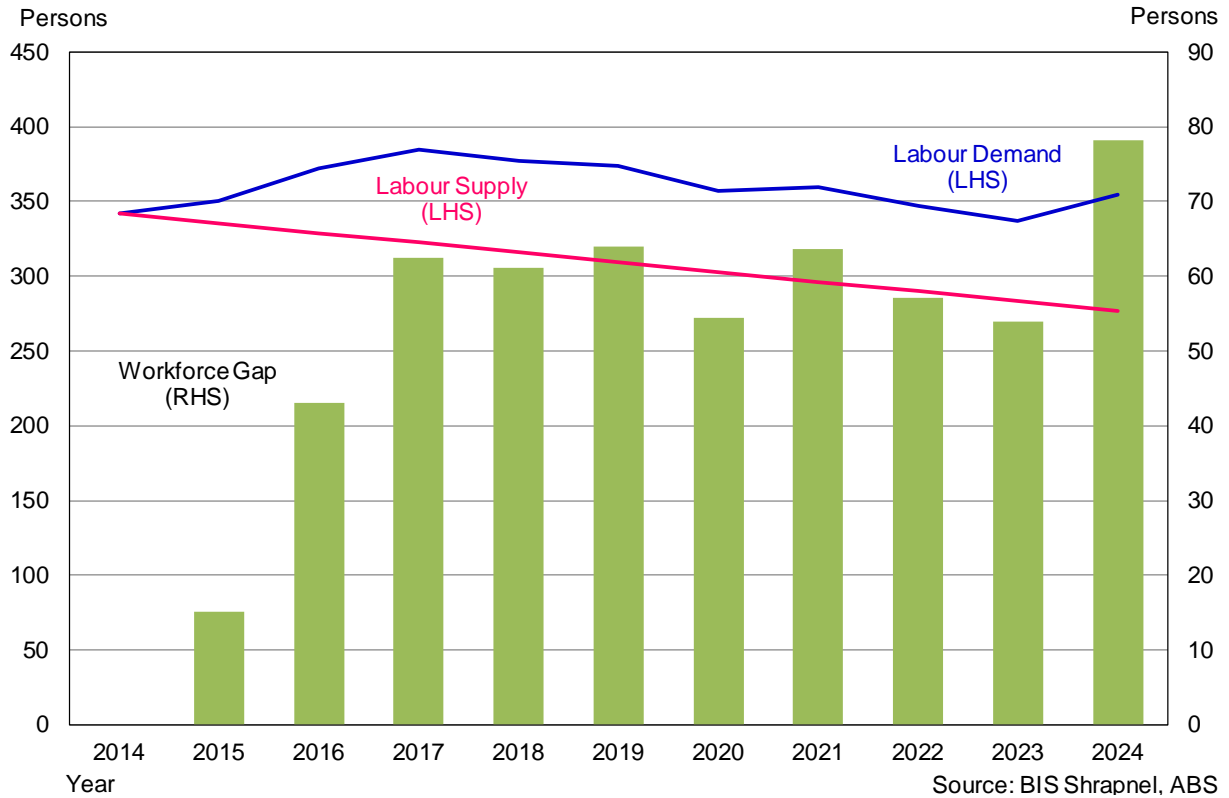
**Chart 3.10: New South Wales
Spatial Scientists (1.5% Productivity Growth)**



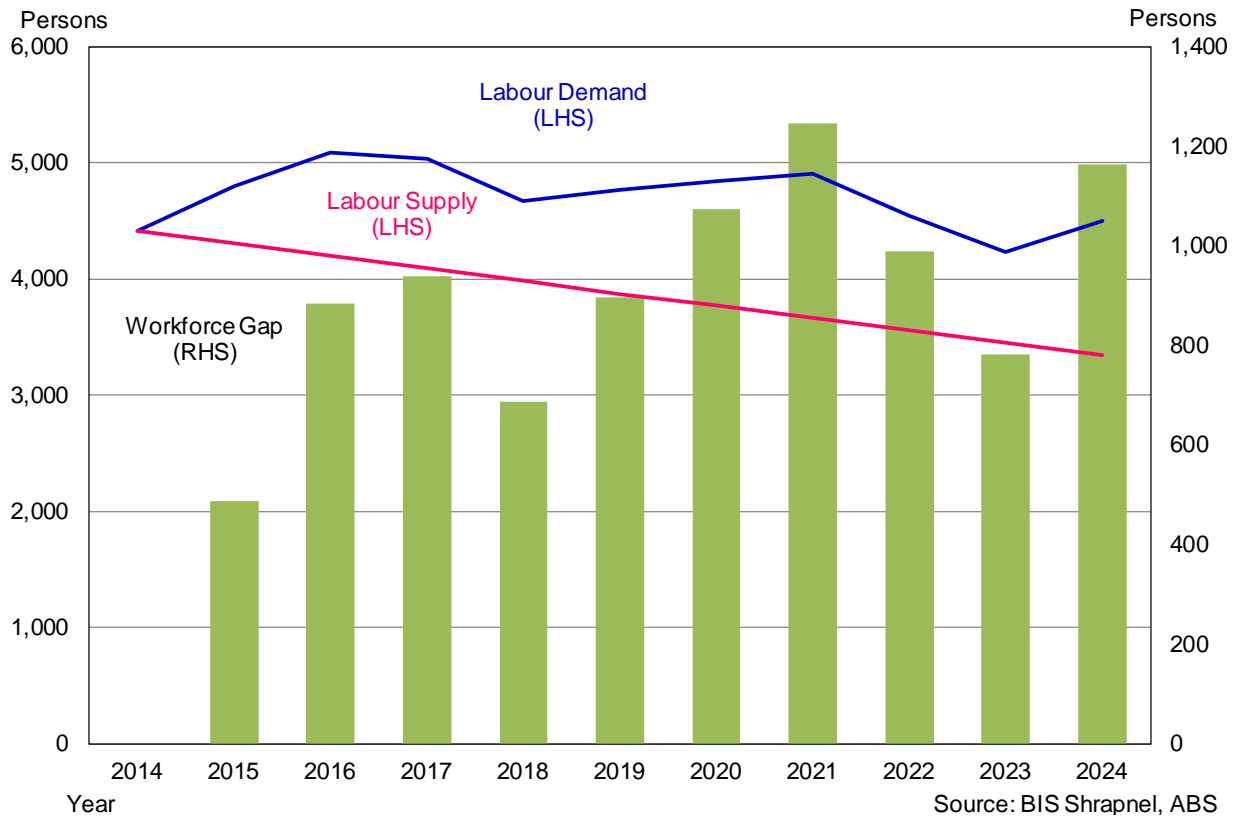
**Chart 3.11: New South Wales
Technicians (1.5% Productivity Growth)**



**Chart 3.12: New South Wales
'Other' Professionals (1.5% Productivity Growth)**



**Chart 3.13: New South Wales
Total Skilled Labour (1.5% Productivity Growth)**



CHAPTER FOUR

Forecasts of Labour Demand and Workforce Gap for Victoria

4. FORECASTS OF LABOUR DEMAND AND WORKFORCE GAP FOR VICTORIA

4.1 The Victorian Economy

Following a miserly 0.2 per cent rise in Victorian State Final Demand (SFD is a measure of demand for goods and services within the state economy) over 2012/13, growth accelerated to 1.6 per cent in 2013/14. However, aside from 2012/13 and 2008/09 (post-Global Financial Crisis, GFC), this is the weakest annual result since the early 2000s. Growth is languishing well below the 20-year average of 3.9 per cent per annum. Although we expect growth to improve in the near-term, we are not forecasting it to return to the long-term average until late-decade.

Construction is estimated to have detracted from Victoria's Gross State Product (GSP is different to SFD as it includes international and interstate trade, and changes in inventories) of in 2013/14, as residential investment saw flat growth and engineering construction continued to fall steeply, more than offsetting a rise in non-dwelling building. Residential investment was one of the key drivers responsible for Victoria's consistently strong growth throughout the 2000s and into the early-2010s. This has left an estimated oversupply of stock, particularly in the other dwellings market (i.e. apartments). Despite this, we expect to see positive growth in 2014/15, fuelled by the pipeline of projects in the detached houses market, which did not see the enormous growth that the other dwellings market did over recent years. However, the extent of the oversupply of stock will necessitate an extended period of negative growth while demand catches up. We anticipate that this contraction will begin from 2015/16, again causing construction to detract from overall economic growth.

In 2013/14, non-residential building activity is estimated to have seen its strongest year of growth since before the GFC. Aged care and health facilities activity continued to escalate, on the back of construction of the Victorian Comprehensive Cancer Centre and the New Bendigo Hospital. On the downside, growth in the office market flattened out following two years of very strong results, while investment in retail and education facilities fell back.

In late November 2014, Labor won the Victorian state election, taking over after one term of Liberal rule. New Premier, Daniel Andrews, appears to be sticking to his promise to "rip up the contracts" for Stage 1 of East West Link. The cancellation of this mammoth \$6.8 billion project means that the forecast profile for Victorian road construction and overall engineering construction is significantly lower. Last year, we were anticipating that total road construction work done would reach a record high of \$4.0 billion within the next five years; in the project's absence, we expect the 2017/18 peak will only reach around \$2.4 billion. Although there remains a small chance that the new government will renege, for legal reasons or otherwise, at this stage it seems unlikely.

Consequently, in the absence of East West Link and as public infrastructure spending continues on its downward trend, we are now forecasting a steeper decline in total engineering construction in 2014/15. A pick up should ensue in 2015/16, as a recovery in public sector investment gets underway, but private sector investment will continue to decline to 2016/17.

Higher levels of consumer confidence and low interest rates likely contributed to Victorian Private Consumption Expenditure (PCE measures household spending on goods and services) improving to 2.3 per cent in 2013/14, not far off the national growth rate of 2.5 per cent. Retail trade growth of 3.2 per cent over the year was surprisingly strong, just eclipsing the Australian average, but the most recent quarterly data indicated a 0.1 per cent (seasonally adjusted) fall in the June 2014 quarter. Falling consumer confidence over the latter stages of the financial year (around the time the Budget was released) and persistent weakness in the labour market were likely key reasons for this recent deterioration.

Average monthly employment growth (s.a.) over the twelve months to June 2014 has been flat and the unemployment rate is among the highest in Australia. This does not bode well for consumer demand going into 2014/15, particularly as several key industries are likely to continue to struggle in the near-term.

Ten years ago, 13.6 per cent of Victorian jobs were in manufacturing. In 2013/14, this share had dropped to 9.7 per cent. In five years time, we expect it to fall to around 8.1 per cent. The pervasive downward trend in manufacturing employment over the past 25 years will only be exacerbated by the end of domestic manufacturing by Ford in 2016, and Holden and Toyota in 2017.

The depreciation of the Australian dollar to below US\$0.80 will come too late for many companies in Victoria's trade-exposed industries, and we should also keep in mind that the extent of the recovery in these industries will depend on how far the dollar eventually falls, and how responsive industry is to this. The education and tourism industries are likely to benefit from the ongoing recovery in the global economy, as rising income overseas (as well as the weaker dollar) encourages more international students and tourists to visit. However, it is unlikely that manufacturing will see a similar recovery.

Although these challenges will dampen economic growth in Victoria in the near-term, we are optimistic about growth prospects towards the end of the decade. The key drivers that underpinned the strong growth of the 2000s and early 2010s are still in place, namely the availability of reasonably-priced land for housing and industry and competitively-priced office markets, which provide Melbourne with a competitive advantage over Sydney in the finance and property and business services sectors. Indeed, Victoria has been able to either maintain or increase jobs in these industries since 2011/12 whereas New South Wales saw a considerable decline in jobs over 2012/13 with little recovery since then. It appears that Melbourne is still considered a better place to do business, and this will be a considerable advantage going forward.

Consequently, although we expect the Victorian economy to continue to trail New South Wales' and the national average in the near-term, towards the end of the decade we should see a return to strong growth. This will be underpinned by the next cycle of residential investment, an upturn in non-mining business investment (and recovery in key trade-exposed industries) as the dollar weakens, and the above-mentioned incentives to invest and do business in Victoria.

4.2 Estimate of the surveying and geospatial workforce

Surveyors comprise 56 per cent of the skilled surveying and geospatial workforce, while spatial scientists and surveying and spatial science technicians making up 25 and 8 per cent respectively. By specialisation, surveyors are predominantly cadastral (38 per cent), with construction surveyors (27 per cent) and engineering surveyors (23 per cent) the next most popular. Nearly 30 per cent of all surveyors in Victoria are estimated to be licenced (see table 4.1 on page 73).

4.3 Outlook for key determinants of skilled labour demand

4.3.1 New private housing commencements

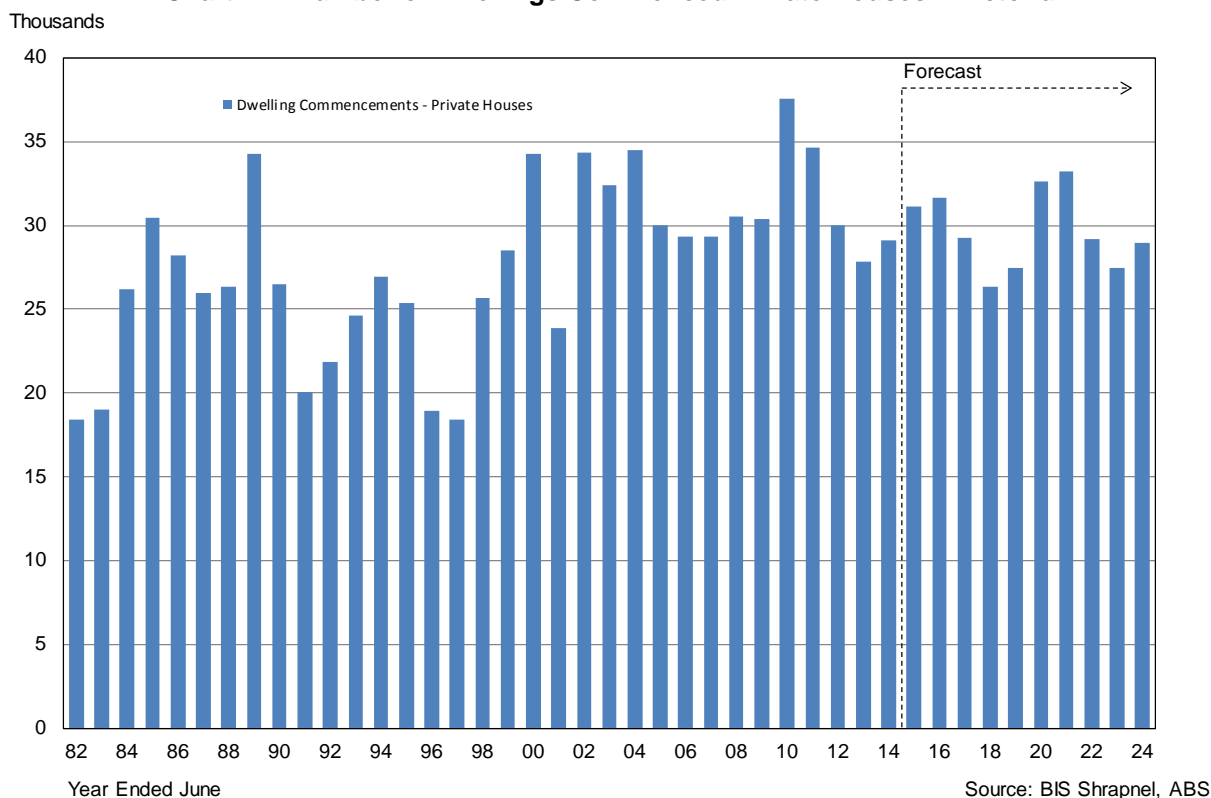
Residential building in Victoria has been tracking well above any other state/territory since 2009. Although this recent strength in building activity has to this point been primarily driven by the other dwellings sector, detached houses are now starting to see growth return after trending downwards since 2010. Activity to this point has been centred around the inner city of Melbourne and as this segment of the market has significant additions to supply come on line

and moves towards oversupply the focus will shift to the middle and outer suburbs. We are already starting to see this occur in the leading indicators and this will provide support to the detached house sector as other dwellings inevitably begins to trend down from its unsustainable highs.

Similarly to New South Wales, Victoria's strength has been underpinned by the investor and upgrader/downsizer segments of the market. First home buyer numbers in the Victorian market fell significantly over 2013/14 (as they adjust to the new policy measures. The policy change occurred later in Victoria than it did in New South Wales or Queensland and so we expect that this adjustment will continue to limit demand from this segment of the market over the forecast horizon.

Regardless, demand across the rest of the market should be sufficient to support strong activity out to the end of 2015. This will be driven by growth in detached house starts on the fringes of Melbourne, with total house starts forecast to rise a further 9 per cent over the next two years. However, average commencements over the next five years will still not be as strong as the recent five year period, down 8 per cent to 29,000 commencements per annum.

Chart 4.1: Number of Dwellings Commenced Private Houses – Victoria



4.3.2 Private multi-residential construction and non-dwelling building construction

Private multi-residential construction

There has been a very strong rise in the share of high density in Victoria over the past five years, reflecting a surge in Melbourne inner city tower apartment construction. This has seen total multi-residential construction work done more than double over the past five years, to a record \$5.8 billion in 2013/14. However, we expect this sector will begin to trend down from unsustainable highs after reaching this peak. As a result total other dwellings construction is forecast to ease back over the next five years, to \$2.9 billion in 2017/18. Although strong from a historical point of view, this will be the weakest result since 2008/09.

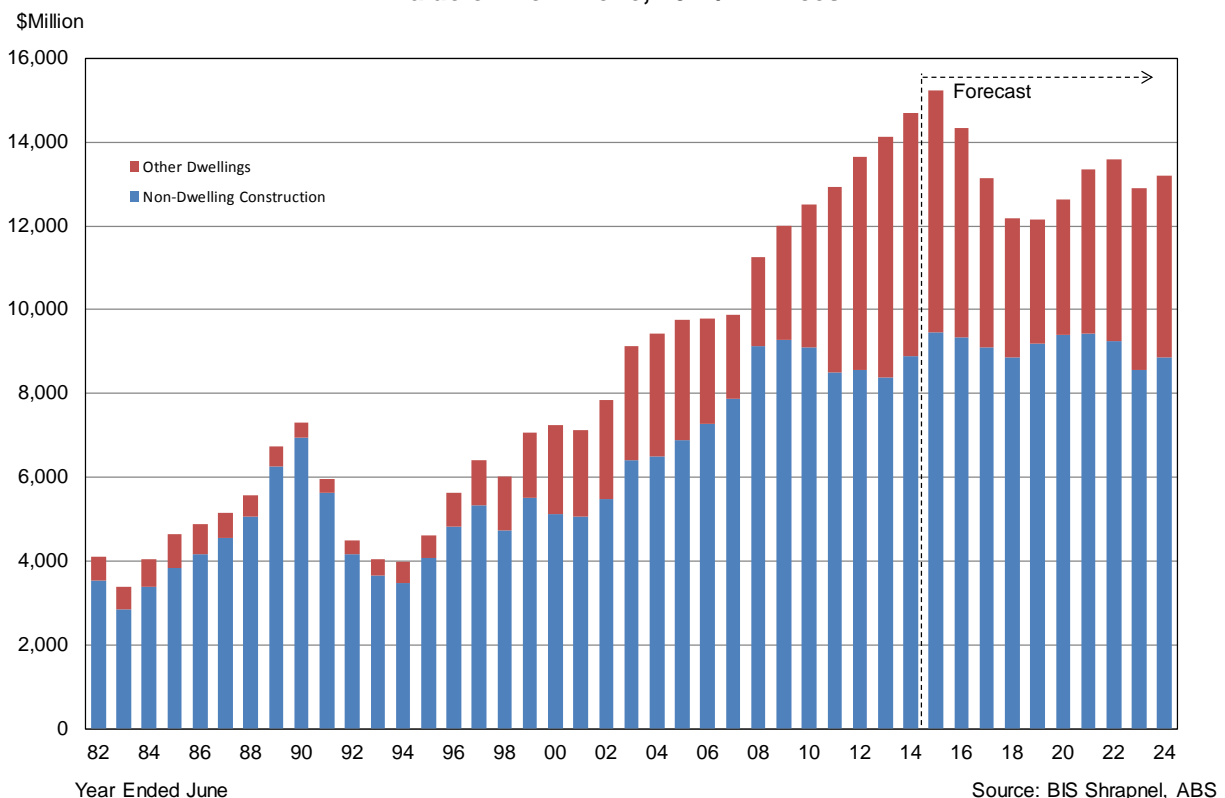
Non-dwelling building construction

After performing very poorly over the early 1990’s, Victoria’s economy improved significantly. The rate of population growth for the state also lifted markedly. Victoria showed a strong upwards trend in non-residential building from the mid 1990s, with work done reaching a record \$7.9 billion by 2006/07. Although the GFC saw commercial and industrial building slump, total activity actually continued to rise, driven by stimulus funding related to education. This saw work done peak at \$9.3 billion in 2008/09, although has since fallen back as stimulus has been withdrawn.

Work done is expected to rise back above \$9 billion over most of the next five years, supported by improving business confidence which will translate into stronger commercial and industrial building. A number of major hotel projects are anticipated (including the \$200 million Windsor Hotel Redevelopment), while retail is also set to lift strongly (\$240 million Pacific Werribee Plaza Expansion and \$330 million Chadstone Capital Development). However, social and institutional building is forecast to hold flat. Although work will soon start on the \$500 million New Ravenhall Prison, large declines are expected across health and entertainment and recreation.

Overall, non-dwelling construction is forecast to average \$9.2 billion per annum over the next five years – up from \$8.7 billion over the past five year period.

**Chart 4.2: Other residential buildings and non-dwelling building – Victoria
Value of Work Done, 2011/12 Prices**



4.3.3 Utilities and transport engineering construction

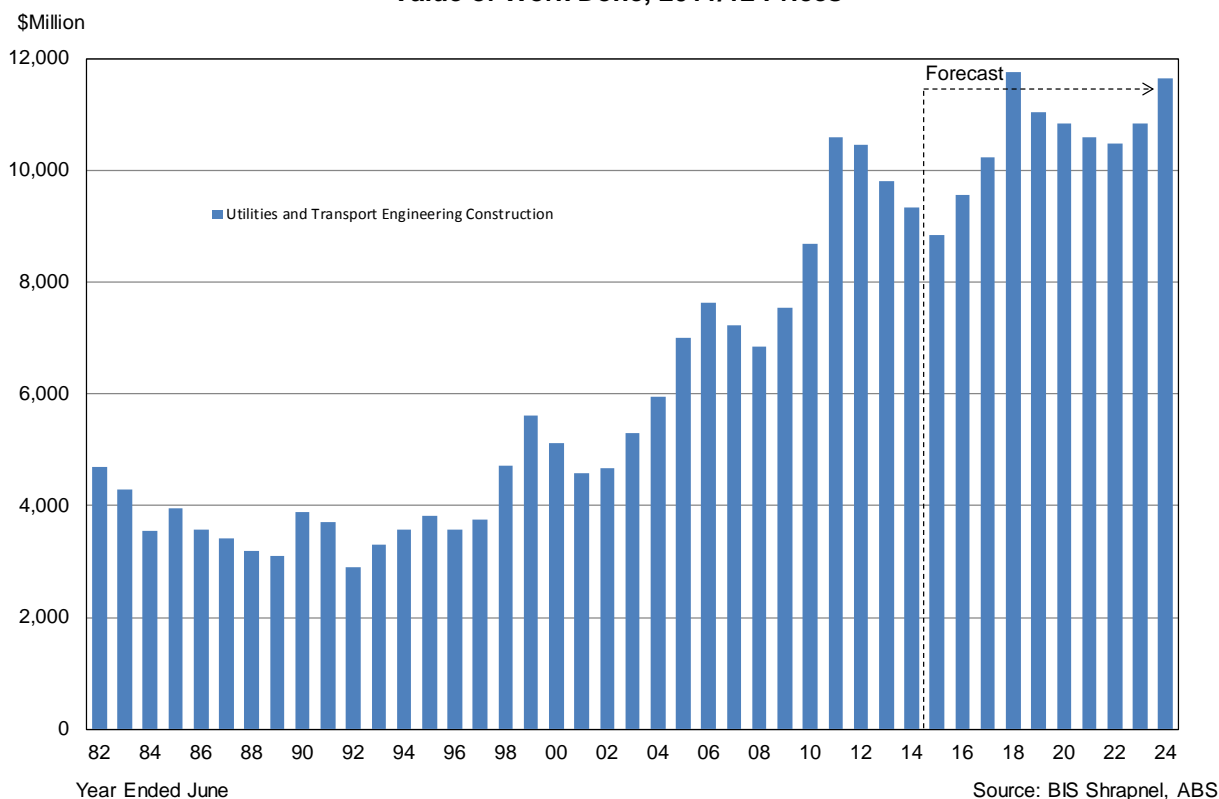
In Victoria, utilities and transport engineering construction peaked at \$10.6 billion in 2010/11, but has since fallen a cumulative 12 per cent over the past three years. Despite electricity construction reaching record levels, greater declines were felt across the roads and water (upon completion of the Wonthaggi Desalination plant) sectors. We expect to see one more year of declining engineering construction, before a recovery that will see activity remain elevated through the remainder of the decade.

Roads activity slipped to a decade-long low of just \$1.8 billion in 2013/14, but a very strong period of growth is in store for the next five years. The privately funded \$6.8 billion East-West Link will be the key driver of this, although the public sector will also provide support with major works on the Princes Highway and Bass Highway. Overall, roads construction is forecast to more than double over the next four years, reaching a record \$4.1 billion by 2017/18.

