



Issues Relating to Skill shortages and labour Force Management in the Greater Brisbane Labour Market

Supplementary Report

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Executive Summary

The Initial report *Skills Shortages in the Greater Brisbane Labour Market 2012-2021* and the updated report in 2013 were designed to examine likely labour market conditions in the Greater Brisbane Labour Market (GBLM) over the next decade, highlight potential labour market bottlenecks over that period and, where required, propose remedial action. In accomplishing these tasks a number of related issues emerged, which are worthy of analysis but were not part of the brief of the study. Some of these issues are covered in a supplementary report. The choice of topics to cover in this report are somewhat eclectic but are connected by their relevance to the future supply of labour in the GBLM in an occupational and industrial sense. They contribute to our current understanding of the GBLM and may lead to further research issues being generated. The supplementary report proceeds in the following way. Section 1 examines changes in the distribution of employment in Brisbane and uses additional sources to examine the conclusions on labour market conditions reached in the main report. These additional data support our conclusions both on the extent and direction of labour market change but also are more sensitive to the mild slowdown in labour market pressure that has occurred over the last 18 months. For example, one area of particular interest, not covered in our initial report, was the area of labour market segregation by gender. The report provides the first quantitative estimates of the extent of and changes in the degree of gender workforce segregation in Brisbane over the last decade and for comparisons sake these are also compared with similar estimates for the United States. Using the Duncan index of dissimilarity, the results indicate that throughout the GBLM, occupational segregation is low and diminishing (from a 3.2% bias in terms of males in 1999) to 2.7% bias in favour of males in 2011. Yet, these results mask some larger differences among the most popular occupations that reflect the contemporary GBLM. Our main findings are:

- Females (proportionately) slightly outnumbered males in Professional occupations and this has increased over the census period from 2.1% in 2006 to 3.2% in 2011.
- This reflects the growing significance of Professionals and “Para- professionals “in Health related and Community Service type industries.
- At a more disaggregated level males are most significant in terms of percentage employment in the five largest occupations in terms of Technicians & Trades (roughly unchanged at 35%) and Managers (approximately 14%). Females are the dominant group in Community and Personal Services, down about a percentage point to 18.8% in 2011.

Overall, the GBLM is less segregated than the US average as a whole, although comparisons between a city and a whole country can be problematic because estimates

at the national level include metropolitan and regional areas. Gender segregation is normally higher in regional areas.

In our main report the strong growth in Professional employment was highlighted, however, due to the number of tasks to be achieved in that report, the topic of Professional employment was not explored at a more disaggregated level. Section 2, in the supplementary report examines this growth in Professional employment in greater depth. It shows that while the professional category as a whole is experiencing high demand, this demand is not evenly spread across all Professional occupations. Specifically, the professions most in demand are:

- Education Professionals
- Business, Finance and Human Resource Professionals
- Medical Practitioners and Nurses
- ICT Professionals
- Legal, Social and Welfare Professionals

It also shows that:

- Throughout Australia employment of Professionals is expected to continue to rise strongly over the next five years in a relative and absolute sense (increasing by 10.4 per cent over the period 2016-17 and to account for approximately 30% of all new jobs).
- This will be disproportionately in the *Health Care and Social Assistance* industry particularly among Medical Practitioners and Nurses, and Health Diagnostic and Therapy Professionals¹.
- Synergies predict that the rate of growth in the demand for Professionals will be even greater in the GBLM. This growth will be supplemented by growth in the Services to Mining industry. However, this conclusion is conditional on the active development of industries compatible with the resource and mining industry growth in the State.

Section 2 also investigated the issue of labour force re-entry. This was based on the premise that, in some occupations, anecdotally nursing and teaching and some trade areas, there exist a reserve army of qualified persons who have left the occupations for which they initially trained but who may be available to fill labour market shortfalls

¹ Note, the unexpected surge in employment numbers in New South Wales in April 2013 was mainly due to the increased employment in health related areas.

under the right circumstances. Our investigation provided a number of conclusions on this issue of a “reserve army”:

- The extent of qualified persons not working in the profession for which they initially trained is relatively high, for example, upwards of 20 percent in nursing.
- However, the majority of these persons were retired (through age or family care circumstance) and /or were working in other occupations.
- There were also a range of issues such as working conditions that led to their original decision to leave and which would need to be altered before these persons would consider a return to their original profession.
- Those that were still in the workforce were in other skilled areas, any decision they made to return to their original job would create shortages elsewhere.
- In the final analysis, despite our initial enthusiasm for this strategy of re-entry, there does not appear to be large numbers of trained workers willing to re-enter the market and the “reserve army” is more legend than reality.
- This fits in with the well-known labour market observation that skilled workers tend to work longer than non-skilled workers and those that do eventually leave the labour market are unlikely to return.
- The broader conclusion is that more attention need be given, both by the individual and training institutions, into the initial selection of courses and career paths. The high rates of drop out of persons from their initial career choices indicate poor initial selection and an inefficient use of training and education facilities.