Rail activity reached \$1.3 billion in 2013/14, but is now likely to post large declines over the next two years as construction on the key Regional Rail Link project slows down. However, the commencement of the Melbourne Rail Link in 2015/16 will see a strong upswing in rail construction, which will sustain through most of the decade. As a result, we expected to see annual activity average \$1.1 billion over the next five years, before rising to \$1.7 billion per annum over the five years to 2023/24.

Electricity-related engineering construction rose by a quarter in 2012/13 to a record high of \$2.6 billion, reflecting three-fold growth over the previous six years. This has been the result of generally increasing transmission and distribution work and additions to capacity, as well as a focus on renewable energy, most particularly, wind farms. However, with the current round of investment almost at an end, activity fell slightly over 2013/14, and further, more significant declines are likely over the next few years.

Chart 4.3: Utilities and Transport Engineering Construction – Victoria
Value of Work Done, 2011/12 Prices



Government legislation has shackled Victoria’s wind-farm industry in recent years, but the industry had a victory in February when the National Health and Medical Research Council found that there was no reliable evidence that wind farms cause direct health impacts. This could have opened up a more positive outlook for future activity. However, the federal Coalition government is less in favour of renewable energy, and has already removed several subsidies and targets. This has made some projects untenable, and has left question marks over several

others. Due to uncertainty surrounding renewables, as well as the end of the current round of investment, we are forecasting annual average activity of \$1.4 billion over the five years to 2018/19, well down on the \$2.1 billion from the previous five-year period.

As previously mentioned, water-related activity has plummeted upon completion of the Wonthaggi Desalination plant, and activity is likely to bump around presently low levels over the next five years. Stage 2 of the Goulbourn-Murray Water Connections Project, worth around \$1.2 billion, will be the main driver of activity over the next five years.

Overall, utilities and transport engineering construction is forecast to average \$10.3 billion per annum over the next five years, slightly above the \$9.8 billion experienced over the previous five years, thanks mostly to the road and rail sectors. Activity is expected to remain elevated around these levels over the following five years to 2023/24, supported by relatively stable levels of activity across all major sectors.

4.3.4 Mining and heavy industry construction

Following a 71 per cent surge in 2011/12, mining and heavy industry construction in Victoria fell a cumulative 42 per cent over the two years to 2013/14, to \$860 million of work done. The oil and gas subsector continued to dominate activity, driven by two key projects, the Kipper Gas Field and Turrum Gas Field developments, both of which have seen significant cost escalations in recent years. This upward shift in project value has stemmed from increased wages, design and timeline changes, and costly clean ups following mercury contamination.

With engineering construction on Stage 1 of the Kipper project and the Turrum project now complete, we had thought a gap in major projects was on the cards. However, the earlier than anticipated start of the \$1 billion redevelopment of the Longford Gas Conditioning Plant is now expected to sustain oil and gas work done at current or slightly higher levels over the next three years. This will ensure the oil and gas subsector remains dominant for some time to come.

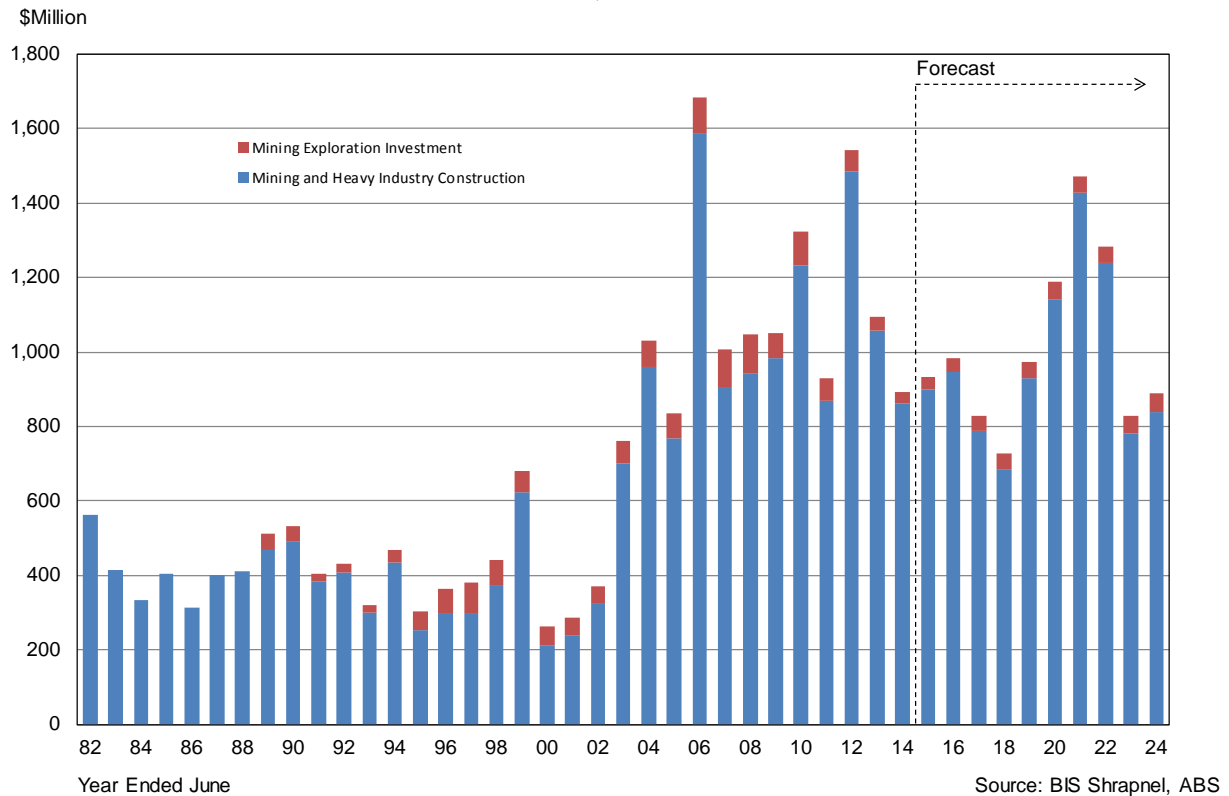
A slight step up in total work done is expected over the next two years, as the Longford Gas Conditioning Plant ramps up, but work done will then decline from 2016/17 as this project moves towards completion without being replaced by projects of similar size. Overall, annual average work done over the five years to 2018/19 is likely to be around 30 per cent lower than the previous five-year period.

The \$1 billion Longford Gas Conditioning Plant development will be a key driver of activity through the middle years of this decade, with support from the Kipper Mercury Handling Facility from 2014/15. Also on the cards for this period is the \$518 million Donald Mineral Sands project. This project has been put off from year to year, but we now expect construction to commence in 2015/16 and run for three years. However, the recent weakness in mineral sands prices continues to create uncertainty, and this project would benefit greatly from a lower dollar to make it more cost-effective. Therefore, there is potential downside to our outlook for other minerals activity, particularly with gold exploration falling and the peak in gold prices past.

Stage 2 of the Kipper Gas Field development will be the key driver of mining and heavy industry work done through the five years to 2022/23. In total, average annual activity is forecast to recover over this period — compared with the corresponding five-year period to 2017/18 — to historically high levels.

Currently, Victoria's electricity is primarily generated by brown coal, but the push for cleaner energy is making coal-powered electricity generation less and less appealing. With numerous wind farms under construction, and even more in the planning stage, and with solar projects starting to gain traction, investment in coal is likely to fall in the future. However, the current government's aversion to clean energy could delay this trend.

Chart 4.4: Mining and Heavy Industry Construction Work Done and Mining Exploration Investment – Victoria, constant 2011/12 Prices



4.3.5 Total construction

Chart 4.5: Total Construction by Category – Victoria Value of Work Done, 2011/12 Prices

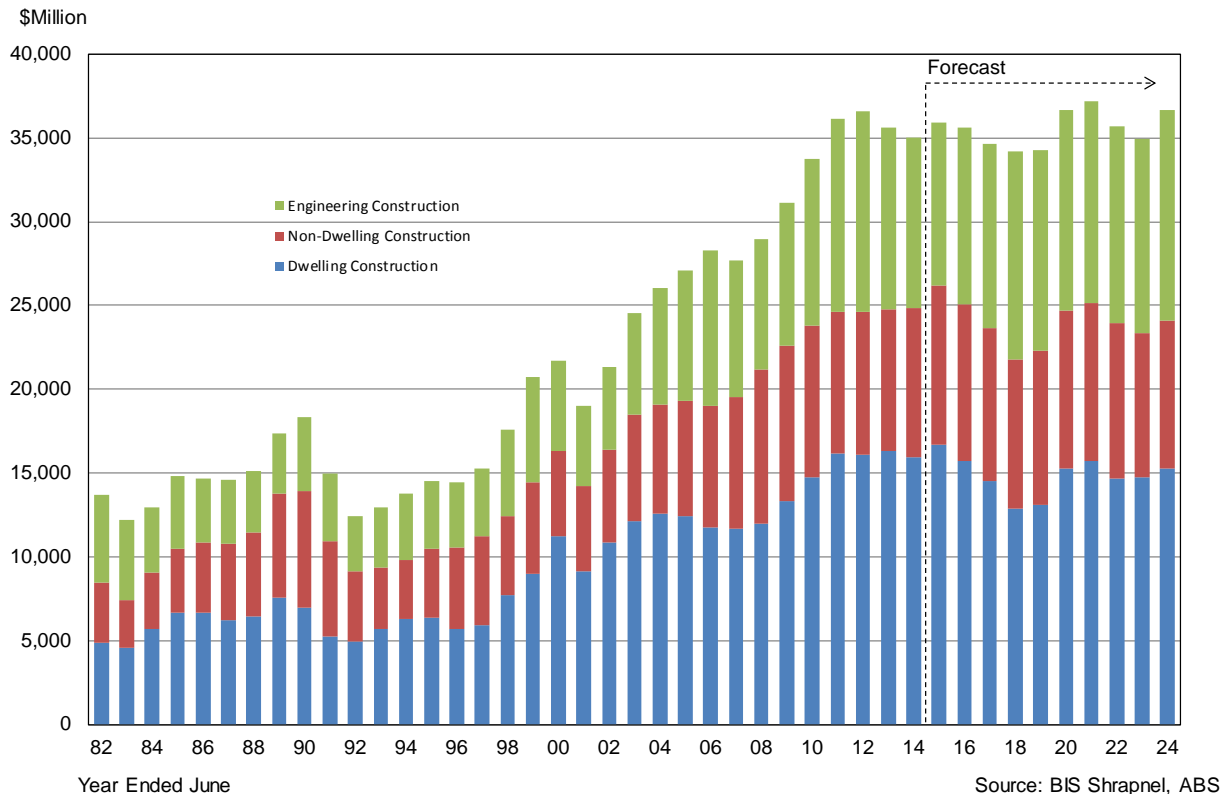


Chart 4.6: Forecasts for Demand for Cadastral Surveyors and Total Surveyors – Victoria

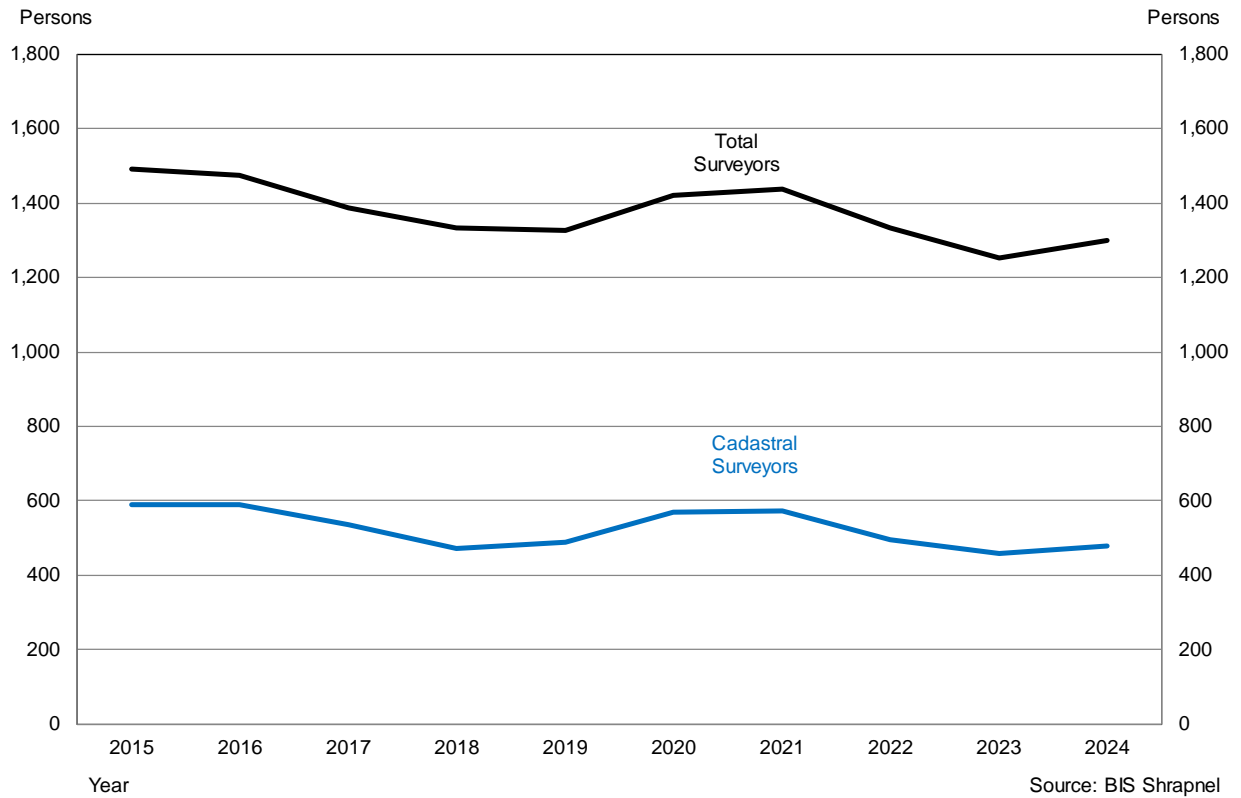
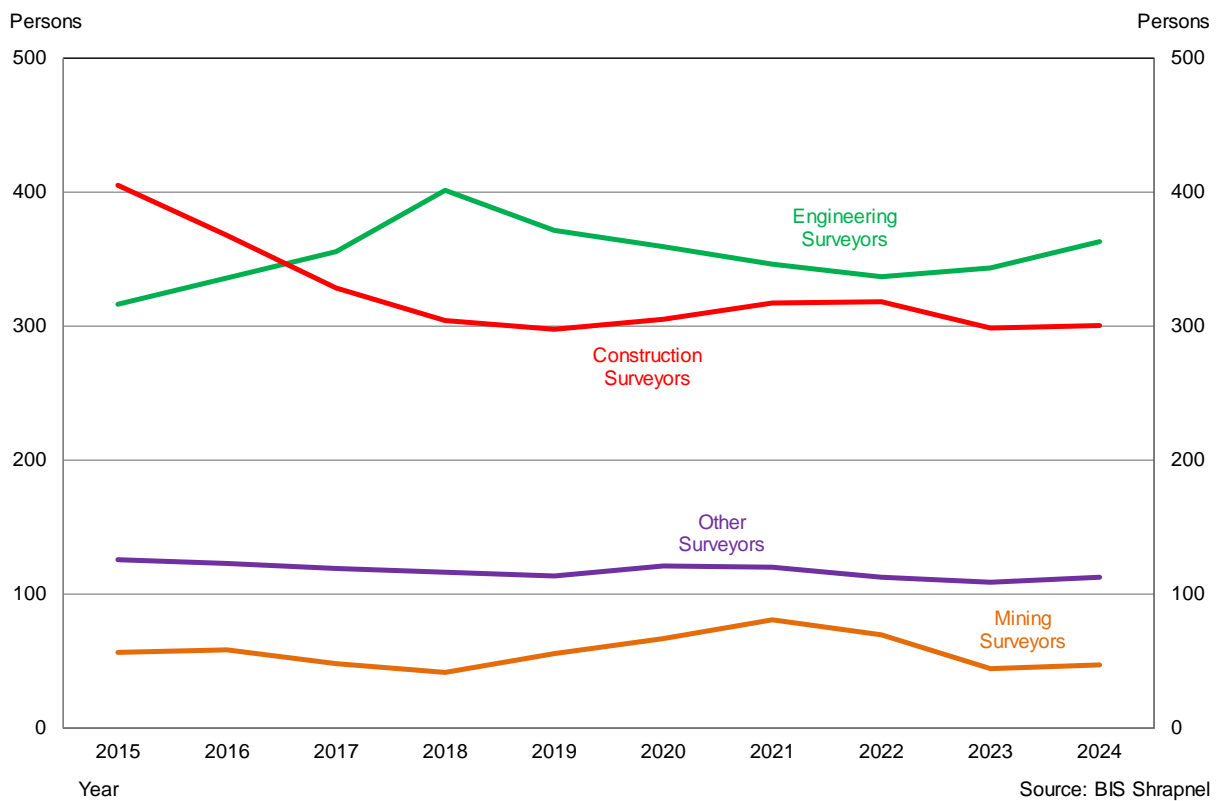


Chart 4.7: Forecasts for Demand for Surveyors by area of Specialisation– Victoria



Beyond a peak in 2014/15, the outlook for total construction in Victoria at first appears to be weak, with declines expected over the following four years to 2018/19. However, these declines are only mild, meaning that activity will actually remain around historically high levels. Construction is forecast to average \$35.2 billion over the next five years, down only marginally from \$35.4 billion per annum over the previous five years.

But within this picture of stability, there are diverging trends by sector. Residential building is expected to fall heavily over the next five years as the current boom period reaches an end, but will be offset by rising engineering construction, led by projects such as the East-West Link.

4.4 Forecasts of skilled labour demand

Our outlook for the key determinants of labour demand generally translates into decreasing demand for skilled labour over the forecast period. Demand is likely to be particularly stable over the next two years as all drivers cycle around their current levels, but weaker levels of construction in the period ahead will hinder demand for skilled labour.

As shown in table 4.1 (which is based on a productivity growth of 1.5 per cent per annum), total skilled labour demand is expected to remain around 2,600 persons through to 2015/16, before declining through to the end of the decade as dwelling construction in particular retreats from its current record levels. A brief respite for the dwelling sector at the turn of the decade will see labour demand rise once more, before resuming the downward trend through to 2023/24. Overall, we expect labour demand will reach a low of 2,251 persons by 2022/23.

4.5 Workforce attrition and workforce gap

The total skilled workforce requirement to meet future construction activity is inevitably higher than the labour demand generated by the model given attrition of the existing workforce 'base', primarily through retirement and death (but also through people leaving the workforce for other reasons).

Given the estimated age profile of the Victorian surveying workforce — and the assumed likelihood of retirement and death in each age group — we estimate that the current workforce will shrink by around 23 per cent over the next ten years which is similar to the national rate of attrition. The difference between the (declining) existing workforce and total labour demand is the workforce gap.

For Victoria, our expectation is for total skilled labour workforce gap to remain positive (i.e. in a deficit position) over the entire forecast period. Given the relatively soft outlook for construction and labour demand, the primary driver of this workforce gap is the ongoing attrition of the existing workforce. However, there are significant differences in the outlook across the surveying and geospatial sub-sectors.

Cadastral surveyors will be in shortage throughout the majority of the forecast period (excluding only 2017/18) despite a soft demand outlook, as the rate of natural attrition causes the workforce to deplete faster than demand. On the other hand, construction surveyors are forecast to have a negative workforce gap (ie surplus of skilled labour) from 2015/16 and beyond. To begin with, this will be due to construction of other dwellings moving off its current record levels, before non-dwelling construction enters an extended period of weakness. Over the nine years to 2023/24, there is expected to be an average excess of 57 construction surveyors.

The spatial scientists, technicians, and 'other' professionals sub-sectors will all remain only mildly in deficit over the next five years as demand slows down largely in line with workforce attrition, before the attrition effect takes over through latter years, causing a rising workforce gap.

The labour demand, labour supply and workforce gap for the surveying and geospatial workforce is presented in table 4.1, and charts 4.8 to 4.13.

Table 4.1: Forecasts of Demand for Surveying and Surveying-Related Professionals and Workforce Gap – Victoria*(Baseline Scenario based on 1.5% labour productivity growth, forecasts as at June)*

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Labour Demand by Specialist Occupation | Estimate | Forecasts | | | | | | | | | |
| Cadastral | 558 | 589 | 589 | 537 | 470 | 489 | 571 | 573 | 495 | 460 | 478 |
| Construction | 393 | 400 | 372 | 333 | 304 | 298 | 305 | 317 | 318 | 298 | 300 |
| Engineering | 338 | 316 | 336 | 355 | 401 | 371 | 359 | 346 | 337 | 343 | 363 |
| Mining | 54 | 56 | 58 | 48 | 42 | 55 | 66 | 81 | 69 | 44 | 47 |
| Other Surveyors | 125 | 125 | 123 | 119 | 116 | 113 | 120 | 120 | 113 | 109 | 112 |
| All Surveyors | 1,468 | 1,486 | 1,478 | 1,391 | 1,334 | 1,326 | 1,422 | 1,437 | 1,332 | 1,254 | 1,300 |
| <i>Licensed Surveyors*</i> | 417 | 424 | 424 | 376 | 329 | 342 | 400 | 401 | 347 | 322 | 334 |
| Total Spatial Scientists | 658 | 662 | 650 | 627 | 613 | 598 | 637 | 636 | 595 | 574 | 593 |
| Total Technicians | 215 | 216 | 212 | 205 | 200 | 195 | 208 | 208 | 194 | 188 | 194 |
| Total 'Other' Professionals | 270 | 271 | 266 | 257 | 251 | 245 | 261 | 260 | 244 | 235 | 243 |
| Total Skilled Labour Demand | 2,611 | 2,635 | 2,607 | 2,480 | 2,398 | 2,365 | 2,528 | 2,541 | 2,365 | 2,251 | 2,330 |
| Existing Workforce (a) | | | | | | | | | | | |
| Cadastral Surveyors | 558 | 538 | 519 | 500 | 481 | 461 | 443 | 425 | 406 | 388 | 369 |
| Construction Surveyors | 393 | 390 | 387 | 384 | 381 | 378 | 374 | 369 | 364 | 359 | 355 |
| Engineering Surveyors | 338 | 332 | 325 | 318 | 312 | 305 | 297 | 289 | 281 | 273 | 265 |
| Mining Surveyors | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 45 | 44 | 43 |
| Other' Surveyors | 125 | 123 | 121 | 119 | 117 | 115 | 112 | 110 | 107 | 104 | 102 |
| All Surveyors | 1,468 | 1,436 | 1,405 | 1,373 | 1,341 | 1,309 | 1,274 | 1,239 | 1,204 | 1,169 | 1,134 |
| <i>Licensed Surveyors*</i> | 417 | 399 | 380 | 362 | 343 | 325 | 309 | 293 | 277 | 261 | 245 |
| Spatial Scientists | 658 | 644 | 629 | 614 | 599 | 584 | 567 | 549 | 532 | 515 | 497 |
| All technicians | 215 | 211 | 208 | 204 | 200 | 196 | 191 | 186 | 181 | 177 | 172 |
| 'Other' Professionals | 270 | 265 | 260 | 255 | 249 | 244 | 237 | 230 | 223 | 216 | 209 |
| Total skilled labour | 2,611 | 2,556 | 2,500 | 2,445 | 2,389 | 2,333 | 2,269 | 2,205 | 2,141 | 2,077 | 2,013 |
| Workforce Gap | | | | | | | | | | | |
| Cadastral Surveyors | - | 50 | 70 | 37 | (10) | 27 | 128 | 148 | 89 | 72 | 108 |
| Construction Surveyors | - | 10 | (15) | (52) | (77) | (80) | (68) | (52) | (46) | (61) | (55) |
| Engineering Surveyors | - | (16) | 11 | 37 | 90 | 66 | 62 | 57 | 55 | 70 | 98 |
| Mining Surveyors | - | 3 | 6 | (3) | (8) | 6 | 18 | 34 | 24 | 0 | 4 |
| Other' Surveyors | - | 2 | 2 | (0) | (1) | (2) | 8 | 11 | 5 | 4 | 10 |
| All Surveyors | - | 49 | 74 | 18 | (7) | 17 | 149 | 198 | 128 | 85 | 166 |
| <i>Licensed Surveyors*</i> | - | 25 | 44 | 14 | (14) | 17 | 91 | 108 | 70 | 61 | 90 |
| Spatial Scientists | - | 18 | 21 | 13 | 14 | 14 | 70 | 87 | 63 | 60 | 96 |
| All technicians | - | 5 | 5 | 1 | 1 | (0) | 17 | 22 | 13 | 11 | 22 |
| 'Other' Professionals | - | 6 | 6 | 2 | 2 | 1 | 23 | 30 | 20 | 19 | 33 |
| Total skilled labour | - | 79 | 106 | 35 | 9 | 32 | 259 | 337 | 224 | 174 | 317 |

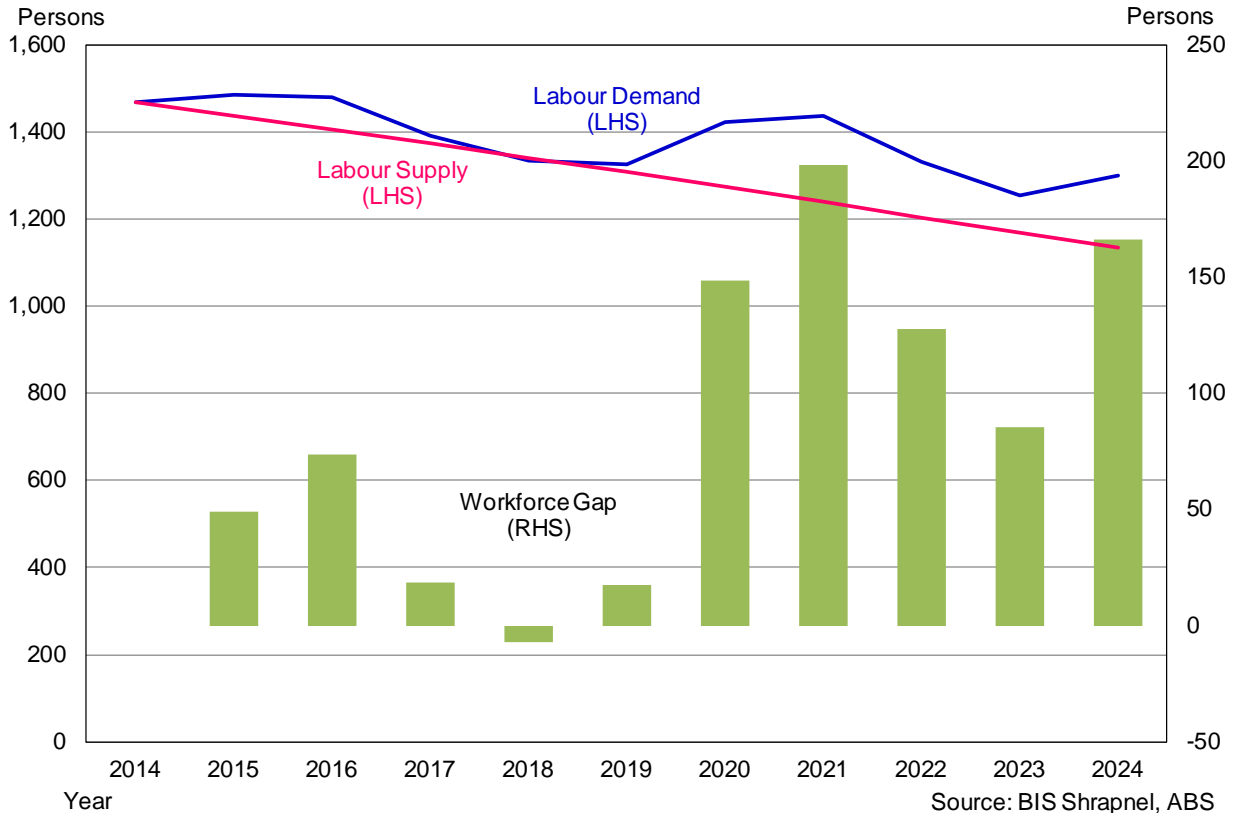
(a) Existing workforce is generated by adjusting the size of the current skilled workforce for natural attrition rates such as retirements and death. Source: BIS Shrapnel, ABS

(b) Workforce gap is calculated as labour demand less existing workforce. A positive number implies a shortage of labour

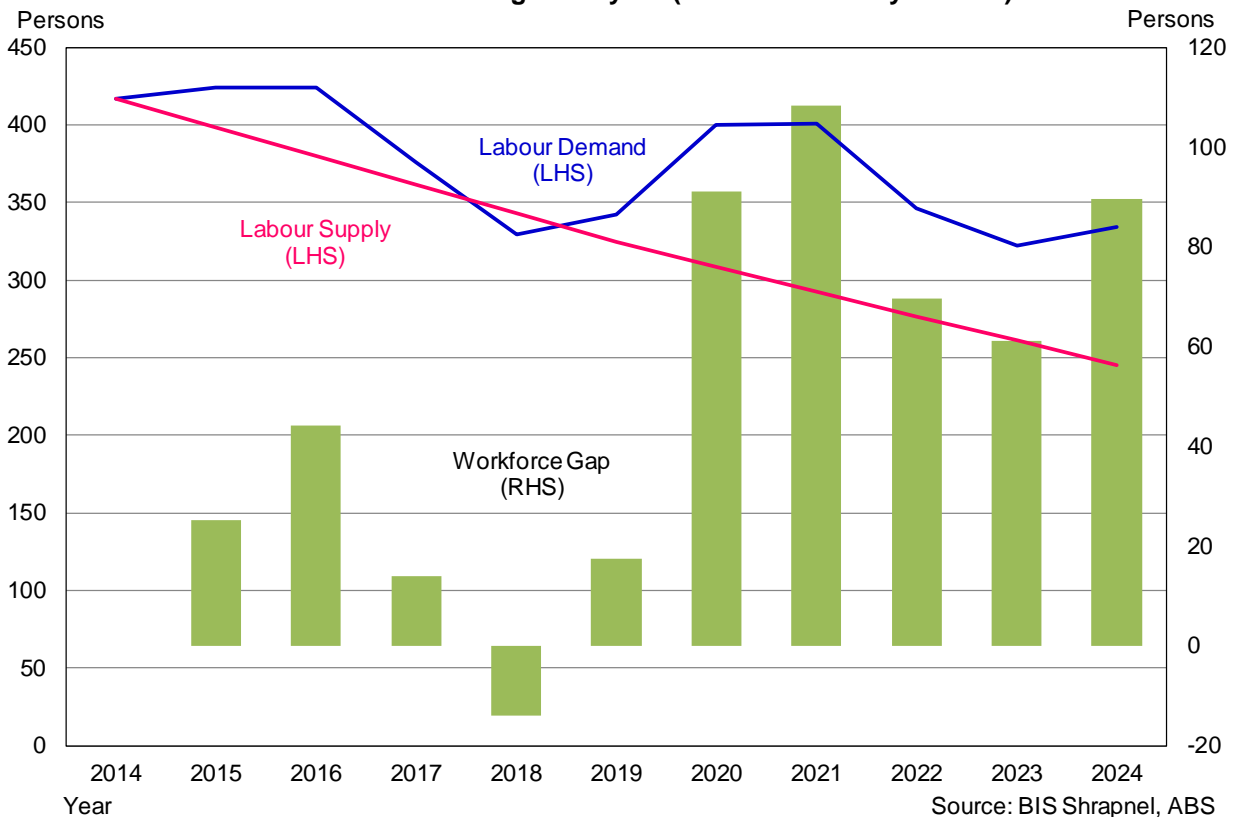
Numbers in brackets imply an excess supply as new supply exceeds the forecast workforce gap.

* Excludes non-practicing surveyors

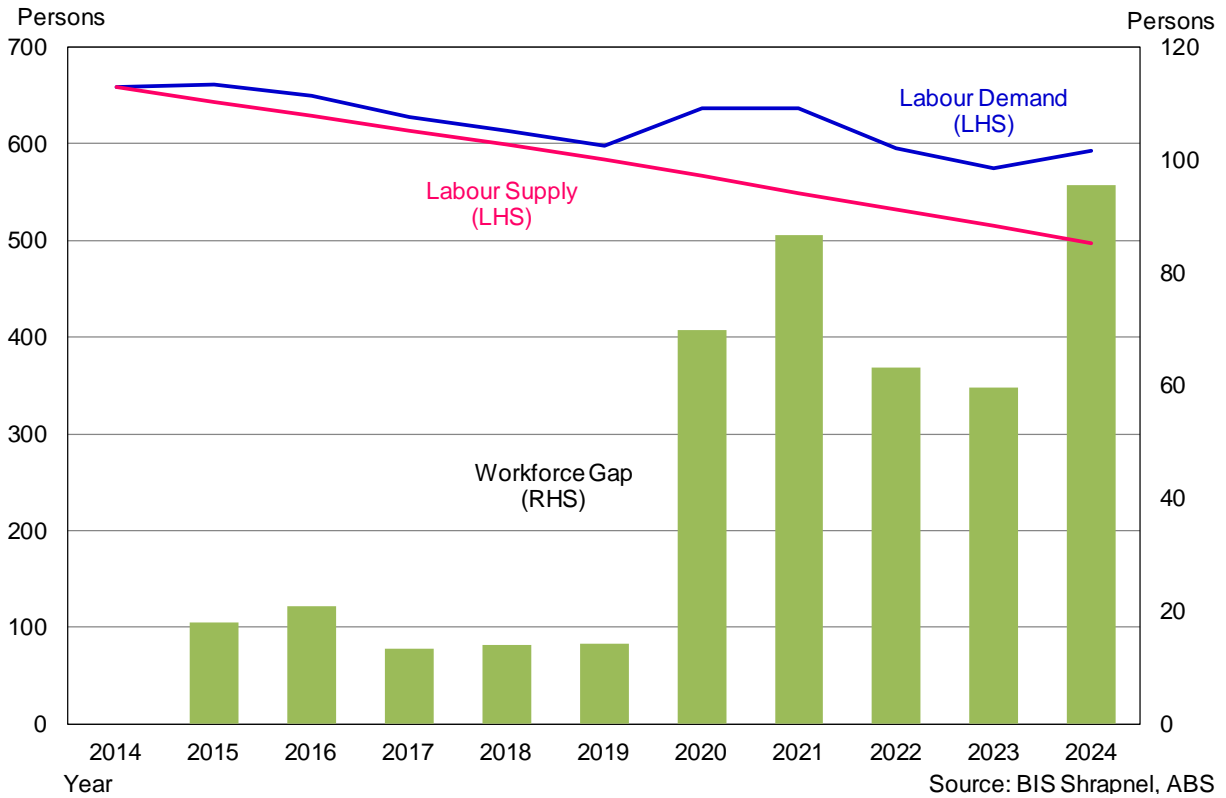
**Chart 4.8: Victoria
Total Surveyors (1.5% Productivity Growth)**



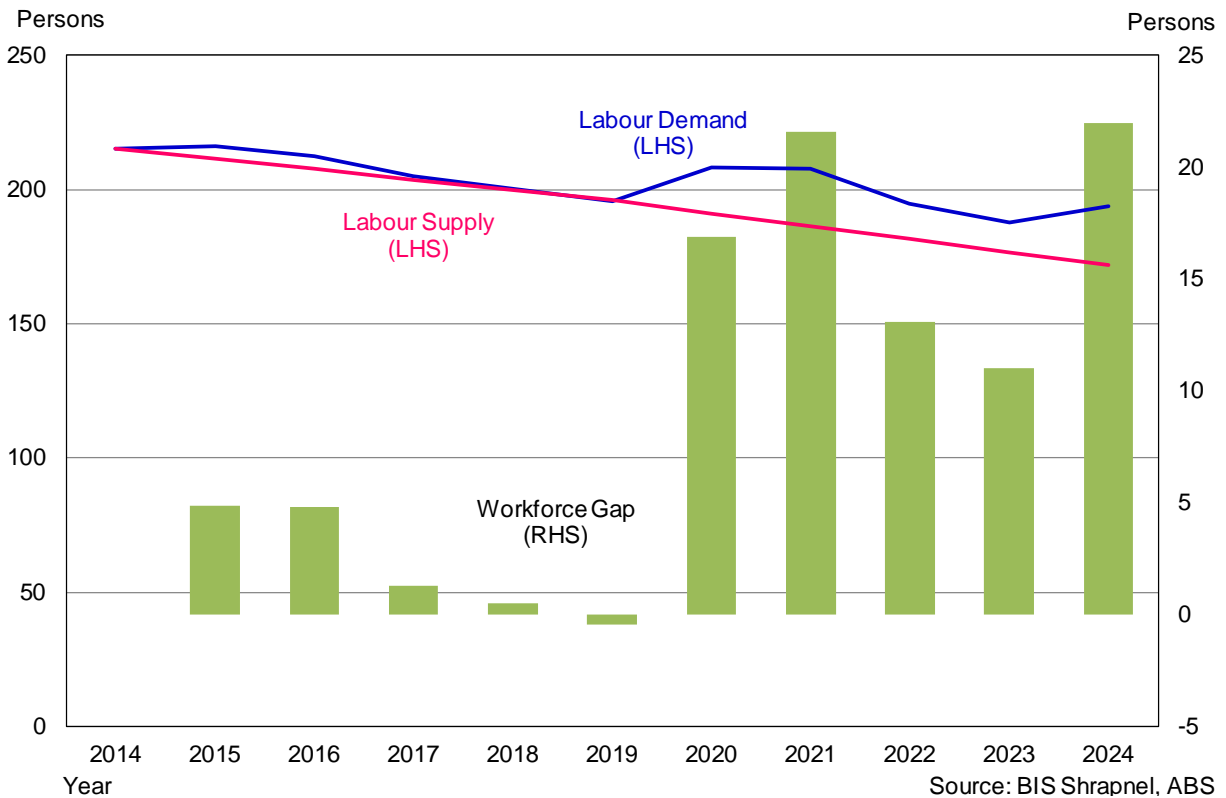
**Chart 4.9: Victoria
Licensed and Practising Surveyors (1.5% Productivity Growth)**



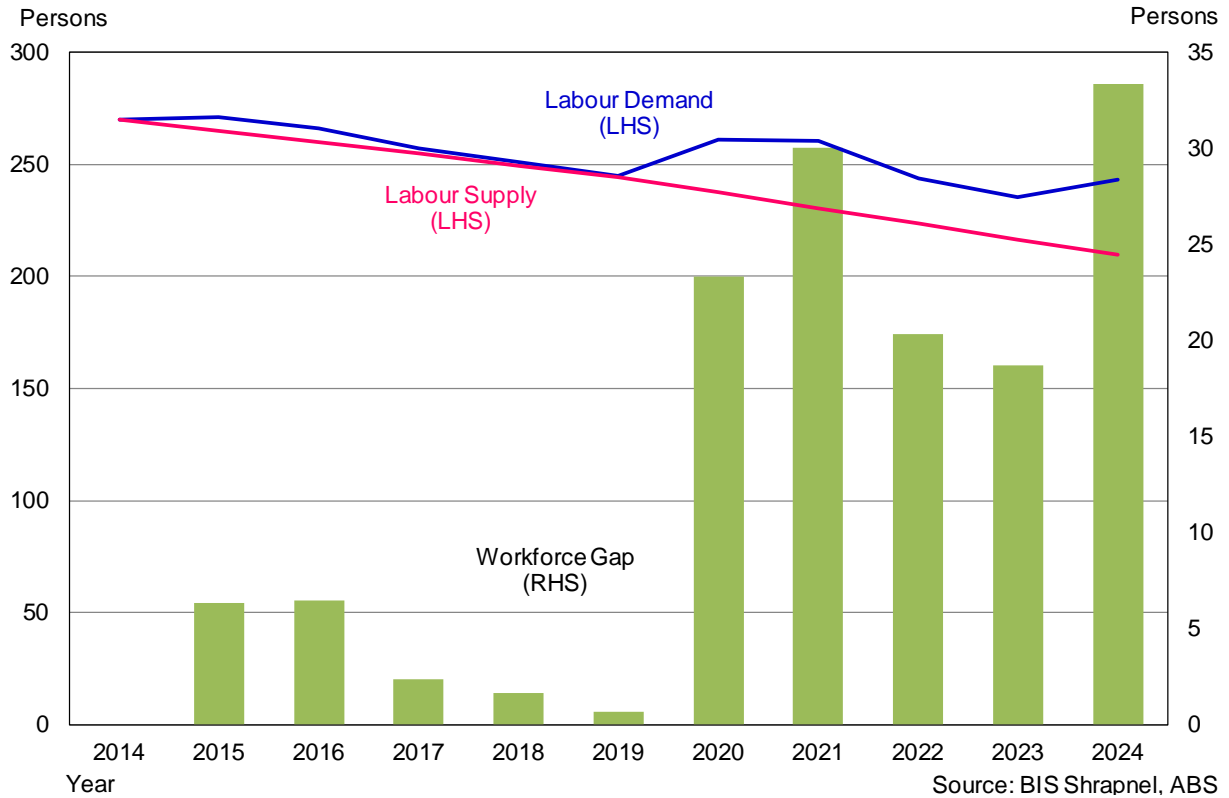
**Chart 4.10: Victoria
Spatial Scientists (1.5% Productivity Growth)**



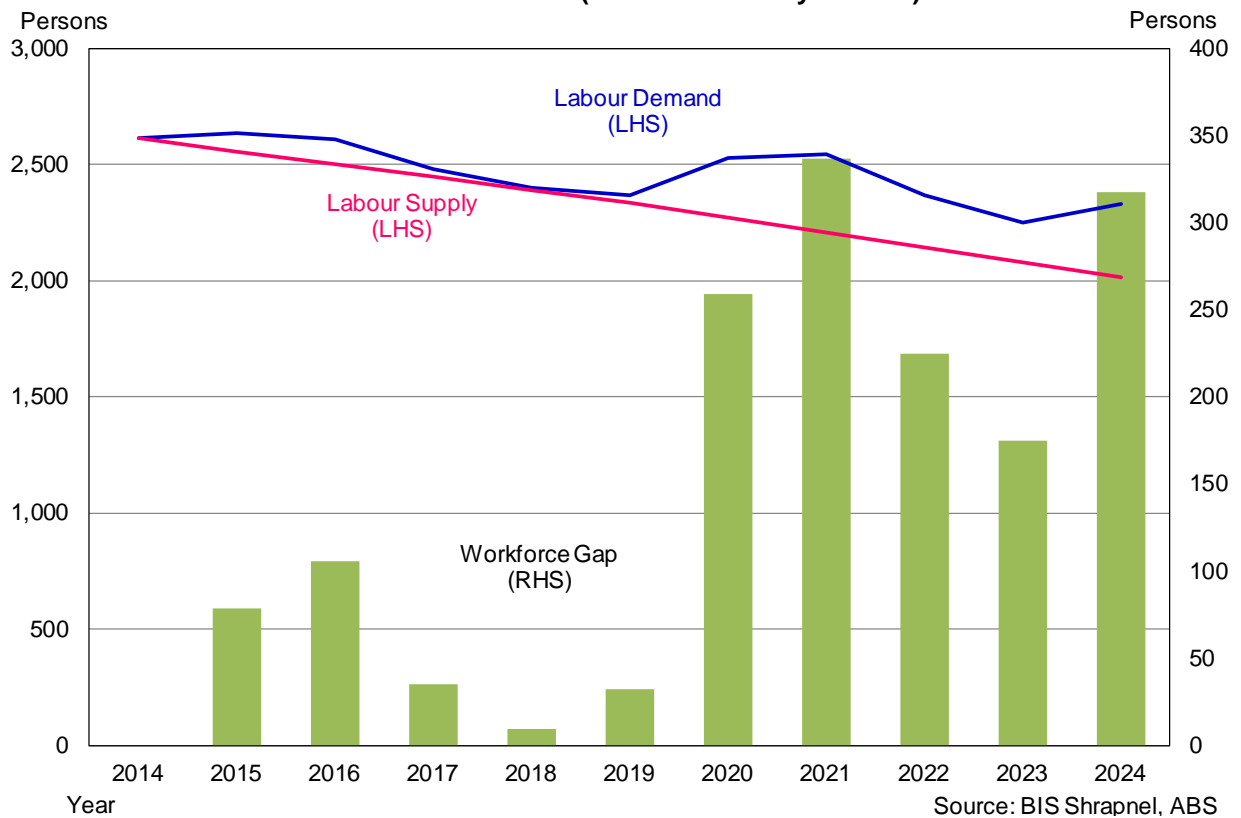
**Chart 4.11: Victoria
Technicians (1.5% Productivity Growth)**



**Chart 4.12: Victoria
‘Other’ Professionals (1.5% Productivity Growth)**



**Chart 4.13: Victoria
Total Skilled Labour (1.5% Productivity Growth)**



CHAPTER FIVE

Forecasts of Labour Demand and Workforce Gap for South Australia

5. FORECASTS OF LABOUR DEMAND AND WORKFORCE GAP FOR SOUTH AUSTRALIA

5.1 The South Australia economy

If anything, our pessimistic outlook for the South Australian economy over the next few years has only become more dismal. The lack of growth drivers continued to weigh on the economy through 2013/14, with State Final Demand (SFD is a measure of demand for goods and services within the state economy) rising by just 1.0 per cent over the year, following largely flat growth the previous year. The pervasive nature of the current economic weakness will have long-term ramifications for the state. Not enough jobs are being created to employ school- and university-leavers, prompting a population exodus from the state.

South Australia is one of the states which have paid the highest price for Australia's mining boom, while seeing disproportionately low returns. Although there have been benefits from investment in oil and gas and other minerals, with Carrapateena and the Olympic Dam expansion still to come, the overall effect has been negative. The strength of the Australian dollar has undercut some of the state's key trade-exposed industries, particularly manufacturing, agriculture, education and tourism, which is weighing on employment and output.

Manufacturing jobs are set to tumble over the next five years. The withdrawal of Holden's manufacturing operations and the negative spill-over effects on parts and related manufacturing will have the most significant impact, but we are also seeing ongoing closures of domestic manufacturing facilities by other big employers in food and beverage and machinery and equipment manufacturing.

The prospect of some of the layoffs from the car and parts manufacturing sector being absorbed by defence projects, specifically the submarine contract, seems to have been extinguished. The Coalition has signalled its intent to have the submarines manufactured in Japan instead, citing domestic cost and productivity concerns.

The closure of Holden's Elizabeth manufacturing plant comes as yet another blow to one of South Australia's key industries and will likely leave many people jobless. The state's unemployment rate averaged 6.7 per cent over 2013/14, second only to Tasmania. Through-the-year to June 2014, there was zero employment growth.

The fragile labour market has been a key reason behind the stagnant growth in Private Consumption Expenditure (PCE measures household spending on goods and services) over the past three years, which has averaged just 0.8 per cent. This is well below the 20-year average of 2.9 per cent. Although we should see some improvement over the next few years, supported by low interest rates, we expect growth will continue to flounder below the long-term average. Retail turnover growth of 1.4 per cent in 2013/14 was an improvement on the flat-to-negative growth of the previous four years, but this is likely to be at least partly driven by pent-up demand.

Adding to the state's woes, construction is estimated to have detracted from South Australian Gross State Product (GSP is different to SFD as it includes international and interstate trade, and changes in inventories) growth in 2013/14. Engineering construction embarked on an expected three year decline, following its peak in 2012/13. Non-dwelling construction is also estimated to have fallen as major projects wind down without similarly-sized projects coming through to fill the hole.

Dwelling activity has been the redeemer, with strong increases in investment recorded across houses, other dwellings, and alterations and additions in 2013/14 (although it should be noted that this follows significant drops in activity over the preceding two years). However, in the

absence of any significant stock shortage, and with population growth expected to remain sluggish, this rebound in residential activity is likely to be short-lived. Post-2014/15, we are forecasting another period of contraction in dwelling investment.

The next few years might not be dissimilar to the early-1990s and early-2000s, during which total construction activity saw considerable falls, undermining overall economic growth. In terms of non-dwelling building, construction on the Adelaide Oval Upgrade has been completed, while the New Royal Adelaide Hospital and the Adelaide Convention Centre Redevelopment are also approaching completion. This will leave a gap in major non-dwelling projects, with the Skycity Casino Expansion and the Adelaide Courts Precinct Redevelopment, both scheduled to commence in 2015/16, not being enough to fill the hole. Engineering construction is also set to fall for another two years at least. Public sector activity is forecast to fall steeply in 2014/15, to its lowest level since 2007/08, and languish around this base for the following two years, given the state government's adverse financial position.

South Australia's hope now is that non-mining business investment will benefit from the forecast depreciation of the Australian dollar. The question is, though, how big of an impact will this have? The state's outlook depends quite heavily on how industry responds to a weaker dollar; there are very few other growth drivers to speak of. The Olympic Dam expansion should provide a boost late-decade, but there is a dearth of other major projects on the horizon.

Even if a weaker Australian dollar does spur significant increases in non-mining business investment and overall economic growth, they will be building on a very weak base. In all, we are forecasting feeble SFD growth in 2014/15, before some improvement from the following year, although this will be far from impressive.

5.2 Estimate of the surveying and geospatial workforce

Consistent with the other major states, surveyors comprise the majority of the skilled surveying and geospatial workforce, at 56 per cent. This is followed by spatial scientists and surveying and spatial science technicians making up 25 and 8 per cent respectively. We estimate that 44 per cent of all surveyors in South Australia are cadastral, followed by engineering surveyors (21 per cent), construction surveyors (16 per cent), mining surveyors (15 per cent) and other surveyors (4 per cent). Further, our estimates suggest that around 1 third of all surveyors in South Australia are licensed (see table 5.1 on page 90).