Section 3 examines the area of skilled labour supply and the implications that structural changes in the provision of training in universities, via the “Melbourne Model” may have on both the supply and educational requirements for the future domestic supply of skilled labour. The Melbourne model (and variations across a number of Universities such as the University of Western Australia) entails:

- Reshaping its undergraduate curricula;
- Introducing more professional graduate programs; and
- Strengthening the preparation for doctoral research.

Under this model, undergraduate offerings will be scaled back and organised around 6 “new generation” Degrees:

- Bachelor of Arts
- Bachelor of Biomedicine
- Bachelor of Commerce
- Bachelor of Environments
- Bachelor of Music
- Bachelor of Science.

Students may then choose to specialise in traditional areas such as Law and Medicine or Commerce but within the confines of a two year professional masters course. Courses that yield a large number of graduates at honours level, for example in commerce and economics, would, under this model, cease to be offered. This has potentially serious implications for those that have left University at the Honours level, In this case the cost of this additional year of schooling will be met jointly by the student, who forgoes one year of income, and the employer who may be required to meet the higher “reservation” wage of the students with an extra year of training. The other immediate implication will be an artificial lift in the number of persons possessing post-graduate qualifications. One important positive feature of the changes, were they to become widespread, would be that the Australian tertiary qualification scheme would become more aligned to overseas courses in structure and alignment, making it easier for the free exchange of skilled labour. Therefore, in terms of the total number of available graduates available for the GBLM (domestic and immigrant) the impact of the changes is unknown but there will be short term dislocation effects.

The supplementary report continues with an in depth evaluation of the Services to Mining Industry. Synergies (2007) had identified the Services to Mining Industry in Queensland (GBLM) was significantly under-developed, particularly in comparison to the extent of the industry in Western Australia. The potential for the growth in this industry was also recognised in the initial RDA report as a major potential growth area for skilled employment if the constraints to the growth of the industry in Queensland could be removed. The development of this industry appears to be one of the major challenges facing Queensland. The GBLM is seen as the logical place from which to draw skilled labour for this industry. Section 4 examines the potential for the industry as a contributor to the Brisbane and Queensland economies and as a demander of skilled labour. The identification of a key future industry sector requiring skilled labour was a major request arising from our initial report. As a result, a considerable amount of resources were expended to provide a detailed evaluation of this emerging industry. To achieve this, the report:

- Used a specifically- constructed Services to Mining Sector in the economic modelling utilizing coefficients established in the Western Australian economy and other data supplied by the Australian Bureau of Statistics².
- Full details of the logic behind this construction are shown in the report.
- Evaluated the potential net contribution to the State economy if the industry achieved a similar level of economic integration as achieved in the Western Australian economy.
- It was found that labour constraints loomed as a potential threat to the expansion of the industry.

Potential labour market constraints (and the reasons behind them) as identified by the Mining Council of Australia (MCA) were examined and evaluated. Specifically the MCA argued for more focused role being played by the Federal and State Governments to:

- co-ordinate a national strategic approach to drive through reforms to the VET system, to put industry skill outcomes and employment as the measure of success;
- that is, to restructure training from a supply-side driven to demand side driven training system³.

Within this new structure the key role for all Governments is to:

- ensure the quality of training providers, particularly in regard to the rigor of training delivery and assessment;
- use off-site standard equipment and appropriate job hazard analysis⁴;
- provide publicly available information on RTO performance to assist enterprises in purchasing quality training; and
- implement a national schools' curriculum with enhanced capacity in language and STEM subjects, and consistency between jurisdictions to avoid disadvantaging children whose family re-locates to follow employment and career opportunities.

² Western Australia has Australia's most developed Services to Mining Industry. However, even here, the industry is far less developed than in overseas countries such as Canada.

³ Essentially meaning a training system that responds more to emerging industry needs rather than a continuation of the tradition craft or trades based approach common to most educational systems

⁴ According to the MCA, "while the Australian Quality Training Framework (AQTF) provides a framework for assessing the systems and processes carried out by Registered Training Organizations (RTOs), it has not yet driven the quality improvements that would engender industry confidence in the VET product"

The MCA also argues that State Governments, as the owners and employers of the TAFE system, have a role in managing the TAFE system to deliver outcomes responsive to the needs of industry and the economy. They are particularly critical of the tendency for TAFE providers of supporting

“Popular or low cost community courses not directly related to national productivity”.