5.3 Outlook for key determinants of skilled labour demand

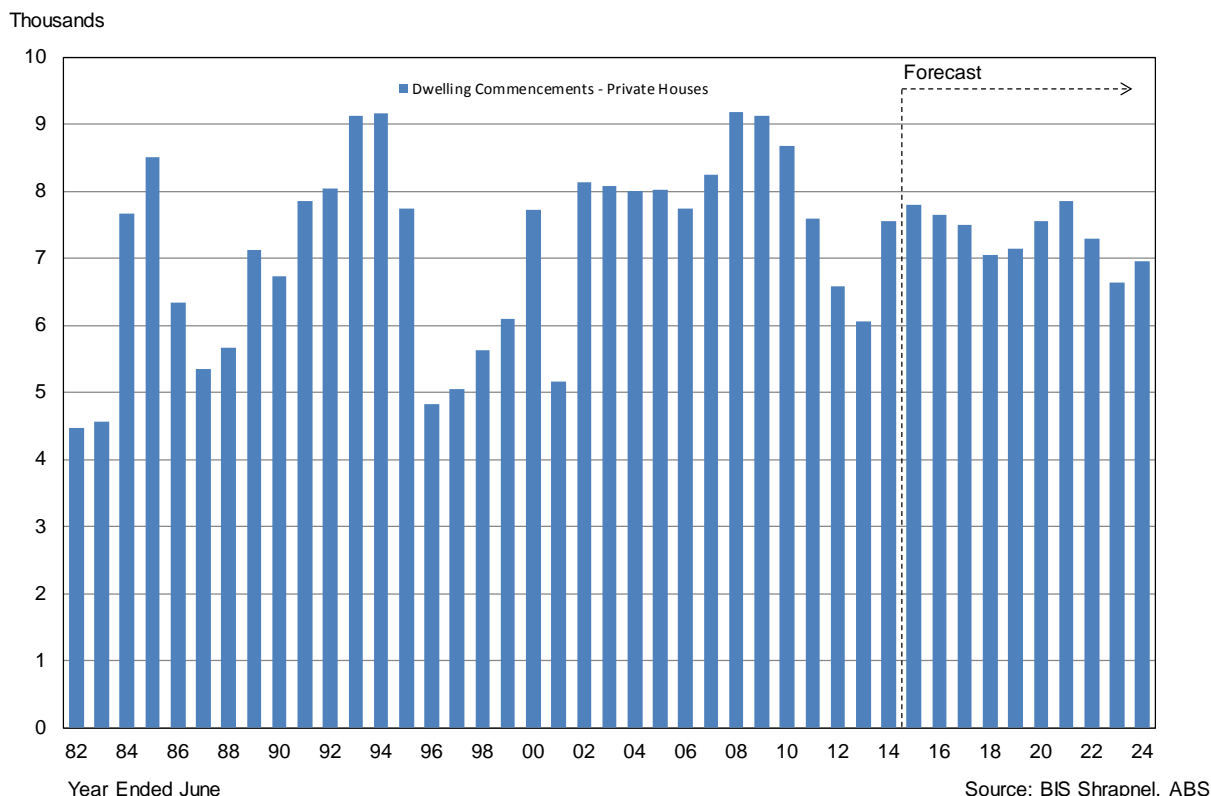
5.3.1 New private housing commencements

Housing commencements in South Australia peaked at 9,200 in 2007/08, but then entered free-fall to a trough of just 6,000 in 2012/13. However, strong growth occurred in 2013/14, with commencements up 25 per cent. Activity is forecast to remain around this level over the next five years, with the 2012/13 level thought to be unsustainably low.

However, we do not see much upside to the South Australia outlook. Population growth in South Australia has slowed in recent years and our estimates suggest that some looseness has emerged in key property markets. Across the state a dwelling oversupply of approximately 1,500 dwellings is estimated to have existed at June 2014, which is limiting price growth and the demand for new dwellings

Overall, construction of new private houses is forecast to average 7,400 over the next five years, which is actually above the 7,300 per annum of the past five years. However, this only reinforces how weak the past few years have been, rather than reflecting an outlook of growth for South Australia.

Chart 5.1: Number of Dwellings Commenced Private Houses – South Australia



5.3.2 Private multi-residential construction and non-dwelling building construction

Private multi-residential construction

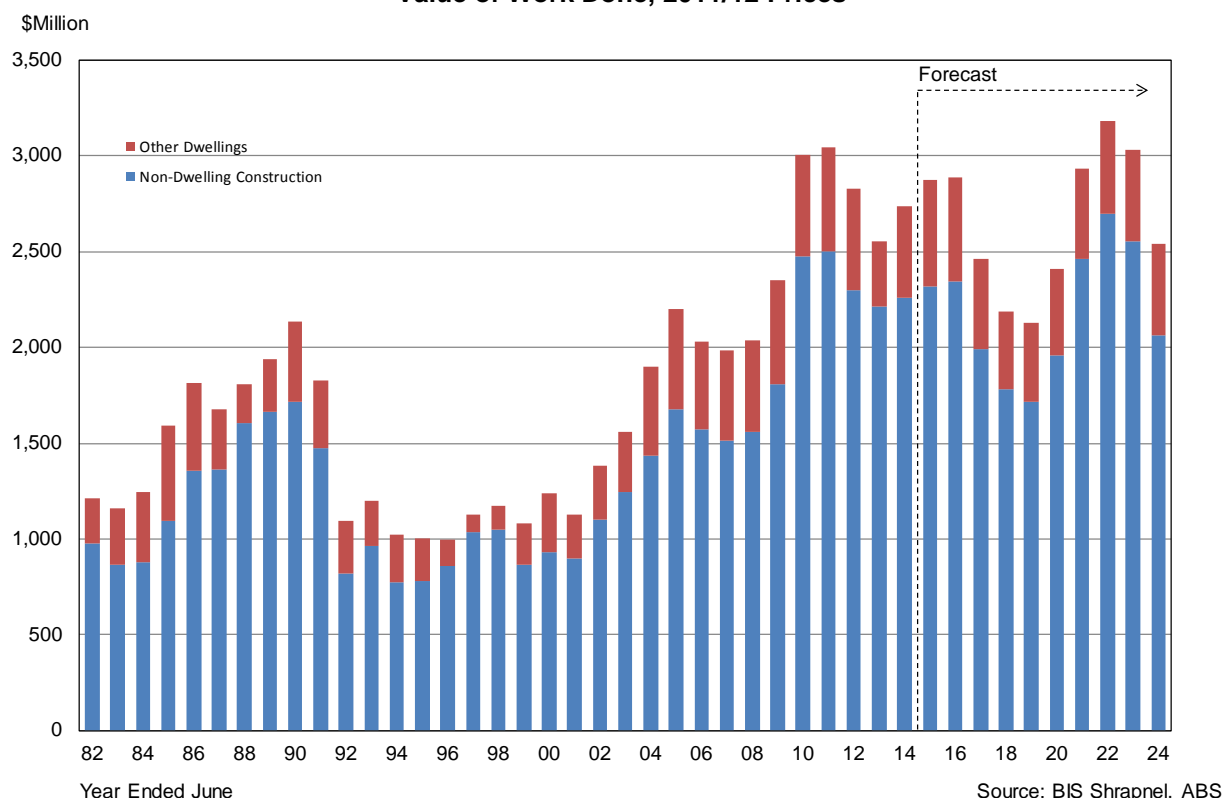
The weakness in the South Australian housing market has also been seen across the multi-residential sector. Although recovering somewhat in 2013/14, work done remained 12 per cent lower than the peak from three years earlier. We believe a brief recovery is likely over the next two years, but this will not be sustained, and annual average activity will be lower over the next five years compared to the previous five.

Non-dwelling building construction

Total non-residential construction peaked in South Australia in 2011/12 at \$2.5 billion, but has since shed 10 per cent as stimulus work has retreated. An extended period of weakness is expected, with activity steadily falling to just \$1.7 billion by 2018/19, which would be the lowest annual level of work done since 2007/08.

The entirety of this weakness is due to the social and institutional sectors. Health work is set to plummet by around 75 per cent between 2014/15 and 2018/19 as the new Royal Adelaide Hospital reaches completion, while the education sector will also soften as stimulus work winds down. Despite commercial and industrial work rising through this period (supported by improving economic conditions), the overall outlook is one of weakness for South Australia.

**Chart 5.2: Other residential buildings and non-dwelling building– South Australia
Value of Work Done, 2011/12 Prices**



5.3.3 Utilities and transport engineering construction

After peaking in 2012/13, utilities and transport engineering construction in South Australia fell by nearly 20 per cent in 2013/14, to \$3.9 billion. This weakness was spread across most major sectors, including roads, rail, and electricity. Further declines are likely over the next three years, as water, sewerage and electricity construction remains weak, before embarking on a solid recovery through to the end of the decade.

Road construction is set for a relatively weak period over the next three years, before rising strongly through to a record \$1.3 billion in 2018/19. This will be driven by work on urban roads, including the North-South Corridor, and the Northern Connector.

The **electricity** generation, transmission and supply sector has been a key driver of growth in engineering construction work in South Australia over the last five years. However, work done fell by 27 per cent in 2013/14, to \$759 million, down from the 2012/13 peak of over \$1 billion. Activity will remain elevated in comparison to historical levels, supported by transmission and distribution works. Wind farm projects drove strong activity in recent years however with the change in government incentives and review of carbon credits and renewable energy targets causing investment uncertainty, we expect to see a retreat in the number of projects of which proceed. There are a large number of projects in the pipeline that are at the planning stage. We have identified Lincoln Gap, Stony Gap, Willogoleche Hill as the most likely.

Over the longer term, there will be a requirement for investment in new base-load capacity in South Australia to meet growing demand for electricity. The volume of committed wind farms to proceed over the next few years will be insufficient to satisfy the energy demands of a (slow) growing population, as well as the upcoming heavy industry projects.

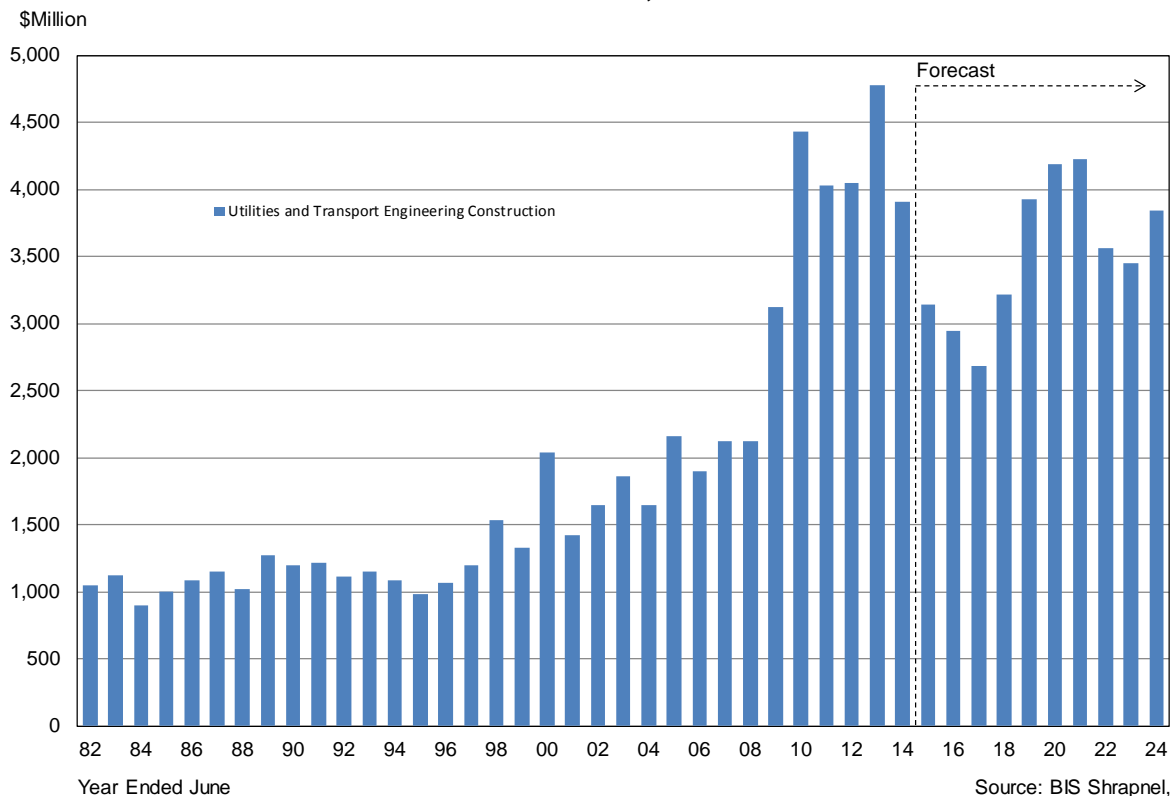
Railway construction activity has been a large driver of engineering construction activity over the past few years especially within the public sector. This has seen the value of work done rise from \$69 million in 2008/09 to peak at \$626 million in 2012/13 with the modernisation and construction of the Gawler Line as well as the electrification of the Noarlunga line. However, we are now seeing a significant gap between projects, with activity expected to fall to just \$93 million in 2014/15.

Water and sewerage engineering activity is continuing to fall back in the wake of the completion of the Adelaide desalination plant and the North-South Interconnection System. From over \$1 billion in 2009/10, activity in the water sector slipped to just \$384 million in 2013/14, while the sewerage sector remained around \$250 million for the fifth year in succession.

Activity across both sectors will be generally softer over the next five years due to the lack of related infrastructure projects that are set to occur, and a generally lower plane of residential activity. This will pick up in later years as mineral projects come on line and there is a stronger need for water supply and sewerage infrastructure projects.

Overall, utilities and transport construction is forecast to average \$3.2 billion per annum over the next five years, down from \$4.2 billion over the previous five years. However, beyond the trough of 2016/17, activity will rebound through the remainder of the decade, and drive stronger levels of activity over the five years to 2023/24.

**Chart 5.3: Utilities and Transport Engineering Construction – South Australia
Value of Work Done, 2011/12 Prices**



Source: BIS Shrapnel, ABS

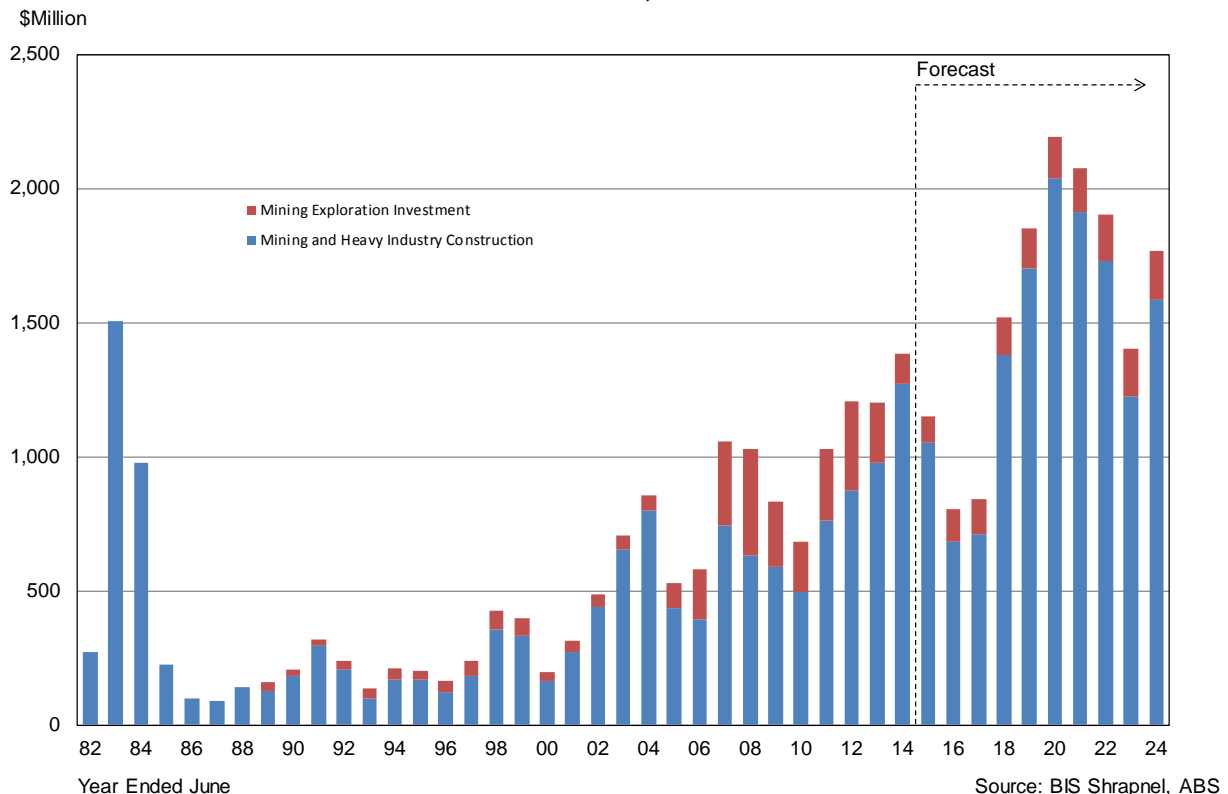
5.3.4 Mining and heavy industry construction

The mining and heavy industry construction sector will still play a significant role in the South Australian economy despite BHP Billiton’s decision to delay the Olympic Dam project. Despite this delay, construction activity lifted to \$1.3 billion in 2013/14, driven by a surge in oil and gas work.

South Australia oil and gas prospects will benefit from politically and environmentally challenging development constraints faced within New South Wales and the need for Queensland LNG producers to boost supplies to meet the contracted demand. There will be higher prices available for gas as available supply is squeezed and South Australia (as well as Northern Territory) may present an easier avenue for extraction which can be and directed through existing pipeline systems. The profile of work done in this sector has been lifting strongly over the past few years and this reflects drilling activity and the \$800 million Cooper Infrastructure Expansion Project by Santos to try and boost capacity out of the Cooper basin in response to the gas shortage emerging on the east coast. Queensland is expected to be extracting and exporting a significant amount of LNG offshore. This is likely to keep Oil and Gas work elevated through the next few years.

Mining and heavy industry construction in total is expected to remain elevated in 2014/15. Notably, the \$800 million Hillside copper project is expected to commence in 2014/15. Beyond 2016/17, we expect significant activity in the construction of copper, gold and uranium mines. The \$2 billion Carrapateena copper mine by Oz Minerals is expected to start construction in 2016/17, and drive a sustained upswing through the rest of the decade. Overall, construction is expected to average \$1.1 billion per annum over the next five years, which is well above historical averages.

Chart 5.4: Mining and Heavy Industry Construction Work Done and Mining Exploration Investment – South Australia, constant 2011/12 Prices



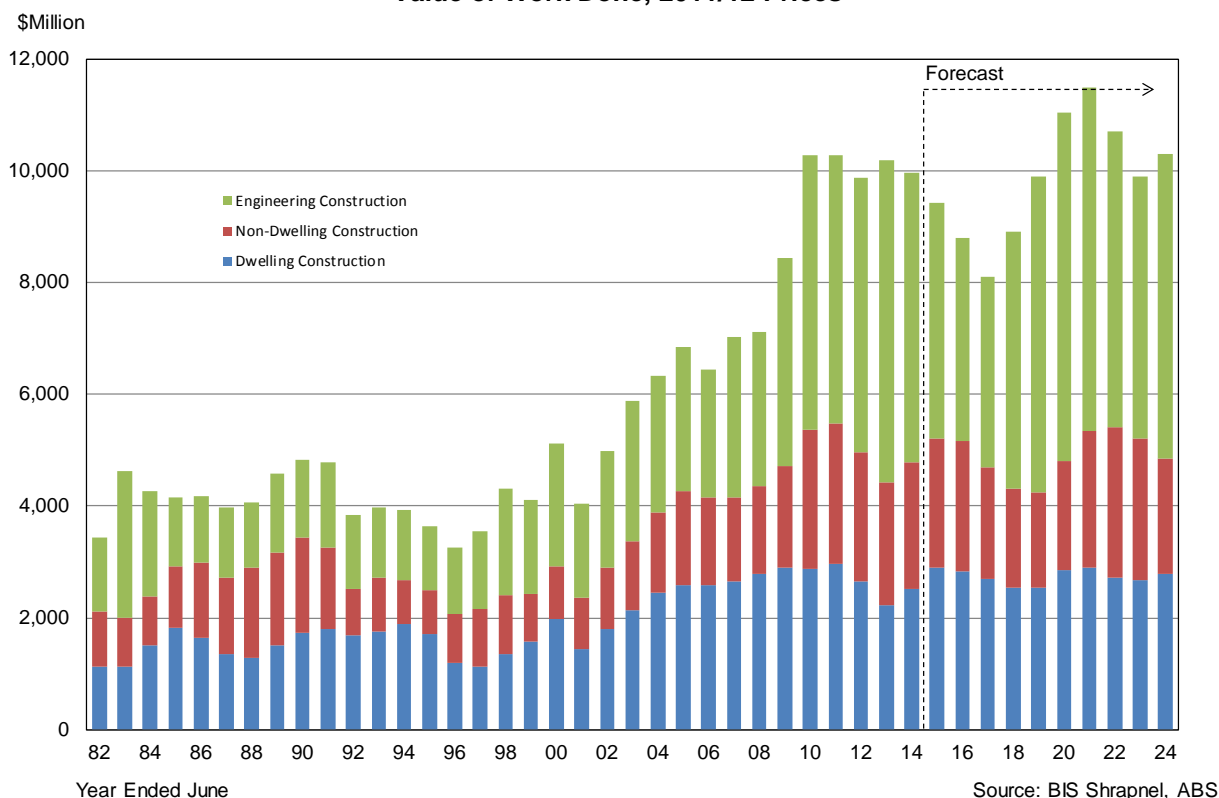
We expect a scaled back version of the estimated \$16 billion Olympic Dam Expansion project to start construction in the latter part of this decade between 2018/19 and 2022/23. If there are no further disruptions with the mine, we expect total mining and heavy industry engineering activity to average \$1.7 billion per annum across the 2020-2024 period.

5.3.5 Total construction

The outlook for total construction in South Australia is rather mixed. Activity is forecast to continue declining over the next three years, shedding a cumulative 17 per cent to \$8.3 billion by 2016/17. This is primarily driven by a weak engineering construction sector, with oil and gas and other minerals activity falling from their currently high levels. Non-dwelling construction will also fall, upon completion of the Royal Adelaide Hospital.

However, a strong upswing is expected over subsequent years to finish off the decade, which will see activity reach a record peak of \$11.3 billion by 2019/20. While the dwelling and non-dwelling sectors will be essentially stable, the upswing is forecast to be underpinned by the commencement of the Olympic Dam project and associated infrastructure such as roads and utilities.

**Chart 5.5: Total Construction by Category – South Australia
Value of Work Done, 2011/12 Prices**



5.4 Forecasts of skilled labour demand

Our outlook for the key determinants of labour demand generally translates into decreasing demand for skilled labour over the next three years. However, acceleration in activity over the subsequent four years is expected to see strong growth in skilled labour demand.

Chart 5.6: Forecasts for Demand for Cadastral Surveyors and Total Surveyors – South Australia

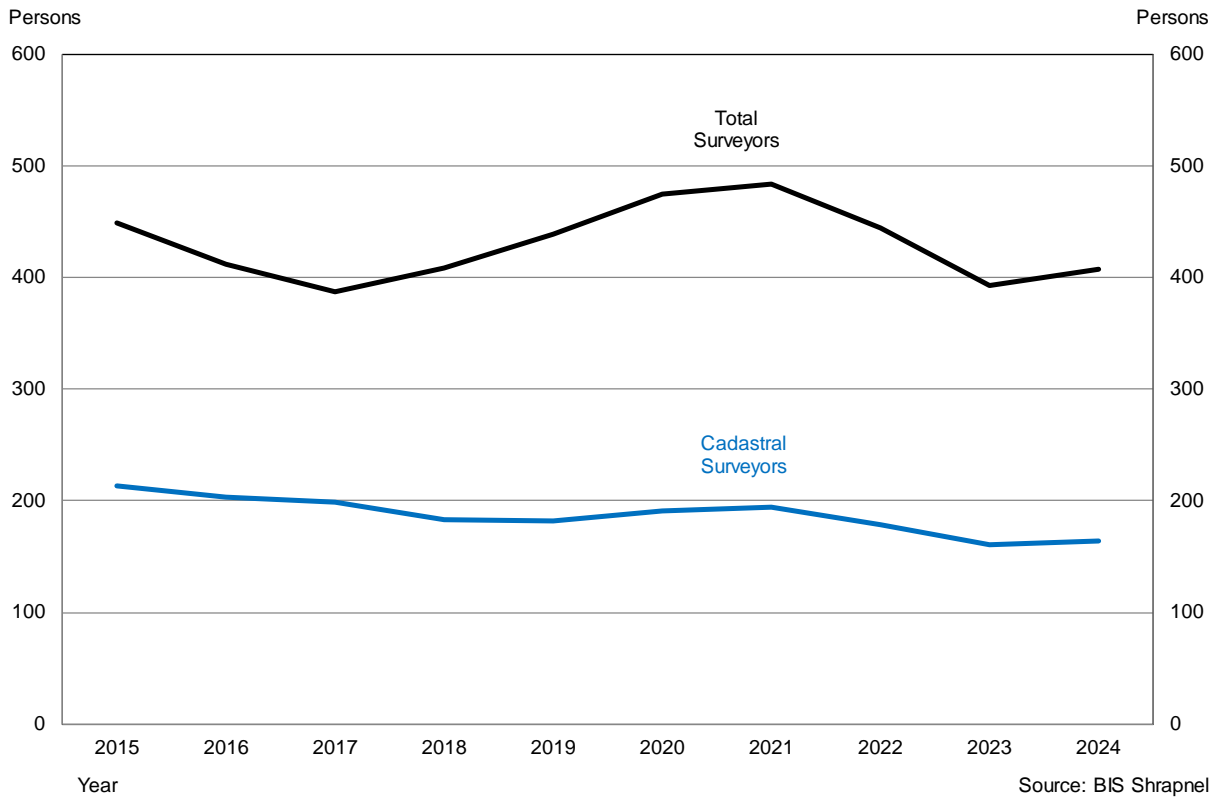
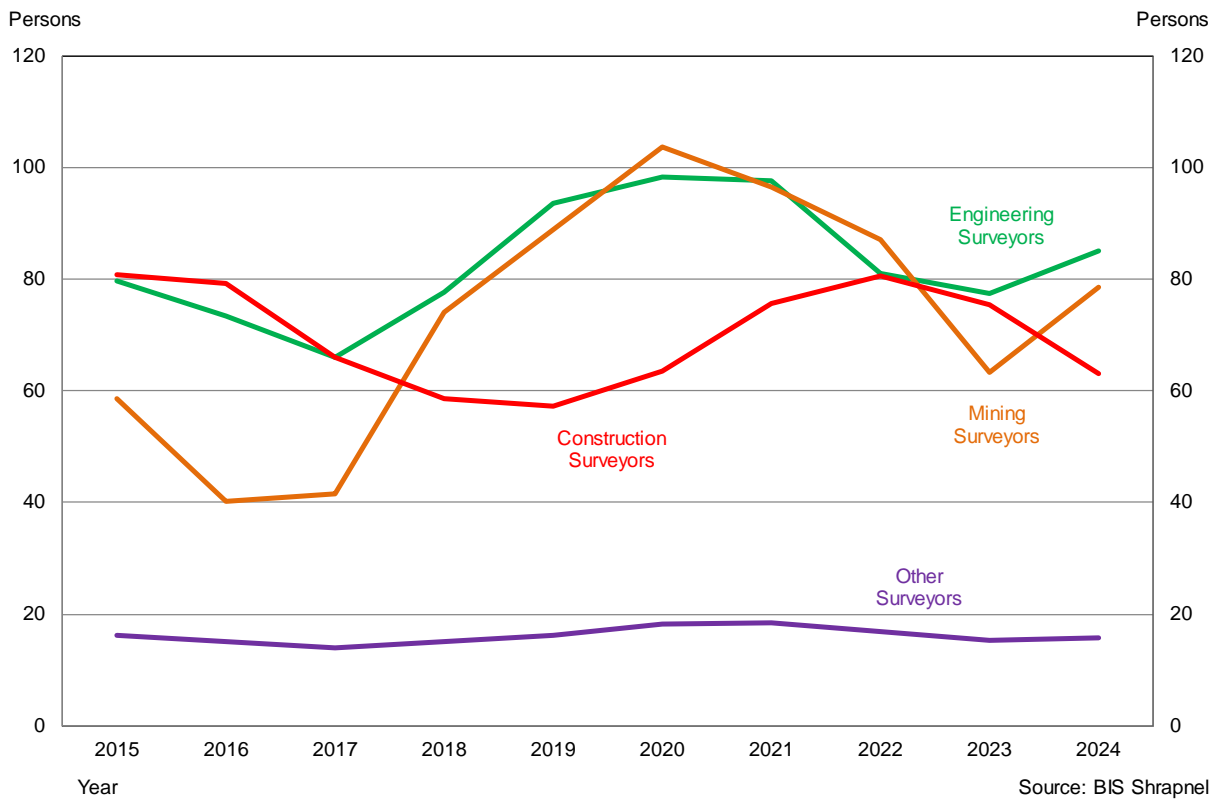


Chart 5.7: Forecasts for Demand for Surveyors by area of Specialisation– South Australia



As shown in table 6.1 (which is based on a productivity growth of 1.5 per cent per annum), from an estimate of 850 professionals in 2013/14, total skilled labour demand is expected to fall to 684 persons in 2016/17. But a recovery in engineering construction, including the mining sector, will see labour demand rebound to a peak of 878 persons by 2020/21.

5.5 Workforce attrition and workforce gap

The total skilled workforce requirement to meet future construction activity is inevitably higher than the labour demand generated by the model given attrition of the existing workforce ‘base’, primarily through retirement and death (but also through people leaving the workforce for other reasons).

Given the estimated age profile of the South Australia surveyors workforce — and the assumed likelihood of retirement and death in each age group — we estimate that the current workforce will shrink by around 24 per cent over the next ten years. Although this is similar to the national rate of attrition, it is worth mentioning that South Australia has a much higher proportion of registered surveyors in the 25-34 year old age bracket compared to the national average. This means that South Australia is particularly well placed to offset the loss of skilled labour through retirements in the years ahead. The difference between the (declining) existing workforce and total labour demand is the workforce gap.

For South Australia, our expectation is for total skilled labour workforce gap to remain negative (ie in a surplus position) over the first four years of the forecast period, through to 2017/18. Although the size of the existing workforce will be steadily declining, a weak construction outlook over the near term will see labour demand fall faster than labour supply, creating a situation of excess labour. This outlook is consistent with feedback received from a survey of surveyors in South Australia. Nearly 60 per cent of respondents said that there is currently no skills shortage in surveying and geospatial occupations, compared to just 7 per cent that said there was.

But this surplus is forecast to turn into a deficit by 2018/19, and remain this way through the remainder of the outlook period. This will be driven by a strong increase in engineering and mining construction, while support will also be provided by the dwelling and non-dwelling sectors, which will remain around elevated levels. The presence of a positive workforce gap in the second half of the forecast period suggests that skilled labour will need to be drawn into South Australia from other states and/or new supply if forecast levels of end use construction sector activity are to be achieved.

The labour demand, labour supply and workforce gap for surveying and geospatial workforce is presented in table 5.2, and charts 5.8 to 5.13. Note that two additional questions were asked of the South Australian surveyors. The first suggests that the surveyors workforce is approximately

Table 5.1: Geospatial Specialists by area of specialisation and age
(per cent of those surveyed)

| | 15-24 | 25-34 | 35-44 | 45-54 | 55-64 | 65+ | Total |
|--|-------|-------|-------|-------|-------|-----|-------|
| Land Management | | 7.7 | | | | | 7.7 |
| Environmental Management | | | 15.4 | | | | 15.4 |
| Health Communities and Management | | | 30.8 | 30.8 | | | 61.5 |
| Infrastructure and Telecommunications | | | 7.7 | 7.7 | | | 15.4 |
| Law Enforcement and Emergency Management | | | | | | | |
| Retail | | | | | | | |
| Remote Sensing and/or Photogrammetry | | | | | | | |
| Total Geospatial Specialists | | 7.7 | 53.8 | 38.5 | | | 100 |

Source: BIS Shrapnel

60 per cent male, and 40 per cent female. The second (results shown in table 5.1) shows the age distribution of the geospatial specialist workforce, by area of specialisation. Of the firms surveyed, the age distribution for geospatial specialists is generally younger than the total surveying workforce.

Table 5.2: Forecasts of Demand for Surveyors and Surveying-Related Professionals and Workforce Gap – South Australia

(Baseline Scenario based on 1.5% labour productivity growth, forecasts as at June)

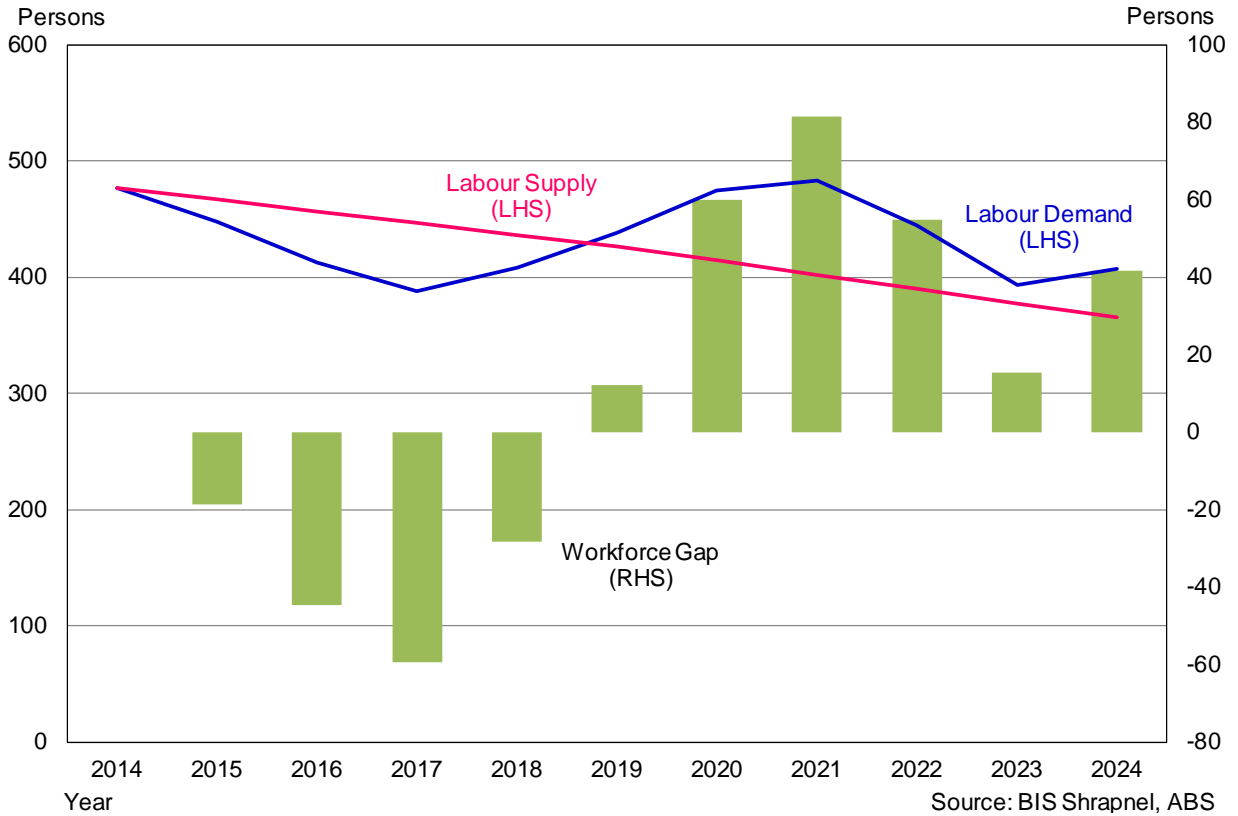
| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Labour Demand by Specialist Occupation | Estimate | Forecasts | | | | | | | | | |
| Cadastral | 210 | 213 | 204 | 199 | 183 | 182 | 191 | 195 | 179 | 161 | 165 |
| Construction | 78 | 80 | 80 | 66 | 59 | 57 | 64 | 76 | 81 | 75 | 63 |
| Engineering | 100 | 80 | 73 | 66 | 78 | 94 | 98 | 98 | 81 | 78 | 85 |
| Mining | 72 | 59 | 40 | 42 | 74 | 89 | 104 | 97 | 87 | 63 | 79 |
| Other Surveyors | 17 | 16 | 15 | 14 | 15 | 16 | 18 | 18 | 17 | 15 | 16 |
| All Surveyors | 477 | 448 | 412 | 387 | 408 | 438 | 474 | 483 | 445 | 393 | 407 |
| <i>Registered/Licensed Surveyors</i> | 152 | 149 | 143 | 140 | 128 | 128 | 133 | 136 | 125 | 113 | 115 |
| Total Spatial Scientists | 213 | 197 | 184 | 169 | 184 | 198 | 221 | 225 | 204 | 186 | 191 |
| Total Technicians | 96 | 89 | 83 | 76 | 83 | 90 | 100 | 101 | 92 | 84 | 86 |
| Total 'Other' Professionals | 65 | 60 | 56 | 51 | 56 | 60 | 67 | 68 | 62 | 57 | 58 |
| Total Skilled Labour Demand | 850 | 794 | 735 | 684 | 731 | 786 | 862 | 878 | 803 | 720 | 742 |
| Existing Workforce (a) | | | | | | | | | | | |
| Cadastral Surveyors | 210 | 204 | 198 | 192 | 186 | 181 | 174 | 167 | 160 | 153 | 146 |
| Construction Surveyors | 78 | 77 | 76 | 76 | 75 | 75 | 74 | 73 | 72 | 71 | 70 |
| Engineering Surveyors | 100 | 98 | 97 | 95 | 93 | 90 | 88 | 86 | 83 | 81 | 79 |
| Mining Surveyors | 72 | 70 | 69 | 67 | 66 | 64 | 63 | 61 | 59 | 58 | 56 |
| Other' Surveyors | 17 | 17 | 17 | 17 | 16 | 16 | 16 | 15 | 15 | 15 | 14 |
| All Surveyors | 477 | 467 | 457 | 447 | 437 | 426 | 414 | 402 | 390 | 377 | 365 |
| <i>Registered/Licensed Surveyors</i> | 152 | 145 | 138 | 131 | 123 | 116 | 111 | 105 | 100 | 95 | 89 |
| Spatial Scientists | 213 | 209 | 205 | 200 | 196 | 192 | 186 | 181 | 175 | 169 | 163 |
| All technicians | 96 | 94 | 92 | 90 | 88 | 86 | 83 | 81 | 78 | 75 | 72 |
| 'Other' Professionals | 65 | 63 | 62 | 60 | 59 | 57 | 55 | 53 | 51 | 49 | 47 |
| Total skilled labour | 850 | 833 | 815 | 797 | 779 | 762 | 739 | 716 | 693 | 670 | 647 |
| Workforce Gap | | | | | | | | | | | |
| Cadastral Surveyors | - | 9 | 6 | 7 | (4) | 2 | 17 | 28 | 19 | 8 | 19 |
| Construction Surveyors | - | 3 | 3 | (9) | (17) | (17) | (10) | 3 | 9 | 4 | (7) |
| Engineering Surveyors | - | (19) | (23) | (28) | (15) | 3 | 10 | 12 | (2) | (4) | 6 |
| Mining Surveyors | - | (12) | (28) | (26) | 8 | 24 | 41 | 35 | 28 | 6 | 23 |
| Other' Surveyors | - | (1) | (2) | (3) | (1) | 0 | 2 | 3 | 2 | 1 | 1 |
| All Surveyors | - | (19) | (45) | (59) | (28) | 12 | 60 | 81 | 55 | 15 | 42 |
| <i>Registered/Licensed Surveyors</i> | - | 5 | 5 | 9 | 5 | 11 | 23 | 31 | 25 | 18 | 26 |
| Spatial Scientists | - | (11) | (21) | (31) | (13) | 6 | 34 | 44 | 30 | 17 | 28 |
| All technicians | - | (5) | (9) | (14) | (5) | 3 | 16 | 21 | 15 | 9 | 14 |
| 'Other' Professionals | - | (3) | (6) | (9) | (3) | 3 | 12 | 15 | 11 | 8 | 11 |
| Total skilled labour | - | (38) | (80) | (113) | (49) | 25 | 123 | 162 | 110 | 49 | 95 |

(a) Existing workforce is generated by adjusting the size of the current skilled workforce for natural attrition rates such as retirements and death. Source: BIS Shrapnel, ABS

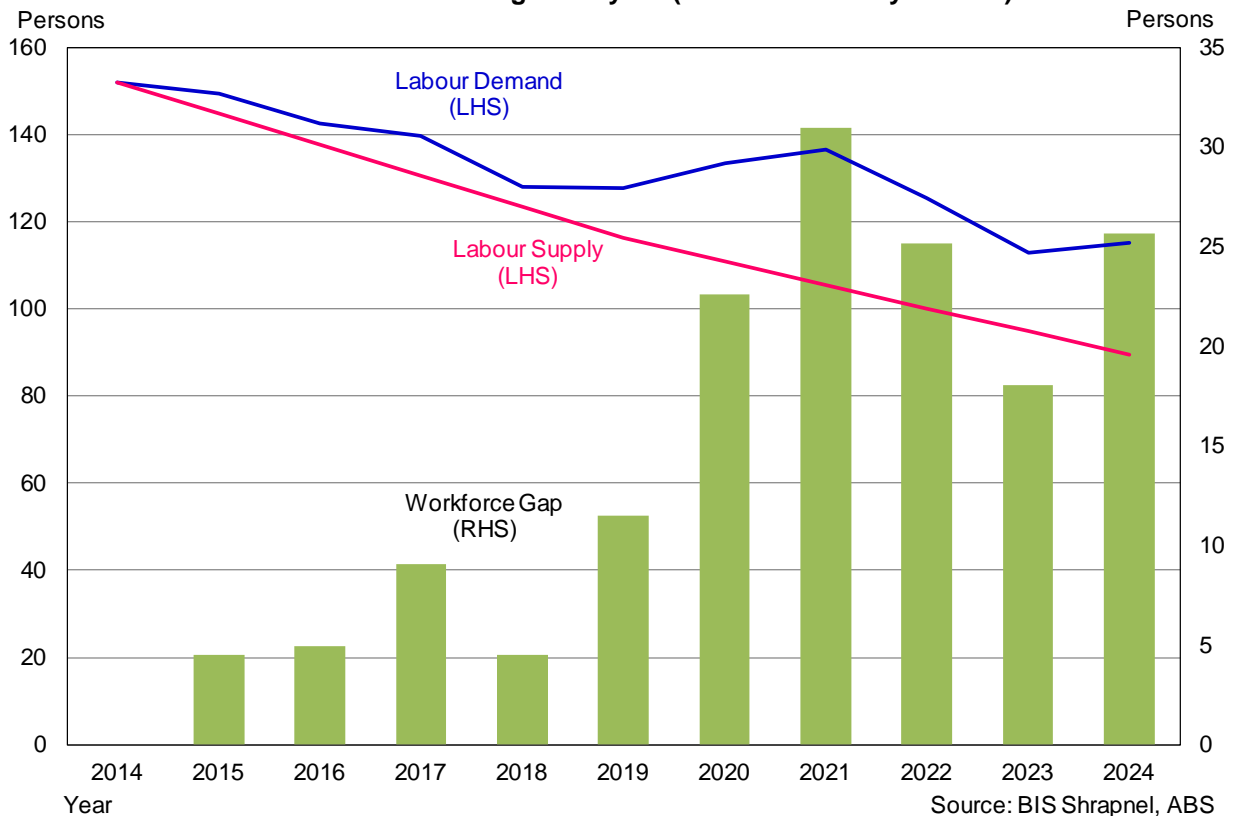
(b) Workforce gap is calculated as labour demand less existing workforce. A positive number implies a shortage of labour

Numbers in brackets imply an excess supply as new supply exceeds the forecast workforce gap.

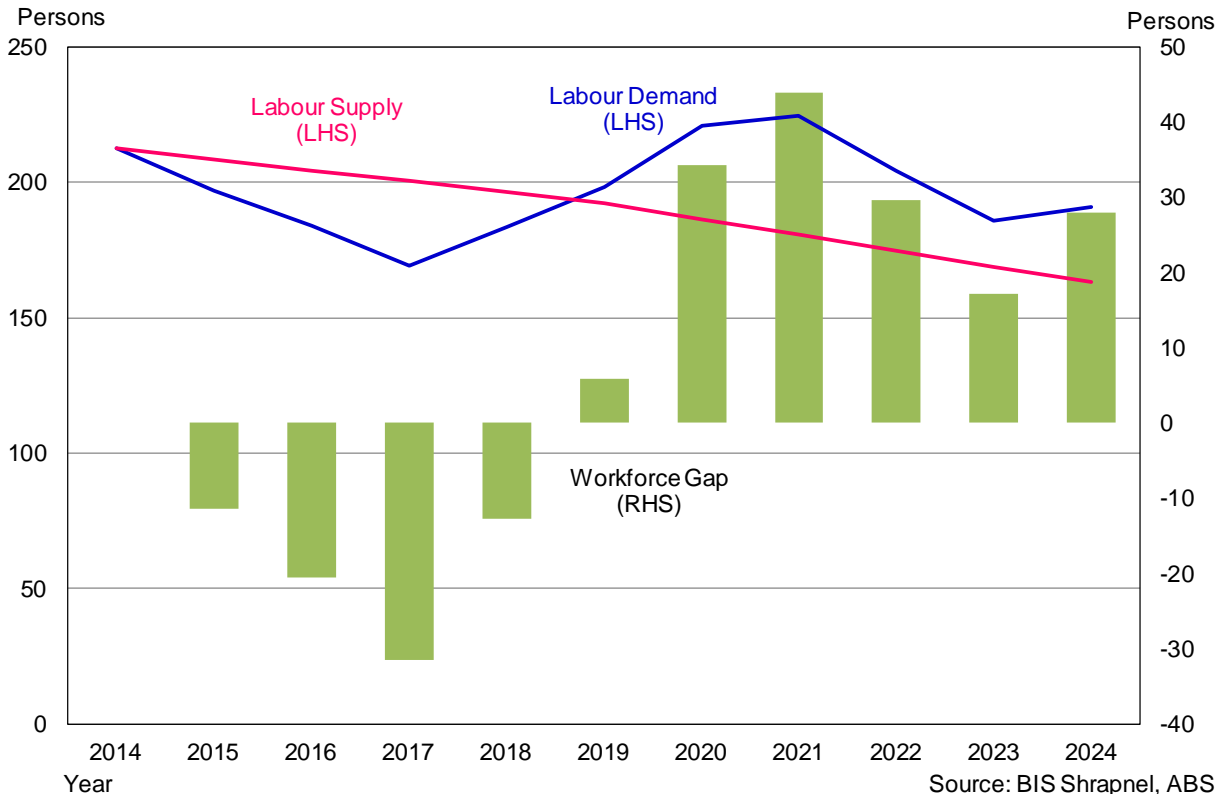
**Chart 5.8: South Australia
Total Surveyors (1.5% Productivity Growth)**



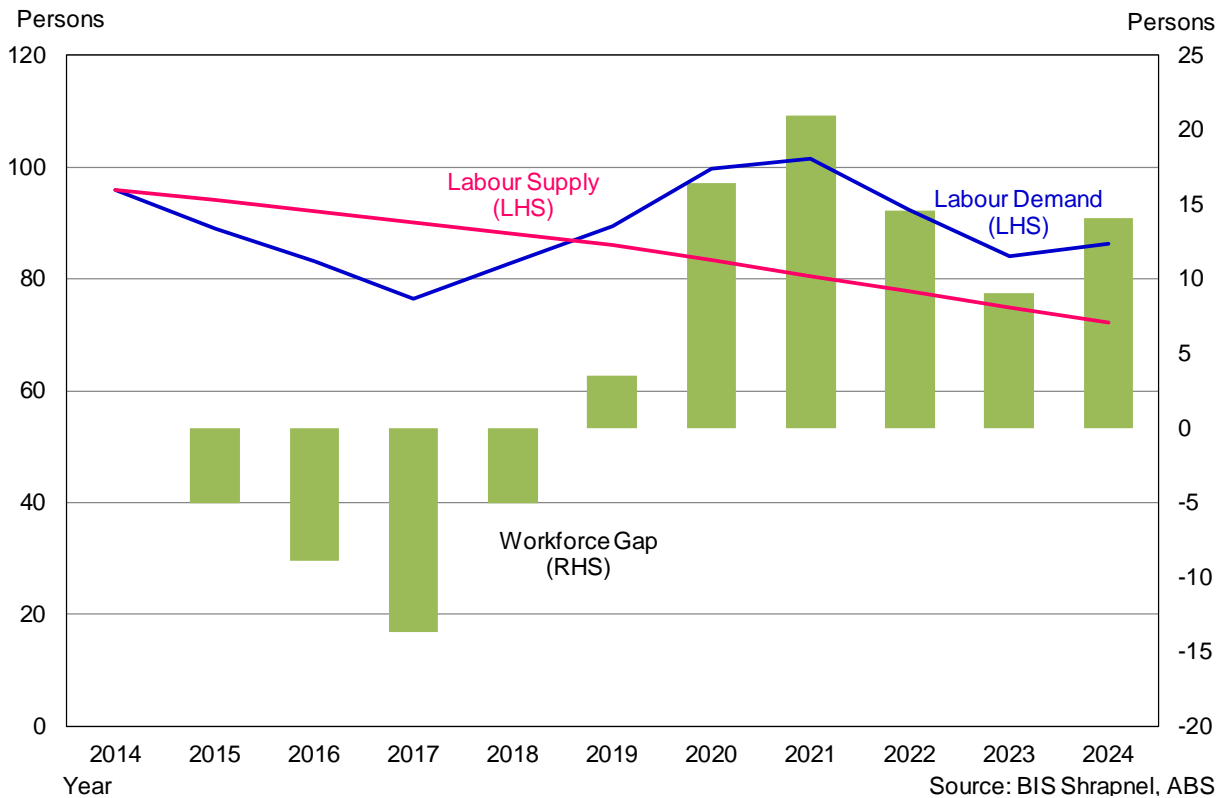
**Chart 5.9: South Australia
Licensed and Practising Surveyors (1.5% Productivity Growth)**