They argue that the training role for industry in the schools system is largely undeveloped in Australia and have concerns about the standards of teaching at the secondary and tertiary level. A major concern of the MCA is the inability of the industry to perform its “often claimed” role of allowing the rural and regional populations, where the mining takes place, to share the benefits of the industry through increased employment. Specifically their recommendations regarding the overall issue of labour force productivity and improvement were:

- to ensure that all Australians, including those in remote and regional Australia, are able to participate in the minerals industry workforce
- promotion of Governments and industry partnerships to ensure that publicly funded training for skills is focused on areas that contribute most to the national economy and that lead to sustainable and meaningful employment;
- focusing of Government programs to improve language, literacy and numeracy and work readiness skills of school leavers and the disengaged;
- Governments to drive the implementation of new School-Based Apprenticeships and Traineeships by states in collaboration with industry, relevant to skill shortage occupations in the minerals sector;
- support of regional higher education markets through more responsive regional loadings;
- the establishment of cross-sectoral collaboration to grow the pool of skilled labour in regional Australia and act as a buffer for the cyclical nature of mining;
- multi-skilling of agricultural labour and farmers to allow them to operate as a reserve labour force during periods of mining booms;
- development of a memorandum of understanding with the National Farmers Federation to allow joint labour force training development;
- Strategic Skills focus across all industries to prevent dislocation caused by demand in one particular sector; and

- incentive schemes to encourage local people to remain in regional Australia and to encourage jobseekers to relocate to obtain jobs.

As a consequence of these ideas, discussions regarding labour supply were held with local employers/contractors to identify the current and likely future state of the labour market for skilled workers in this area.

- The discussions indicated that the Mining/Mining Services Industry was experiencing a rare lull in labour market pressures for skilled workers in the industry across the range of technical and business related activities.
- In the GBLM and within Queensland this was put down to the job losses in the public service, the cancellation and/or closure of mining projects and the reduction in Government sponsored consultancies⁵.
- The broad opinion was that these were temporary and that an increase in labour demand within this industry and the Mining industry in general was likely to occur.
- It was found that the labour hire firms in this industry had a high opinion of local graduates but still tended to hire workers with 7-10 years of work experience and this limited the career opportunities of local graduates in their initial years in the workforce.
- A partial remedy to this problem, suggested by one of the companies, was to upgrade the number of industry placements given to graduates during the course of their studies.

Finally, section 6 revisits the conclusions made in the 2011 report concerning the likely output over the period from Queensland Tertiary Institutions. We have updated our predictions of tertiary enrolments and completions, showing an increase over our previous estimates but still not sufficient to meet expected demand.

⁵ The longer term impacts here are difficult to predict. However, it is well known that skilled labour in mining is highly mobile

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1 Introduction

This supplementary report is designed to cover issues that both expand the range of analysis undertaken in our previous report, *Skills Shortages in the Greater Brisbane Labour Market 2012-2021*, and examine emerging issues that will impact on the labour market in Greater Brisbane in years to come. It focuses on some key issues underpinning the labour market trends identified in our previous report as well as providing the first estimates of labour market segregation by gender within the Greater Brisbane Labour Market (GBLM).

The scope of the report is to address the following research questions:

1. Examine the labour market made in our main report in the line of the findings of others and in the light of the recently released findings of the 2011 Census data. The report also provides the first estimates of the level and trends in gender segregation in the GBLM.
2. A disaggregation of the Professionals labour market. This is done to develop our findings that this group will provide the largest increase in labour demand for the GBLM over the next 10 Years. The intent here is to show that while this category as a whole will be in high demand, there will be considerable within-group variation in demand depending upon the specific type of professional training required.
3. Research on the number of people with qualifications in areas of predicted skill shortage not engaged in the labour market. This specifically investigates the “reserve army” hypothesis for those persons not in the labour force, which is often seen as a potential source of skilled labour in a tight labour market.
4. Identification of a potential growth industry for the GBLM in the short to medium term and investigate the implications this will have for skilled labour force planning. Part of this latter aim is accomplished by consultations with local firms specialising in the relevant labour markets.
5. Provide a breakdown of domestic and international student numbers, and “update” the low forecasted tertiary graduations.
6. The supplementary report is structured as follows:

Section 2 uses the recent census regional and small area data to examine trends in the GBLM. This section provides corroborating evidence and additional insights to the work undertaken in our previous report.