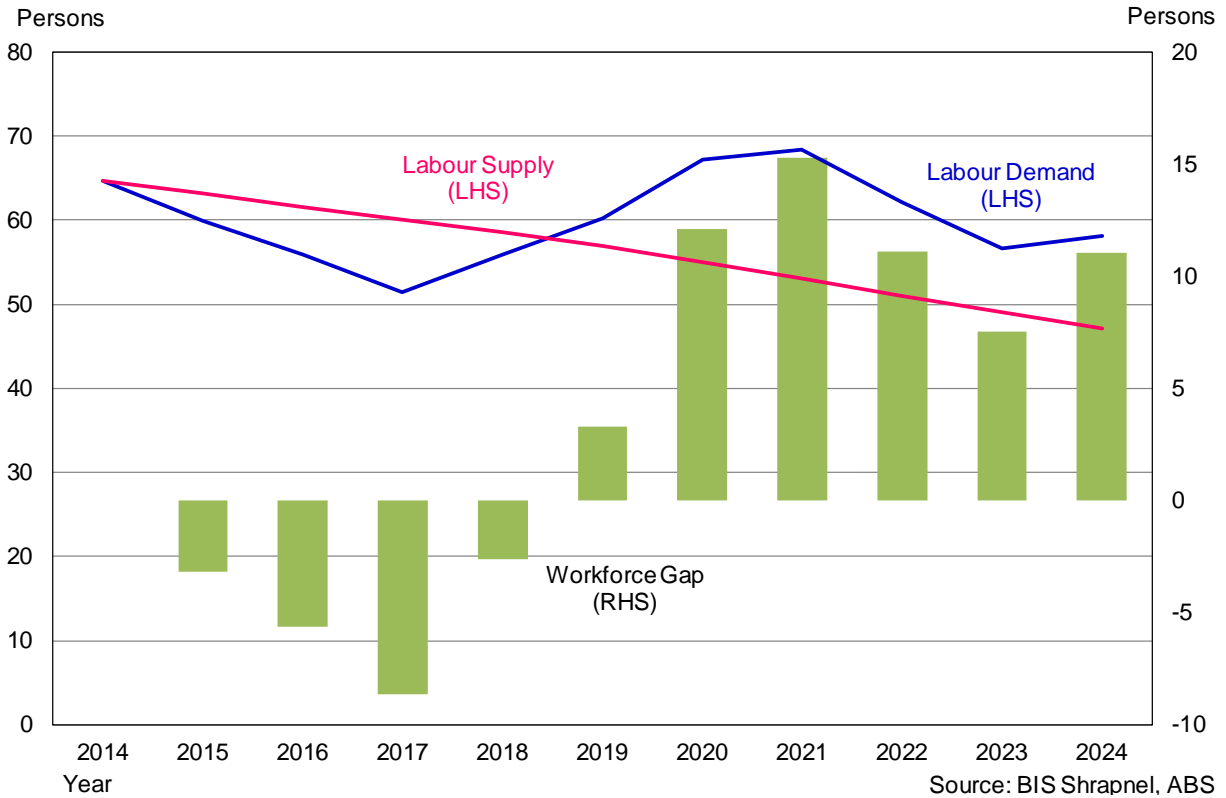
**Chart 5.10: South Australia
Spatial Scientists (1.5% Productivity Growth)**



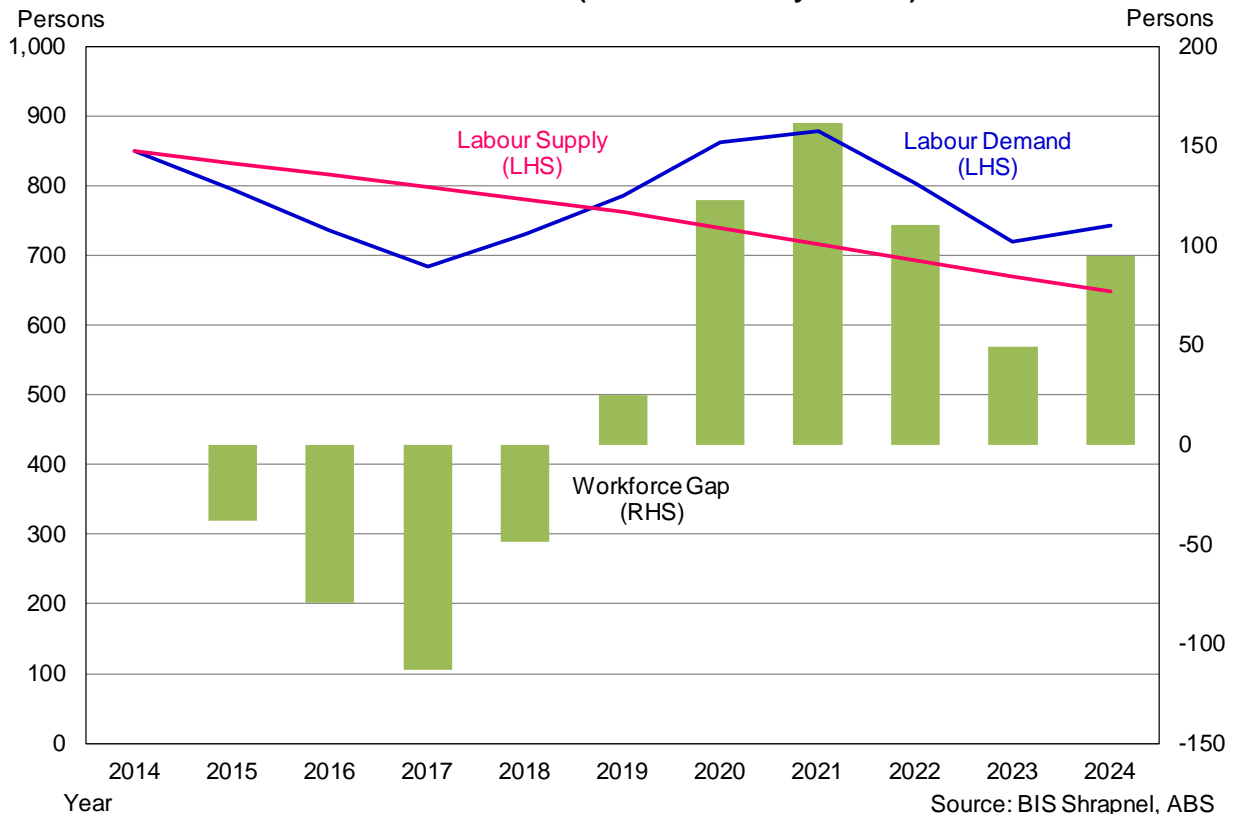
**Chart 5.11: South Australia
Technicians (1.5% Productivity Growth)**



**Chart 5.12: South Australia
'Other' Professionals (1.5% Productivity Growth)**



**Chart 5.13: South Australia
Total Skilled Labour (1.5% Productivity Growth)**



CHAPTER SIX

Forecasts of Labour Demand and Workforce Gap for Queensland

6. FORECASTS OF LABOUR DEMAND AND WORKFORCE GAP FOR QUEENSLAND

6.1 The Queensland economy

Queensland is going to have a tough time of it over the next few years. It will be the first of the mining-intensive states to bear the brunt of the decline in mining investment, and these impacts are already starting to filter through. Queensland State Final Demand (SFD is a measure of demand for goods and services within the state economy) growth has deteriorated from a peak of 8.4 per cent in 2011/12 to stall in 2013/14 at just 0.4 per cent. Gross State Product (GSP is different to SFD as it includes international and interstate trade, and changes in inventories) growth has waned over the same period.

We are forecasting SFD to contract in 2014/15, in line with plummeting mining and mining-related construction. Coal-related investment has already begun to drop, falling by more than a quarter in 2013/14 (compared with the previous year). Escalating oil and gas investment on the back of the three colossal LNG projects (Australia Pacific, Gladstone, and Curtis) is estimated to have peaked in 2013/14 at over \$20 billion, but will plunge over the next three years as these projects approach completion.

Overall, we are forecasting mining and heavy industry activity to plummet by more than two-thirds over the three years to 2016/17, while total engineering construction is expected to drop by almost half during the two years to 2015/16 as non-mining-related engineering construction also falls away. This is partially due to an emerging gap in publicly-funded activity; several major projects have been completed or are approaching completion but the next round of major projects is not slated to commence for another couple of years. From 2015/16, the beginning of a recovery in public sector investment is forecast to begin, with major road, rail and ports projects scheduled to get underway or ramp up around this time. These include the \$5 billion Bus and Train Project, the Outer Harbour Expansion, and the Toowoomba Range Second Crossing.

As the shift from the mining investment phase to the production phase progresses, mining output will make more and more significant contributions to economic growth via exports. However, the multiplier on output (i.e. the positive spending effects that spill over to the rest of the economy) is much smaller than the multiplier effect of domestic construction. So although the economic benefits stemming from mining production will continue to flow through to the rest of the economy, these will be on a smaller scale.

Turning to the outlook for residential investment, we are forecasting strong growth over 2014/15 and 2015/16. However, the volume of dwelling construction is so dwarfed by engineering construction that this growth will not be anywhere near enough to offset the corresponding plunge in engineering construction. It should be noted, though, that the residential upswing underway can be partly attributed to the mining boom, which stimulated strong population growth from both interstate and overseas, driving a mounting stock deficiency. Given the size of this gap between supply and demand, we expect to see dwelling investment trend upwards until the early-2020s, aside from a dip in 2017/18, largely due to higher interest rates.

Non-residential building activity is estimated to have recorded positive growth in 2013/14, led by health facilities, particularly the \$1.4 billion Queensland Children's Hospital (now complete) and the \$1.2 billion first stage of the Sunshine Coast University Hospital. On the downside, education and offices saw activity decline. We expect to see uneven growth in non-residential activity over the next few years, as overall construction is quite dependent on the timing of key projects. The expected recovery in non-mining business investment should support commercial and industrial activity, but social and educational investment is likely to suffer for a few years yet before the state government loosens the purse strings.

In terms of household spending, Queensland posted Private Consumption Expenditure (PCE measures household spending on goods and services) growth of 2.4 per cent in 2013/14, largely on par with the national average. However, the latest data (June 2014 quarter) indicated zero growth in PCE and a 0.7 per cent (seasonally adjusted) fall in retail turnover. These were the poorest quarterly results in more than three years. This correlates with the unemployment rate creeping upwards since late-2013.

The operational (production) phase of mining is much less labour-intensive than the construction (investment) phase, so we expect employment growth will continue to be undermined by layoffs from the mining industry as projects under construction reach completion, without similarly-sized projects coming through to take their place. In addition to this, it has been estimated that about a quarter of the Queensland office market (both in Brisbane and regionally) is now being used by firms servicing the mining boom. The decline in investment will therefore lead to a substantial adjustment in occupancy and employment.

On the whole, Queensland will experience a big negative shock in the near-term, resulting from a sharp decline in the state's mining and mining-related investment. Both SFD and GSP are likely to deteriorate further before they see improvement from 2015/16, but it should be noted that GSP will be benefitted by increasing volumes of mining exports.

There is reason for optimism in the medium-term. Fundamentally, Queensland has a diversified economy, with key industries including agriculture, tourism and education. Prior to the mining boom, and the structural shift towards mining and mining-related activity, the state experienced an extended period of strong growth. As the economy adjusts to significantly lower levels of mining investment and a depreciating Australian dollar, the question will be, how quickly will the state's trade-exposed industries be able to recover and take up the slack?

6.2 Estimate of the surveying and geospatial workforce

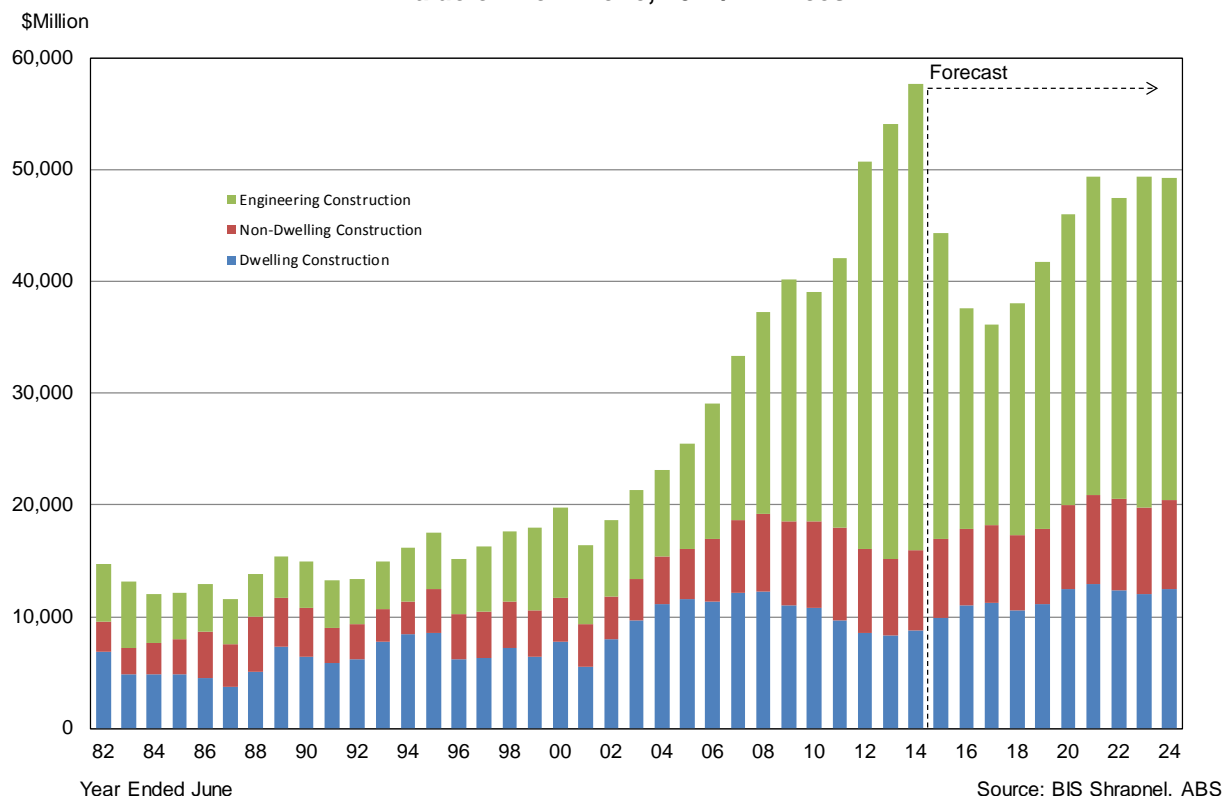
Surveyors comprise 57 per cent of the skilled surveying and geospatial workforce with spatial scientists and surveying and spatial science technicians making up 23 and 10 per cent respectively. We estimate that cadastral surveyors account for 32 per cent of all surveyors in Queensland. This is followed by mining surveyors (25 per cent), construction surveyors (21 per cent), engineering surveyors (15 per cent) and other surveyors (6 per cent). In addition, we estimate that 26 per cent of all surveyors in Queensland hold licences (see table 6.1 on page 98).

6.3 Outlook for total construction

Of the major states, Queensland has by far the weakest outlook for total construction activity over the next five years. From a peak of \$57.7 billion in 2013/14, activity is expected to fall 35 per cent over the next three years, before rebounding slightly through to 2018/19. This weakness can be firmly attributed to the engineering construction sector, with mining and heavy industry work leading the declines. Although residential and non-residential building will be increasing and stable respectively, the large size of the engineering sector means that overall construction will fall. In all, activity is forecast to average \$40.2 billion per annum over the next five years, down from \$48.7 billion over the past five years.

A solid recovery is then expected through to 2023/24 as all sectors rise in unison. An expanding population base will drive demand for housing, non-residential building and utilities, while the next round of mining projects in the coal and oil and gas sectors will spur a recovery in engineering construction.

**Chart 6.1: Total Construction by Category – Queensland
Value of Work Done, 2011/12 Prices**



6.4 Forecasts of skilled labour demand

In line with its weak construction outlook, Queensland has by far the weakest prospects compared to other states, in terms of skilled labour demand. From an estimated peak of 3,652 surveying professionals employed in 2013/14, demand is forecast to shed a cumulative 30 per cent over the next four years, to just 2,589 persons in 2017/18.

Relatively stable activity across the dwelling and non-dwelling construction sectors will see demand for cadastral and construction surveyors rise and remain steady respectively over the next few years. However, tremendous declines in engineering construction and the mining sector in particular, will see total construction and labour demand fall heavily. Demand for mining engineers is forecast to fall by nearly 80 per cent over the next three years, as activity declines even faster than it ramped up through the late 2000's and early 2010's.

A mild recovery in labour demand will ensue around the turn of the decade, supported by both an improvement in the mining sector, but also dwelling construction as Queensland's population continues to expand. However, even by the expected peak in 2020/21, labour demand will remain a full 10 per cent lower than today's level.

6.5 Workforce attrition and workforce gap

The total skilled workforce requirement to meet future construction activity is inevitably higher than the labour demand generated by the model given attrition of the existing workforce 'base', primarily through retirement and death (but also through people leaving the workforce for other reasons).

Given the estimated age profile of the Queensland surveying workforce — and the assumed likelihood of retirement and death in each age group — we estimate that the current workforce will shrink by around 30 per cent over the next ten years. This is higher than the national average, and reflects the fact that Queensland's existing workforce has a higher age profile than other states and territories. Queensland has an exceptionally high proportion of workers in the 55-59 year old bracket, many of whom will be entering retirement toward the latter years of the 10-year forecast period.

The difference between the (declining) existing workforce and total labour demand is the workforce gap. As seen in table 5.1, Queensland is forecast to have a negative workforce gap (i.e. a surplus of skilled labour) through to 2019/20, despite having an above-average rate of workforce attrition, which normally works to create shortages of labour. The primary reason for this weak outlook for labour demand is the collapsing engineering construction and mining industry. By 2016/17, when mining-related construction reaches a trough, there is forecast to be a surplus of nearly 400 mining surveyors. This weakness in total construction will spread across most other areas, including spatial scientists, technicians, and 'other' professionals, all of which are forecast to remain in surplus for a number of years.

Table 6.1: Forecasts of Demand for Surveying and Surveying-Related Professionals and Workforce Gap – Queensland

(Baseline Scenario based on 1.5% labour productivity growth, forecasts as at June)

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|--------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Labour Demand | Estimate | Forecasts | | | | | | | | | |
| All Surveyors | 2,128 | 1,895 | 1,775 | 1,688 | 1,619 | 1,734 | 1,955 | 2,050 | 1,958 | 1,834 | 1,815 |
| <i>Registered/Licensed Surveyors</i> | 562 | 587 | 610 | 562 | 507 | 559 | 661 | 672 | 627 | 525 | 529 |
| Total Spatial Scientists | 865 | 656 | 556 | 534 | 551 | 584 | 653 | 706 | 663 | 688 | 667 |
| Total Technicians | 363 | 276 | 234 | 224 | 231 | 245 | 275 | 297 | 278 | 286 | 280 |
| Total 'Other' Professionals | 296 | 225 | 190 | 183 | 188 | 200 | 224 | 242 | 227 | 223 | 238 |
| Total Skilled Labour Demand | 3,652 | 3,051 | 2,755 | 2,629 | 2,589 | 2,763 | 3,106 | 3,295 | 3,126 | 3,031 | 3,001 |
| Existing Workforce (a) | | | | | | | | | | | |
| All Surveyors | 2,128 | 2,082 | 2,036 | 1,990 | 1,944 | 1,897 | 1,846 | 1,795 | 1,744 | 1,693 | 1,642 |
| <i>Registered/Licensed Surveyors</i> | 562 | 531 | 500 | 468 | 437 | 406 | 382 | 357 | 333 | 309 | 285 |
| Spatial Scientists | 865 | 845 | 826 | 806 | 787 | 767 | 744 | 721 | 699 | 676 | 653 |
| All technicians | 363 | 357 | 350 | 344 | 337 | 331 | 323 | 315 | 306 | 298 | 290 |
| 'Other' Professionals | 296 | 290 | 285 | 279 | 274 | 268 | 261 | 253 | 245 | 238 | 230 |
| Total skilled labour | 3,652 | 3,575 | 3,497 | 3,419 | 3,341 | 3,263 | 3,173 | 3,084 | 2,995 | 2,905 | 2,815 |
| Workforce Gap | | | | | | | | | | | |
| All Surveyors | - | (188) | (261) | (302) | (325) | (163) | 109 | 255 | 214 | 140 | 172 |
| <i>Registered/Licensed Surveyors</i> | - | 57 | 110 | 94 | 70 | 153 | 280 | 315 | 294 | 216 | 244 |
| Spatial Scientists | - | (189) | (270) | (272) | (236) | (183) | (91) | (15) | (36) | 12 | 14 |
| All technicians | - | (81) | (117) | (120) | (106) | (86) | (48) | (18) | (28) | (12) | (10) |
| 'Other' Professionals | - | (66) | (95) | (97) | (85) | (68) | (37) | (11) | (18) | (15) | 8 |
| Total skilled labour | - | (524) | (743) | (790) | (752) | (500) | (67) | 211 | 131 | 126 | 185 |

(a) Existing workforce is generated by adjusting the size of the current skilled workforce for natural attrition rates such as retirements and death. Source: BIS Shrapnel, ABS

(b) Workforce gap is calculated as labour demand less existing workforce. A positive number implies a shortage of labour

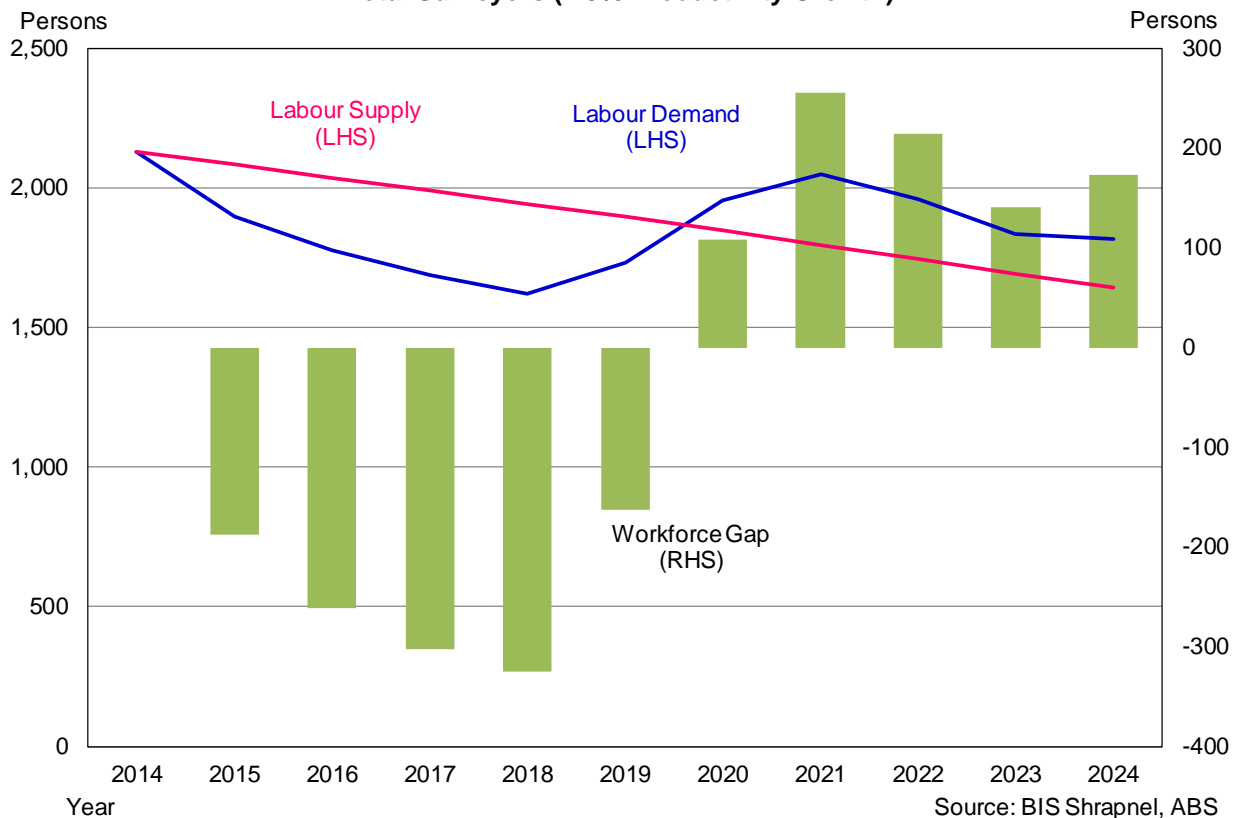
Numbers in brackets imply an excess supply as new supply exceeds the forecast workforce gap.

The solitary bright spot for Queensland will come from dwelling construction, which is forecast to rise over the next few years, and remain elevated at high levels. As a result, there will be a shortage of cadastral surveyors throughout the forecast period.

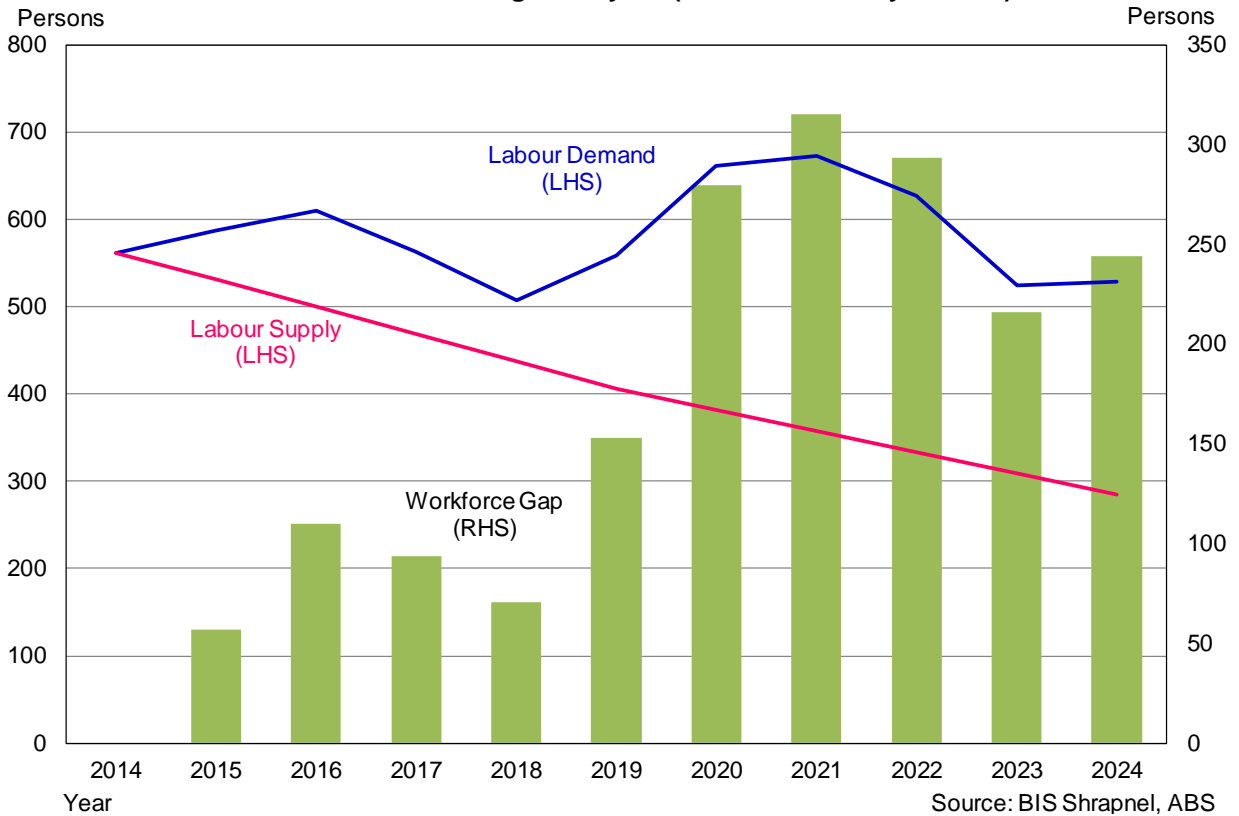
Further ahead, the beginning of a recovery in total construction, combined with ongoing attrition of the existing workforce, will see a positive workforce gap (ie shortage of labour) emerge around 2020/21.

Note that this forecast of an extended period of surplus skilled labour is rather different to that presented in ACIL Tasman’s 2013 ‘Surveying and geospatial workforce modelling’ report, which expected to see shortfalls in both surveyors and technicians in each year through to 2025. However, we believe that our forecasts of surplus labour are more probable to occur, given the differences in the methodologies used to forecast demand for skilled labour. For example, ACIL Tasman’s report assumes that the surveying workforce in the construction sector (excluding mining) will grow at 5 per cent per annum over the forecast period. Given the likely declines in engineering construction activity (even outside the significant falls in the mining sector) we do not expect to see sustained growth in the workforce. In addition, the report does not allow for any improvements in labour productivity, which works over time to reduce the demand for labour for a given level of output.

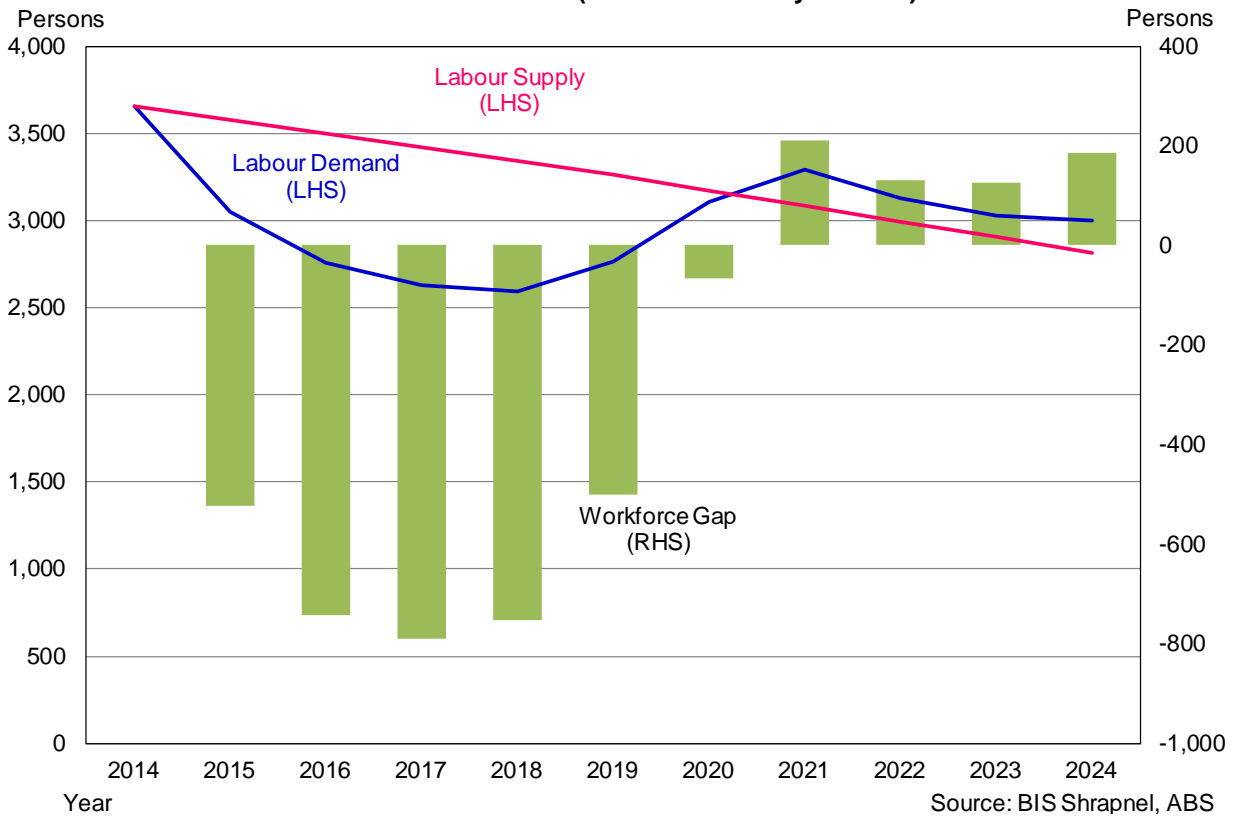
**Chart 6.2: Queensland
Total Surveyors (1.5% Productivity Growth)**



**Chart 6.3: Queensland
Licensed and Practising Surveyors (1.5% Productivity Growth)**



**Chart 6.4: Queensland
Total Skilled Labour (1.5% Productivity Growth)**



CHAPTER SEVEN

Qualitative Results for Surveying Industry Demand Study

7. QUALITATIVE RESULTS FOR SURVEYING INDUSTRY DEMAND STUDY

This chapter presents the results of qualitative research on how surveying firms have changed over the last 10 years and what surveying firms will look like in 10 years time. This chapter was written by Dr Veronica Bondarew, Chief Executive Officer of Consulting Surveyors National, and was included in the previous *Determining the Future Demand, Supply and Skills Gap for Surveying and Geospatial Professionals 2012 to 2022* report.

7.1 Methodology

7.1.1 The Qualitative Survey: Aim and Choice of Methods

Qualitative research has been described as an unfolding model that occurs in a natural setting that enables the researcher to develop a level of detail from high involvement in actual experiences (Creswell, 1994). One identifier of a qualitative research study is the social phenomenon being investigated from the participant's viewpoint. The aim of the qualitative component to the demand study therefore is to study some of the results which have turned up in the quantitative survey conducted by BIS Shrapnel, to a deeper level. The aim is also to bring out some new perspectives and to review them as they were seen by a representative group of 18 consulting surveyors selected across Victoria and NSW. Inspiration has also been sought in previous literature and research on the growth of firms and skills shortages in the surveying profession in both New Zealand and Australia.

7.1.2 Choice of Survey Method

The rationale underpinning this study is the assumption that a more exhaustive analysis and understanding of the factors affecting the demand for surveying skills cannot be carried out *exclusively* through "representative" surveys by sending out questionnaires. Analyses of such factors and processes may more expediently be made by various forms of qualitative methods, including combinations of studies of theories and literature.

It is important that the aim of the survey should determine the choice of method. The choice has to be made among a spectrum of available qualitative methods including phenomenology, grounded theory, ethnography and case studies. Choices can also be made from various combinations of survey methods from representative *population surveys of multiple case studies* to the *single case study*. This study has chosen the multiple case study methodology.

By choosing the multiple case study as the method, the aim is to find out whether there is a basis for generalisation by comparing the empirical, detailed results of the research with established theories and the quantitative analysis of the quantitative component of the study.

Although the qualitative method chosen here is not a real case study in the traditional sense, but a series of qualitative interviews, inspiration has still been sought in the methodical approach used in connection with multiple case studies.

The choice of qualitative interviews as a method has opened up the possibility of gradations as well as more profound studies, updated regular interpretations, and specifications of important issues. The combination of the deductive and the empirical inductive methods we call the "the integrative method", with an explanatory and an explorative aim, respectively. The personal interview has also been used to generate ideas, and it has provided room for new fields of study and problems, which the interviewees have been allowed to raise themselves.

It will always be a problem to find the extent to which the results of qualitative interviews can be "generalised", but by standardising the form of semi-structured interviews it has been possible to search for patterns in the respondents' attitudes, opinions, and descriptions of their own behaviour.

7.1.3 The Question Framework and its Development

The dialogue with the 18 consulting surveyors was structured via an interview guide with 5 themes, each comprising a number of specific questions being 14 in total. The themes have been chosen and formulated on the basis of results from the quantitative part of the survey concerning the changing nature of the Australian economy as the context within which the surveying firms are situated. The framework of the questioning is based on the Resource Based View (RBV) of the growth of the firm as proposed by Penrose (1959; 1995) and enhanced by Lockett (2005); Hugo & Garnsey (2005); Teece (1997; 1980). The entrepreneurial literature (Shane (2000); Schumpeter (1961)) provides another theoretical framework for this study. This study proposed that undertaking research on only one of the firm's resources, namely skills, provides a very narrow perspective of the phenomenon. Therefore by taking a RBV, the study has been able to investigate the impact of the external environment on entrepreneurial activity creating the need to adjust resource utility for firm sustainability and growth.

The external market for the surveying profession includes economic activity, government policy, technological change and client needs and expectations. Service provision and therefore skills requirements and organisational structures have been adjusted over the last decade by participating firms to address the changing nature of the external environment. These topics have provided the study with its 5 themes of investigation although economic activity and government policy have been condensed into one theme given their inter dependence. The study has attempted to demonstrate these changes and how they have been addressed by surveying firms. In the process it is expected to identify the critical problems that have provided both threats and opportunities for the participating consulting surveying firms.

7.1.4 The Interview and the Interviewer as Part of the Instrument

An influential factor in connection with an interview is the interviewer. When the analyses try to explore the persons' attitudes, motives, and characteristics, the reliability and validity of the surveys will be influenced significantly by the interviewer's behaviour. This may have a negative and/or a positive effect on the atmosphere and the relationship of trust created when the interview takes place. It is impossible to isolate the influence of the interviewer, and it is not practical, either. To mitigate negative influences the interviews were all undertaken by one person being the CSN CEO who was known to the interviewees by association with the organisation. The qualitative question framework was structured so as to increase the possibility of making a comparison of the 18 interviews. In addition, to promote validity, the interviewees were all promised anonymity to ensure that they were comfortable in expressing their personal views without fear of repercussions.

7.1.5 Validity and Reliability of Qualitative Interviews

An important question in connection with qualitative studies is the evaluation of the validity and reliability of the surveys. The validity can be evaluated on the basis of the soundness of the material which is presented as documentation for the relevance, reliability, and authenticity of the applied methods and interpretations. The validity is therefore a crucial point also in qualitative surveys, because validity is an indicator of whether the areas or questions have been illustrated as intended. For example, there exist possibilities that communication filters and misinterpretations in the dialogue between the respondent and the interviewer may occur. Still it is possible to argue for the view that by a determined effort it is possible to increase the validity by semi-structured interviews rather than by quantitative surveys. This is due to the fact that there is a chance of assessing whether the question has been understood, and as the interview proceeds, to discuss it in detail, to conclude, interpret, and verify.

In this form of survey, reliability is an indicator of the extent to which it is intended that identical answers can be obtained from the consulting surveyors if the interview should be repeated. Therefore it is often more difficult to evaluate reliability in connection with qualitative interviews, as an exact repetition of the same interview can never be achieved. Reliability problems can also arise when the interview is put in writing. In this survey an attempt has been made to improve the quality of the direct transcripts of tapes by having the interviewer as far as possible transcribe the tape and checking with interviewees with follow up questions. Reliability was also established through the development of a case study protocol, and a case study database (Yin, 1984). The case study protocol included 'table shells' to record data (Miles and Huberman, 1994). Construct validity was established by using multiple sources of evidence, the creation of a chain of evidence, and by having key informants review drafts of the case study. These steps were undertaken to increase the reliability of the qualitative survey to the practical maximum.

7.1.6 Selection of Respondents – The Composition of the Respondent Group

The selection of respondents was based on the need to research the differences in entrepreneurial activity within different structures and geographic locations in an effort to identify the impact of various external environments on consulting surveyor behaviour in a number of geographic regions. This means that they are consulting surveyors in all but one case either running their own business or a director of that consulting surveying firm. Firms were chosen only if they had survived at least 15 years and were therefore able to demonstrate knowledge of the changing nature of the firm over the last decade and provide some discussion on the constraints that may be faced by the profession in the near future.

Firms whose core service did not include surveying were not included in the qualitative interviews. Nor does the survey include the firms which have been closed down. Although covered by the quantitative component of the study, the qualitative study did not investigate the public sector seeing it as responding to different drivers. Although this is a limitation of the study it was not possible under the assigned time constraints. Such research is definitely an area that should be addressed in future research.

The enterprises included in the qualitative survey represent the "representative firm" within their size, structure and geographic location. The representative group consisted of large metropolitan firms with a number of regional branches, medium size firms of 25 – 50 employees, small firms with 15 or less employees and firms without employees where the partners of the firm did all the work. Regions covered in the study included the north coast of NSW, New England, the Hunter Region, central west NSW, metropolitan and CBD firms in both Victoria and NSW and firms working on the border in both states.

The response rate from other states for the quantitative component of the study were below target and were therefore not included in the qualitative component of the study in this instance. The Australian estimates of the research were made possible on BIS Shrapnel background research within the construction industry. Further research to include additional states for qualitative analysis will greatly enhance the information provided in this study.

7.1.7 Identification of Patterns in the Interview Material

For the purpose of being able to identify "generalisable" patterns in these consulting surveyors' attitudes and opinions in connection with the changing nature of the profession over the last decade, a number of themes have been selected, as described in the interview guide. The interpretation of the interviews has been systematised by reviewing, editing and analysing the 18 interviews in relation to the following themes:

The overarching question – How have surveying firms changed in the last 10 years and what will surveying firms look like in 10 years' time?

- Motives behind the decision to set up in business
- Would you say there has been a change in the business environment since you came into the business?
- What are the core services provided by the firm and have they changed from the initial position?
- What has driven the change in service delivery?
- Has the change meant changes in the skill requirements of your firm?
- Have you found difficulty in finding people with those skills?
- Does the firm have training and development policies?
- Has the clientele changed over the last decade?
- Have you been able to achieve productivity improvements in the last few years and if so, how has this been achieved?
- Can you compare the amount of cadastral work you used to do to the amount of cadastral work now done by your firm?
- Would you say that the work carried out by a cadastral surveyor now is much different to say a decade ago?
- Have you considered changing the structure of the firm?
- Does the firm undertake marketing, strategic planning?
- What do you see as some of the major constraints currently facing surveyors now and into the future?

The identifiable patterns that can be "generalised" in relation to the above mentioned themes are supported by and built up in the report around selected quotations from the interviews, but new and interesting points of view are also presented. Thereby this part of the analysis is also used to generate ideas.

7.2 Limitations of the qualitative study

- The study focuses on the behaviour of surveyors who own or are senior staff in consulting firms. There are many more surveyors working for the public sector and their views on the profession will add valuable insights which are not presented here. Further study on this sector is recommended.
- Only 18 out of a possible 350+ firms were interviewed. Although the qualitative methodology attempts to generalise findings from a small number of participants, it would be interesting to compare additional interviews with a larger population to determine how the views of our 18 firms compare.
- Student choices and perspectives on making the profession attractive to new cohorts of young students would also add insights into why the current academic institutions are not

attracting greater numbers of students into their surveying courses. Universities are particularly constrained by government funding models and may therefore be locked into delivery models that are not appropriate to the modern day surveying student. This is another necessary area of study.

- Finally only consulting surveyors from NSW and Victoria have been part of the qualitative study. There are different drivers in regional areas of these states and therefore it follows that the variety of experiences will be even greater on a national scale. It is hoped that this exercise can be extended into other states in the near future.

7.3 Some results of the qualitative survey

The qualitative findings supported the quantitative data collected by BIS Shrapnel. Additional rich data for the 5 themes set out below were derived from the 14 interview questions outlined above.

The findings are presented under the 5 themes outlined in the previous section.

7.4 External environment

7.4.1 Changing business environment

All participants reported that the key driver for the services provided by the surveying profession is the external business environment. Changes in economic conditions such as the period of the GFC impacted heavily on the profession. As expected during periods of tight financial conditions, developers, the key clients of the surveying profession, are forced to reduced activity due to the lack of availability of financial resources and demand for construction products. Government spending in the form of the Education Revolution and Nation Building provided a buffer for a number of firms working on infrastructure projects. However as these projects near completion, work, especially in most regional areas is drying up. Firms reported that since 2008, they have either downsized or are 'treading water' in anticipation of new projects commencing as promised by the NSW government. In Victoria, as the recent State projects also come to completion, most firms have reported a consolidation period with staff departures not being replaced.

Such findings however were not global. In some areas like Orange in NSW, the impact of the GFC has been negligible. Work provided by the local mining works created strong growth in the area both in mining works and in housing activity.

"Throughout the 1980s there were two surveying firms in Orange now there are five. They are pretty much fully employed and we often contract work out to each other."

In addition participants reported that government legislation had impacted decisively on their activity especially in the areas of planning requirements.

"Twenty years ago you could almost do a Development Application (DA) on the back of an envelope but now the amount of reporting required for a DA has made it too expensive for most of our smaller clients."

"I recall doing an application on a 30 lot subdivision which was a 7 page submission. Now it would have to be a 70 to 100 page submission. That adds a lot of additional cost".

Onerous planning requirements have impacted on participating firms in various ways. For the smaller firm especially in regional areas work for 'mum and dad' subdivision has mostly dried up.

"It is harder and harder for the small private developers to take on the risk of development. We are in the corridor that had plenty of orchard owners looking into developing their land into residential property (with the spread of urban development). They would do it themselves in the past but now it is too expensive for them and a developer will come in and buy 10 orchards and the surveyor will be working on a 400 acre job rather than lots of 40 acres."

Firms have responded to changing legislative requirements in various ways. Some firms have extended their planning services by employing planning graduates who are fully conversant with changes in planning legislation requirements rather than taking the risk of leaving the work to surveyors in the company. Others focused on infrastructure development and have walked away from doing any jobs that involve DAs altogether.

"We try to avoid town planning because these days the town planning laws are so complex that you need to be a town planning expert to deal with any town planning matters."

In NSW participants also reported the frustration with council engineers still not understanding that NSW surveyors are qualified in doing engineering design work. The need to either get an engineer to sign off on the work or spend time arguing to the validity of the appropriate qualifications but especially the loss of client confidence from such a lack of understanding is not just annoying but can also be very costly. Despite confirmation from past surveyor generals and senior levels of the Department of Planning and lobbying by the relevant Association, the anomaly persists. Again the experience is not global. How the engineering design work is accepted by the council changes from council to council depending often on the relationship the surveyor is able to establish with the planning department within the council and the attitude of the General Manager.

A growing number of firms have used the additional planning requirements as an opportunity to extend the services provided including the addition of planning expertise. Diversifying into service provision to a 'one stop shop' concept was reported by a number of expanding firms.

"We have steadily added disciplines to the business including planning experience, home design, landscape and architecture more recently."

"If we weren't in engineering and project management we probably wouldn't have a third of the work we now have."

Participants explained that the motive behind such a strategy is to mitigate the risk of having 'all the firm's eggs in one basket' and as one sector declines there are opportunities elsewhere. Although it was interesting to note that a number of other firms have actually chosen to work on building loyalty with one or two very major developers for a constant stream of high paid work.

Work Health and Safety (WHS) legislation has also added to the costs of survey work. Although at times the requirements are onerous, the cost is usually factored into the cost of doing the work and there was no pronounced dissatisfaction with the current requirements. The major concern expressed was that some competitors don't price in the cost of WHS and are therefore able to undercut the price for tenders. Several participants noted that unless they had WHS and Quality Assurance processes in place there may be difficulty in obtaining appropriate insurance. In addition any large clients such as RMS, Vic Roads or Sydney Water demand that these are in place before any work will be granted.

In terms of Industrial Relations, apart from the odd case here and there, in the main, participants reported there were no real issues in the profession. Although there had been some wage pressure of the last 5 years this was not considered by all participants to be a bad thing since it raised the profile of the profession as being able to attract new entrants. A stated characteristic of people in the profession was that they hated change and generally stayed in the same job for, in some cases, decades.

“If you recruit a country kid who likes playing sport and treat them well, you don’t have any industrial relation problems. That’s probably one of the good things about the surveying profession. Most of the people who end up doing surveying generally like fitting in.”

“I reckon we made this a good place to work. We do a lot of other things besides working here and that’s why people stay. We are pretty family based and I have been pretty proactive with the guys doing things like running and riding bikes and that sort of thing”

7.4.2 Clients

The critical external factor enabling the surveying firm’s survival and sustainable growth are their clients. Most firms reported that their initial services included surveying, engineering and planning work. Most firms have diversified in many cases taking on a project management role to meet client needs and mitigate risks of economic activity by being situated in only one sector. The changing nature of the ‘client market’ has occurred in the last two decades for a number of reasons.

“The days when you could sit by the phone waiting for the next job to come in have long since gone.”

Partly the loss of the luxury referred to by the last comment has occurred because of the lack of demand for identification surveys. Requests used to come into surveying offices almost at every change of ownership of a property or every new home that was connected to a bank loan. Banks have preferred to take the risk rather than employ the need for an identification survey and clients not being instructed as to the need for such a survey are not making the phone calls. This was once the ‘bread and butter’ income for many small firms in the past but has been significantly reduced over time.

Interestingly the ‘no employee’ firms in the survey confirmed that its clients have not changed a great deal over the years. The partners continue to do a number of identification surveys and with a recent change in dual occupancy laws a significant percentage of all allotments in subdivision have got their DA through dual occupancy. Other bread and butter clients include a variety of council work, railways, road acquisitions and smaller builders mainly for the residential market. These tend to be established clients that generally stay loyal although all public sector clients no longer have the autonomy that they once had to allocate contracts and must go to tender for each job.

All participants agreed that if they were to build their business, it was necessary to find loyal clients. The surveying firm needs to become necessary to the client’s existence. However all participants also agreed that clients’ expectations had increased dramatically.

“Clients are expecting things can be done easily and don’t understand that you are not always working just on their work. We used to be able to say, “ok there will be a 5 day delay because of the amendments you want”, but now they ask “can you have it done by 12.00 pm today?”

Several of the participating firms agree that the pressure can be immense and can be very challenging but it also becomes much more rewarding. They agree that some operational issues can be difficult but it is easier to manage a small number of very large clients than having to deal with a great number of small jobs. The pressure is constant.

“We just can’t say to our client, “You are not going to get your plans or your marks next week because we are too busy”. We just have to find a way to do it. We have managed to rise to such challenges by growing our business by an additional 55% in staff numbers. Our client loyalty depends on us getting it right.”

Although the loyalty factor is crucial for continued work, it is not always achievable.

“The bigger clients have a project manager who is reporting up in line. The consultants including the surveying firm, is the easy target to blame for something going wrong. There is not as much loyalty as there used to be.”

Cash flow is critical for any business but as pressure on the developer grows and margins are squeezed tighter, the need to choose clients carefully so as to ensure constant cash flow is paramount. Several of the bigger firms reported that they adhere to a classification of clientele from A to D. An ‘A’ client is generally one of the larger developer clients that pay their accounts within 30 days or sooner. They understand the surveying firm and its business. The surveyors have a clear indication of what the work requires and what their surveyors or engineers have to do. There is regular contact with the directors and owners of the client company who are pleased with the work that the consultant surveyors produce and are happy to continue working together.

“Two of us have really done most of the relationship and marketing for the last 10 years. We have our key clients that we basically dedicate a week a year to. We entertain and look after them and make sure that we get their business next year.”

The public relationship (PR) role referred to in the above comment is not one that surveyors generally feel comfortable in. However most of the larger participating firms agreed that given the competitive market, and the waning loyalty factor, if you have a good client, PR cannot be avoided if you want to stay in business. However the smaller firms especially many country firms still resist such PR activity.

A ‘B’ client is one of the larger construction companies who although they signed a contract that says they will pay within 45 days, do not and there is constant need to chase them for money. The loyalty factor with these clients is reasonably high but the surveying firm can never be sure how long that will last. The ‘C’ clients are the smaller mum and dad client who pay regularly but their jobs are small and valuable time needs to be invested to guide them all the way through a project because it will most likely be their only construction project. A ‘D’ client needs to be considered carefully and monitored closely. It is often better to refer them onto someone else if possible.

In summary, the clientele market has changed over the last decade due to the kind of work required and constant pressure of increasing expectations on time and price. Such pressures have created the need for additional activities not generally necessary in consulting surveying firms several years ago such as public relations and client monitoring to increasing levels.

7.4.3 Technology

Schumpeter (1961) argued that technological change provides the basis for the creation of new processes, new products, new markets and new ways of organising, and entrepreneurship is central to this process. Before technological change leads to new processes, products, markets or ways of organising, entrepreneurs must discover opportunities in which to exploit the new technology.

Participants in this study agree that although there have been sweeping changes to the way surveyors do their work because of new technology that has indeed created new process, new products, new markets and new ways of organising, many surveying firms have not found ways to exploit the new technology to their financial benefit.

Among the new surveying technology, Global Positioning Systems (GPS) and one man total stations have made a major difference to the way surveyors produce surveying products. One person can go out and do in one day the work that a 3 man party would do in 2 days 30 years ago. Using a third of the workforce has greatly improved productivity in the field. Furthermore what was measured would then be written into books by hand. When the surveyor came back into the office, the data were all hand produced and hand plotted. Now it's all straight from the instrument into the computer. CAD drafting software and design software have also added to productivity enhancement. There is also no need to upload information because it is now already in the computer and there is no need to do as many field checks as was once required, the instruments quite often check themselves. In addition computers have enabled the maintenance of extraordinary databases which has further enhanced surveyor's capability, productivity and market value. Although costs for new equipment continue to fall, it is still expensive.

"We've just taken on a big 3 year job with the Department of Defence. We spent over \$30K in upgrading some of our technology to meet the demand for that job. It's taken a year to find a job that will allow us to spend the money to do that".

Overall the instrumentation that surveyors use is much more sophisticated than it was 10 to 15 years ago. Consequently the plans that are prepared are also more sophisticated and are used by clients and contractors in new and different ways. For instance pegs for road building are a thing of the past. Plans in 3D models are prepared for the road builder and they load it into their GPS machine or their scribe or grader to do the work.

An additional benefit of new technology is the advent of ePlan which allows for the electronic lodgement of plans especially for country surveyors. ePlan has provided many functions that impact on positive cash flow for any business. In addition the SIX View system initiated by LPI in NSW has been described as leading the world.

Although some participants felt that the massive speed of technological change in this profession has peaked, others note that it appears to continue the trend set over the last two decades. They refer to brand new technology with smart phones and the increasing ability to use aerial photogrammetry with drones especially in the mining industry.

It would be expected that such major advances in technology would make a major impact on the demand for surveying skills and indeed many registered/licenced surveyors in the larger companies do not spend much time in the field any more. The work can be carried out by less qualified employees. However although the field work has provided opportunities for greatly enhancing productivity in the field, most participants agreed that there is now a lot more office work to support the new systems. The digital world requires processes to ensure that it is

accurate and equally important that it is up to date. Field work is now so dependent on digital data that processes have to be put in place to ensure that it is current all the time and that it exists in only one updated record. The process is a significant additional cost. The digital world has also meant that small changes to a plan which would take perhaps 5 minutes to rub out and redraw, now requires digital adjustment which can take up to 2 hours. Participants noted that the huge amount of data is not user friendly.

Perhaps the biggest problem with the improved technology is the lack of entrepreneurial perspective. As noted in the first paragraph of this section, the explosion of new technology should be exploited by surveying firms for financial benefit but that has not been the case. The recording and maintaining of data bases which costs time and effort was estimated by one firm to provide a sound return as value add to projects till they found out that other firms who had similar data bases were providing it to the clients for free. Other examples included when savings can be made on speed and efficiency of doing a job, this results in a price reduction to the client. Such price cutting behaviour can only lead to lack of appreciation for the value of surveying work and reduces client expectation of that value. It is difficult to understand such market behaviour and the whole profession suffers. Given the highly competitive current market surveyors are going to extreme lengths to get jobs even though financially this not sustainable and the products that such price cutting establishes can only be inferior.

In summary although there has been some process revolutionising new technology in the market place that have trebled the productivity of surveyors and their employees in the field, registered surveyors in NSW are still in short supply. The ability for less qualified staff to undertake some of the tasks out in the field that surveyors used to do has lessened the impact of the skills shortages that recent literature has discussed. However the checking of data that has been gathered stored and maintained throughout the digital process still requires the services of senior surveyors with a strong underpinning of surveying skills and qualifications. No matter how much technology advances there will still be a need for the human highly skilled professional who will create new ideas, good solutions and provide management skills for those in the profession following in their footsteps.

7.5 Internal changes

7.5.1 Structure

Several factors impacted on the structure of the firms that participated in this survey perhaps based on a combination of personal characteristics together with perceived market forces. A number of the partners in the smaller firms originally had experience in much larger organisations but did not enjoy the lack of control. Others saw the expansion of management issues and time spent in meetings and other organisational activity required in structures with lines of command as not what they wanted to do which was solving surveying problems.

“Less people to look after and less business management required. We see each other in the office every day rather than having meetings maybe once a month in other towns. Financially we seem to be better off than we were as a group.”

“We are open to offers and to being taken over but this is a good size for us. We have been in bigger organisations but we are more comfortable and have more control in this structure.”

“We looked at geographic expansion and we had a strategic plan to becoming multi-disciplinary but the areas we were considering to expand into were ultra-competitive and we could not make the numbers work. Same with becoming a multi-disciplinary firm, it would have been a backward step causing a lot of headaches.”

In direct contrast, growing, diversified firms felt that,

“Smaller companies are drying up over the next 5 to 10 years and the big companies are merging and operating a wide range of services.”

Others expressed financial freedom by becoming part of a very large organisation that spread their risk and provided them with a more secure future by having established systems in place especially in terms of financial management. Their house was no longer under the bank’s control and they did not need to concern themselves about selling the business when the time came for retirement. In such a large national organisation they also welcomed the opportunities to perhaps work for a few hours a week rather than retiring from the profession all together. Although such opportunities could also be available in a smaller firm, the rewards could not be as good. In addition it was noted that surveyors as a general rule are fitter than the general population because of their work and their sporting orientation and therefore they can be expected to be around a lot longer providing services to the community although it may be within shorter hours.

Others have merged to solve skills problems. For instances in some cases firms merged to acquire necessary missing skills so a firm with a surveyor partner and another with an engineering partner joined to establish a multi-disciplinary firm that has been very successful due to the merger and no problems of missing skills during a time that was seen as experiencing severe skills shortages.

Although one partner stated that,

“People go into surveying for the love of it not to make a fortune.”

Others said that they went into business to create wealth and were focused on growth. Their focus was on servicing large clients that are service driven and do not mind paying for a better product. Five year plans include mergers and take overs in areas where large projects are expected to be situated. In such situations, due diligence to establish cultural fit, can be critical. There is always the potential risk of a firm driven by the ‘love of the work’ joining a firm that is driven by growth to clash badly.

Firms that had successful experience with expanding resources through mergers and acquisitions have found that they are more likely to experience a smooth transition with like-minded companies rather than setting up in opposition. An additional problem with expansion into several regional areas occurs when a regional area/s goes into a down turn and regional headquarters needs to carry them. However diversification strategies provide staff with the opportunities to move around and do a variety of work without having to change jobs.

Growing firms recognise that they need to address the issue of keeping staff and making sure that they can service their clients. Combining those two objectives, structural strategies include share options for deserving staff. Not all firms are able to do this. Some owners state that they would have trouble having to share decision making responsibilities with their staff. Again there is that issue of control. Others recognise that generation Y and those that come after do not have the same loyalty ideals that previous generations had and if they are really entrepreneurial they will not want to stay around for a wage. The strategy to provide shares for such employees ensures that many years of investment in the training of intelligent employees is not lost and there is a built in commitment from the employee by the fact of ownership. This strategy has further benefits for the owners of the firm who may be willing to sell larger and larger segments of their shareholding as they get older and will not need to find a buyer for the whole firm in one go which is a problem expressed by a number of participants in the study for many surveyors who are trying to sell their business in the current market.

In summary, surveyors are not a homogeneous group of professionals. Their work orientation colours their expectations of the services they provide which does not augment well for any industry body trying to bring change to the industry.

7.5.2 Skills

All participants indicated that they had had problems recruiting new skilled staff especially registered/licensed surveyors. But to extrapolate the sourcing difficulty with a breakdown in the system is a little simplistic. All firms with skills shortages demonstrated some very inventive strategies to overcome their difficulties.

In some of the bigger firms in both states, senior members of staff volunteered to assist with teaching programs in universities teaching surveying degrees. Such a strategy provided them with access to students, especially country students before they graduated.

Other firms recruited from Otago University. With the local universities on average producing only 5% of demand, immigration has become a fall back strategy. Participants reported that NZ graduates were an excellent source of skills because they were willing to work over their summers while still at university and fitted in very well. Also it was possible to ask them if they had friends that wanted a job and a good choice of CVs would arrive to choose from. The down side however was that at least 50% of these NZ graduates got home sick after 2 to 3 years and returned home. Participants also reported that they had employed other nationals who had migrated to Australia from the Philippines, Iran and Nigeria. Although like most migrants they were hard workers, it took several years to bring them up to speed in language and Australian standards. A very few did reach registration although in one instance as soon as he received registration, the employee went to work for the mining industry and all that training was lost to the surveying firm. It would not appear that a major campaign to attract overseas surveyors could be an immediate solution given the years of training that is required to bring them up to standard even though such a strategy would assist in reducing the pressure on any technical pressures.

The extent of the surveying skills shortage problem tended to be modified by geographic location. Firms in Metropolitan Victoria were currently rationalising their human resources but this was coming off a very active base over the last 5 years. Shortages were experienced which were beginning to reduce project opportunities. The tighter market conditions have reversed this position. The Sydney Metropolitan firms reported similar difficulties in attracting skills to their firm however expectations were that there were imminently greater difficulties ahead. Currently casuals are sometimes employed to assist with work in the short term. Country areas in both states experienced the biggest difficulty in attracting new staff.

“It’s not just finding the appropriate skilled staff. You have to find a job for their partner and pay the transfer costs. If that person does not eventually fit in or moves on it can be a very expensive exercise.”

“Attracting registered surveyors to Orange is just about impossible. Even though we are very busy and Orange is a very beautiful rural city, they say to me, isn’t it cold in winter? They prefer to get a job somewhere in the north preferably on the coast even if there is not as much work.”

Regional surveying firms report that they continue to advertise the possibility of doing a Gap year with the firm to HSC students. They will also provide assistance if the person wants to go on with gaining qualifications in surveying. They have found some success with such strategies but are desperate for TAFE and university courses that provide flexible delivery of courses to reduce costs and keep the country student in the country where they prefer to be.

In one case it was found that environmental scientists provided the answer.

“Environmental scientists are adaptable. They are willing to learn, they don’t mind being out in the field because they have more versatility than an engineer or a town planner and they have a technical aptitude for surveying.”

In response to the lack of available skills in the market place, all firms provided training and development to up skill their employees at all levels.

“University does not teach the person the job you only learn that when you get out so the learning doesn’t stop for 10 to 15 years.”

Strategies to provide training include moving employees to various jobs and sectors of the firm so that they develop a broad range of skills.

“Every firm and every employee should have at least two or three skill sets. It is important to have a multi-disciplinary focus to satisfy the client’s needs and also have control of the outcomes and the quality of work.”

For field hands and technicians there is the opportunity to attend TAFE courses and for graduates there is supervision and mentoring assistance for registration or licensing for those that would like to move to the next level which takes at least two years but usually much longer. Unfortunately not all graduates aspire to undertake the registration process and some of the participants lament that they have employees that are excellent surveyors but without registration cannot do the final signing off on projects which legislation requires. In house training also takes place for new equipment and other perceived skills shortages within the firm.

In some cases, firms have not gone out to the market to find new surveyors in the traditional sense.

“We have never advertised for a surveyor. Rather than hire someone, the acquisition took place. Since then we have attracted others without too much effort.”

Most owners of surveying consulting firms have understood that they need to supplement their surveying skills with management, especially financial management skills and have undertaken additional courses especially in business management. In larger firms with divisional structures management training has also been undertaken to assist skill development.

“Surveyors are technical people. They love to solve the technical problems but with promotion they need to manage people and learn to delegate but they often find that difficult to do.”

In summary, all participants reported that they had problems in filling positions especially for registered surveyors however they had all undertaken a number of strategies including working longer hours and hiring casuals for peak periods to maintain the sustainability of their business. The demand for registered surveyors is an integral part of national development. A lot of contracts specify signing off by a registered/licensed surveyor. Maintenance of the integrity and absolute accuracy of the cadastre also underpins the need for the surveying profession. How this demand can be met given the current lack of profile and inability to attract new participants is another area of research that is urgently needed.

The break-up of technicians, field hands, planners etc. within each business was developed in the quantitative component of the study and was not repeated in this segment.

7.6 Future constraints

The profession of consulting surveyors consists of very highly skilled people who provide critical skills for national development. The most quoted constraint for the sustainability of the profession is the lack of commercial perspective within the surveying population. Two main aspects of the commercial process have been highlighted. These are marketing and pricing.

Some firms understand the concept of marketing and include their profile and brochure with a quote for a tender. They support local sporting teams and have well developed websites and promotion strategies. But for most surveyors it is not a skill that comes easily.

“If you do good work and no one knows that you do good work it is pointless. We try and get our senior people to make a call to their clients at least once at the beginning of the year. But it does not come naturally to them.”

Being a relatively small professional group there have not been the funds to hire marketing professionals to promote the profession in a similar fashion to the accountants and the surveyors have attempted to promote the profession themselves. It follows that because marketing does not come naturally to surveyors, this could be the very reason that they have had such problems promoting the amazing profession that occupies their working lives. In Victoria this problem has been addressed jointly by the industry through the establishment of a Surveying Taskforce managed by a marketing company and has seen a growth in numbers of students applying for courses at RMIT. The Victorian experience has demonstrated that for the profession to improve its profile and promotion to a sophisticated young market, professional marketing assistance needs to be on a national scale. Otago University in NZ has reported that student application numbers for surveying degrees are consistently higher following marketing campaigns. Also Curtin University in WA reported that following a marketing campaign by the mining industry, student applications for surveying degrees increased. The profession will not go away, the country's national development and basis of economic financial structure depends on it. As the numbers of professionals cannot meet the demand for their skills national development opportunities are and will continue to be lost. This is not a problem for surveyors. It is a national problem.

The second most quoted constraint also reflects a lack of promotional focus. Price under cutting has made the ability to grow a surveying business very difficult. Financial benefits from efficiency and productivity gains are passed onto the client instead of being used to grow the business. Price fixing is illegal and the Guide to Fees once published by the relevant Associations, have been banned by the ACCC. Somehow the message that getting the job at unsustainable levels is very short sighted and only addresses the immediate problem needs to be addressed by the profession. Keeping that client is of no value because they now expect the unsustainable price but because it is only sustainable with an inferior product no one benefits.

But again this is not an issue to be solved by the individual surveying firm. Local councils are among the clients that have been instructed to accept the lowest price regardless of the product. The individual firm cannot address this issue. It needs to be dealt at higher levels.

Other constraints noted are the threat of commercialising the Land and Property Information (LPI) and the possibility of non-registered surveyors undertaking cadastral work. But these are political issues for the future. Surveyors have generally been very good in working with government and lobbying their politicians and these issues will be addressed as they arise but the immediate problem of a skills shortage is an issue that needs attention immediately.

The quantitative analysis of demand for surveyors demonstrates that the perceived shortage is manageable for the a few years but will become critical in a few years as construction plans in all sectors are ramped up. Proactively addressing the imminent surveying skills crises cannot be left to the individual surveying firm. Only collaborative action on a national scale will provide a solution.

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APPENDIX A

Survey Questionnaire

CSN Skills Demand Study 2013/14 to 2023/24 - Skilled Workforce Data Collection Survey for South Australia

Please enter details in white cells

Where you see a downward arrow next to a box, please click on the arrow and choose response from the drop-down list

1. Please provide the size of the current skilled workforce by qualification within your firm or organisation:

| | Technicians Without formal qualifications | Technicians With formal qualifications (eg. Certificate/Diploma) | Graduates With a Bachelor degree - not licensed or endorsed | Graduates With a higher degree (Masters, PhD) or licensed/registered |
|---------------------|--|--|---|--|
| Surveyors | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Spatial Scientists | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Other Professionals | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |

Are you a certified professional from SSSI or a likeminded professional body? ▼

How long have you been certified?

Do you intend to become a certified professional from SSSI or a likeminded professional body within the next three years or renew your certification? ▼

2. Please provide the size of current skilled workforce by specialist occupation and by age group within your firm:

| | 15-24 | 25-34 | 35-44 | 45-54 | 55-64 | 65+ | Total |
|---|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| SURVEYORS | | | | | | | |
| Cadastral Surveyor | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Construction Surveyor | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Engineering Surveyor | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Mining Surveyor | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Other Surveyors | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Total Surveyors | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> |
| (of which Registered/Licensed Surveyors) | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| GEOSPATIAL SPECIALISTS | | | | | | | |
| Land Management | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Environmental Management | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Health Communities and Management | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Infrastructure and Telecommunications | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Law Enforcement and Emergency Management | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Retail | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Remote Sensing and/or Photogrammetry | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Total Geospatial Specialists | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> |
| TECHNICIANS | | | | | | | |
| Surveying Technician | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Spatial Science Technician | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Total Technicians | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> |
| OTHER PROFESSIONALS | | | | | | | |
| Planners | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Environmental Scientists | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Engineers | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Others | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text" value="0"/> |
| Total Other Professionals | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> |
| Total of defined skilled workforce | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="text" value="0"/> |

3. Please provide the average number of retirements by specialisation and by age group per annum over the last three years (ie from 2011/12 to 2013/14):

| | 15-24 | 25-34 | 35-44 | 45-54 | 55-64 | 65+ | Total |
|--|-------|-------|-------|-------|-------|-----|-------|
| SURVEYORS | | | | | | | |
| Cadastral Surveyor | | | | | | | 0 |
| Construction Surveyor | | | | | | | 0 |
| Engineering Surveyor | | | | | | | 0 |
| Mining Surveyor | | | | | | | 0 |
| Other Surveyors | | | | | | | 0 |
| <i>Total Surveyors</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (of which Registered/Licensed Surveyors) | | | | | | | 0 |
| GEOSPATIAL SPECIALISTS | | | | | | | |
| Land Management | | | | | | | 0 |
| Environmental Management | | | | | | | 0 |
| Health Communities and Management | | | | | | | 0 |
| Infrastructure and Telecommunications | | | | | | | 0 |
| Law Enforcement and Emergency Management | | | | | | | 0 |
| Retail | | | | | | | 0 |
| Remote Sensing and/or Photogrammetry | | | | | | | 0 |
| <i>Total Geospatial Specialists</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TECHNICIANS | | | | | | | |
| Surveying Technician | | | | | | | 0 |
| Spatial Science Technician | | | | | | | 0 |
| <i>Total Technicians</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER PROFESSIONALS | | | | | | | |
| Planners | | | | | | | 0 |
| Environmental Scientists | | | | | | | 0 |
| Engineers | | | | | | | 0 |
| Others | | | | | | | 0 |
| <i>Total Other Professionals</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

4. Please provide the average number of redundancies by specialisation and by age group per annum over the last three years (ie from 2011/12 to 2013/14):

| | 15-24 | 25-34 | 35-44 | 45-54 | 55-64 | 65+ | Total |
|--|-------|-------|-------|-------|-------|-----|-------|
| SURVEYORS | | | | | | | |
| Cadastral Surveyor | | | | | | | 0 |
| Construction Surveyor | | | | | | | 0 |
| Engineering Surveyor | | | | | | | 0 |
| Mining Surveyor | | | | | | | 0 |
| Other Surveyors | | | | | | | 0 |
| <i>Total Surveyors</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (of which Registered/Licensed Surveyors) | | | | | | | 0 |
| GEOSPATIAL SPECIALISTS | | | | | | | |
| Land Management | | | | | | | 0 |
| Environmental Management | | | | | | | 0 |
| Health Communities and Management | | | | | | | 0 |
| Infrastructure and Telecommunications | | | | | | | 0 |
| Law Enforcement and Emergency Management | | | | | | | 0 |
| Retail | | | | | | | 0 |
| Remote Sensing and/or Photogrammetry | | | | | | | 0 |
| <i>Total Geospatial Specialists</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TECHNICIANS | | | | | | | |
| Surveying Technician | | | | | | | 0 |
| Spatial Science Technician | | | | | | | 0 |
| <i>Total Technicians</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER PROFESSIONALS | | | | | | | |
| Planners | | | | | | | 0 |
| Environmental Scientists | | | | | | | 0 |
| Engineers | | | | | | | 0 |
| Others | | | | | | | 0 |
| <i>Total Other Professionals</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

5. Please provide the number of new hires by area of specialisation and by age group in 2013/14:

| | 15-24 | 25-34 | 35-44 | 45-54 | 55-64 | 65+ | Total |
|--|----------|----------|----------|----------|----------|----------|----------|
| SURVEYORS | | | | | | | |
| Cadastral Surveyor | | | | | | | 0 |
| Construction Surveyor | | | | | | | 0 |
| Engineering Surveyor | | | | | | | 0 |
| Mining Surveyor | | | | | | | 0 |
| Other Surveyors | | | | | | | 0 |
| <i>Total Surveyors</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (of which Registered/Licensed Surveyors) | | | | | | | 0 |
| GEOSPATIAL SPECIALISTS | | | | | | | |
| Land Management | | | | | | | 0 |
| Environmental Management | | | | | | | 0 |
| Health Communities and Management | | | | | | | 0 |
| Infrastructure and Telecommunications | | | | | | | 0 |
| Law Enforcement and Emergency Management | | | | | | | 0 |
| Retail | | | | | | | 0 |
| Remote Sensing and/or Photogrammetry | | | | | | | 0 |
| <i>Total Geospatial Specialists</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TECHNICIANS | | | | | | | |
| Surveying Technician | | | | | | | 0 |
| Spatial Science Technician | | | | | | | 0 |
| <i>Total Technicians</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OTHER PROFESSIONALS | | | | | | | |
| Planners | | | | | | | 0 |
| Environmental Scientists | | | | | | | 0 |
| Engineers | | | | | | | 0 |
| Others | | | | | | | 0 |
| <i>Total Other Professionals</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

6. Please specify the sector from which you sourced your new hires in 2013/14:

| | New Graduate | From Private Sector | From Public Sector | Total |
|---|--------------|---------------------|--------------------|-------|
| Number of new hires during last 12 months by sector | | | | 0 |

6b. How would you rate the current level of difficulty in filling surveying and geospatial positions?

Minor difficulty - Managed to fill vacancies, but dissatisfied with the pool of candidates overall (with respect to size of pool, qualifications of candidates, etc)
Moderate difficulties - Able to fill vacancies only after extensive effort (eg. after re-advertising a position)
Severe difficulties - Unable to fill vacancies satisfactorily

Surveyors

Technicians

Graduates

Registered/Licensed or endorsed by Surveyors Board

Higher degree

Spatial Scientists

Technicians

Graduates

Higher degree

Other Surveying related occupations

Please click on downward arrow and choose from drop-down list

6C. Do you perceive there is a skills shortage in surveying and geospatial occupations?

6D. If yes, do you expect the skills shortage to worsen over the short to medium term (ie over 2014 to 2017)?

7. Do you intend to hire more staff in 2014/15?

If yes, please provide the number of expected new hires in 2015?

8. Characteristics of your firm:

8A. Are you a sole proprietor?

Are you a partnership firm?

Are you a company?

Please provide the number of employees employed by the firm

What proportion of the skilled workforce are males?

Is your main office located in a city or metropolitan area?

If yes, please specify major city?

If no, please specify regional area?

Please specify the number of branches of the firm

8B. Are you a Government Department?

If yes, please specify if you are a local council, state or federal government department?

9. Changing composition of firm or organisation workforce over recent decades:

Please provide a distribution (%) of your workforce by qualification during the 1990s:

Unskilled Diploma University Registered Surveyors

Please provide a distribution (%) of your workforce by qualification during the 2000s:

Unskilled Diploma University Registered Surveyors

Please provide a distribution (%) of your current workforce by qualification:

Unskilled Diploma University Registered Surveyors

9b. What percentage of your skilled workforce was trained within your state?

10. What are the core services offered by your firm or organisation?

| | | |
|--------------------------------|---|---|
| <input type="text"/> Cadastral | <input type="text"/> Construction Surveying | <input type="text"/> Engineering Surveying |
| <input type="text"/> Geodetic | <input type="text"/> Project Management | <input type="text"/> Planning and Development |
| <input type="text"/> Mapping | <input type="text"/> Mining Surveying | <input type="text"/> Environmental Surveying |
| <input type="text"/> GIS | <input type="text"/> Certification | <input type="text"/> Infrastructure Design |
| <input type="text"/> Other | | |

11. What client services do you think your survey practice or organisation will need to offer in the next 5 to 10 years?

12. What skills will be required for each type of new future service?

13. Improvements in technology have lifted the productivity of surveyors and spatial scientists greatly over recent decades. Do you foresee technological change and productivity improvements over the next 10 years?

If Yes, what areas do you see an increase in productivity?

If No, please provide some reasons?

14. Do you see any impediments to your practice due to the attitude, processes and relationships that you have with local and state Government?

If Yes, do you see a need for staff to have training or relevant experience when dealing with local and state Governments?

15. Can you identify potential constraints impacting on the viability of consulting surveying firms in the future?

16. To what extent is competition from larger building and professional services firms (eg consulting engineers) an impediment for the sustainability of consulting surveying firms?

17. Please provide the contact details of your business:

Business Name

Address

Contact person and telephone number

Thank you for completing the survey

Instructions to send questionnaire:

1. Save the questionnaire on your computer as an 'Excel Macro-Enabled workbook'.
2. Enable all macros in Microsoft Office Excel (instructions to 'enable macros' is provided on the right hand side).
3. Click on 'submit by email' option below and press 'send' in Microsoft Outlook'.

Alternatively, save the file on your computer and send the questionnaire as an attachment in an email to KSen@bis.com.au
If you encounter any problems, please call Kishti on (02) 8458 4251

Consulting Surveyors National (CSN) thanks the following organisations for their financial contributions. This updated review of supply and demand conditions in the Australian surveying profession would not be possible without their support.

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The Association of Consulting Surveyors NSW



The Association of Consulting Surveyors Victoria



The Institutions of Surveyors NSW



The Surveying & Spatial Sciences Institute (SSSI) South Australia