Section 3 uses the census data to examine an issue that was not examined in the original report; gender segregation in the GBLM. This was undertaken because, while it is known that considerable structural change has occurred over the last decade, it is not known how this impacted on the relative position of males and females in the labour market or if the identified labour skills shortages translate equally across males and females.

Section 4 examines some of the structural changes that are taking place in tertiary education. These changes, if adopted by Queensland Universities, will have significant impacts on the flow of students as well as the classification of their qualifications. They will also have implications for the flow of international students.

Section 5 builds on the original report by providing an in depth report into an industry of interest; the Service to Mining industry. It examines current and future labour force issues within this industry.

Section 6 revisits the issue of the capacity of local University and VET providers to meet expected labour demand. It incorporates new data and information to provide revised estimates. These show greater output than previously predicted but still insufficient to meet expected demand.

Section 7 has the summary and conclusions and links the findings of the supplementary report with those of the main report and provides overall recommendations.

2 Inter census changes in the Greater Brisbane Labour Market 2006-2011

Economists rely on two main forms of data for labour market analysis; data from the Census of Housing and Population (hereafter referred to as Census data) and data obtained from the labour force survey. Census data is highly prized because it provides a rich picture of the labour market environment and the social and economic context which influence labour market outcomes. The main problem with Census data is that although it provides a detailed snapshot of most aspects of the labour market it is collected only every 5 years. In between time, basic labour force data is gathered through the monthly and annual labour force surveys, which provide both stock and flow data on the main labour force aggregates of employment, unemployment, participation and the size of the labour force. Other primary data sources, such as longitudinal surveys, are more irregular. While these data sources provide comparable data they are not fully reconcilable, with the labour force surveys generally (when compared to the census) providing under estimates of the main labour force aggregates⁶.

Release of new Census data, when compared to the previous Census data provides a good opportunity to examine the extent of structural change over the previous 5 years and to cross check the analysis that has emerged from use of the labour force survey data. Below we provide a brief analysis of the main changes to the GBLM over the inter-census period 2006-2011. The data provides information on structural change and it is a means of cross checking some of the analysis completed in our previous report⁷.

Over the 5 year period:

- total population of the Greater Brisbane area increased to 1.651 million, 12% higher than in 2006;
- the labour force expanded by 14% or an average of 2.8% per annum⁸;
- the larger increase in labour force size compared to the total population was driven by an increased participation rate (65% compared to 63.8%);

⁶ The reasons for this relate to issues inherent to survey taking but also relate to the fact that some participants in the labour market (for example in the informal economy) do not provide accurate information to the labour force surveys but their presence can be detected by close scrutiny of the census data' A similar event occurs in UK data collection see, <http://www.ons.gov.uk/ons/rel/census/2011-census/key-statistics-for-local-authorities-in-england-and-wales/rpt-labour.html>

⁷ Using data provided by the Australian Bureau of Statistics

⁸ The use of the Labour Force survey yield a 2000-2011 average period estimate of 2.9% annual growth

- the increased participation rate was a factor causing increased unemployment, both in absolute terms (63,865 compared to 41,490) and per-cent terms (3.8% compared to 2.8%) as more people became active in job search, although there is also some evidence of reduced labour demand;
- full time employment remained the dominant form of employment overall (declining slightly from 40% (in 2006) to 39.7% (in 2011)) and for males (again with a slight decline in percentage from 63.3% to 62.4%); and
- for females, part-time employment remained the majority form of employment for women (67.9% down from 69.2%).

Overall, the picture of the GBLM over the inter-census period is one of a maturing labour market with a gradual continuation of the main drivers that have characterised most mature labour markets of the last two decades:

- modest labour market growth (2-3% per annum); and
- slow feminisation of the labour market and a slow retreat from full time work.

These trends were interrupted (modestly) over the 2006-2011 period by the Global Financial Crisis (GFC) which slowed economic growth and the upward trend in labour force participation. The GFC and its aftermath also led to the increase in unemployment.

2.1 Changes in the occupational distribution of employment

Occupations in Australia and New Zealand are classified under the Australian and New Zealand Standard Classification of Occupations (ANZSCO) and consists of 1,014 occupations covering all jobs in the Australian and New Zealand labour force; 358 unit groups each containing a number of occupations; 97 minor groups each containing a number of unit groups; 43 sub-major groups each containing a number of minor groups; and 8 major groups each containing a number of sub-major groups⁹. On most occasions the discussion of occupations centres on the 8 major subgroups¹⁰.

The top 5 occupations (see Table 1), by number, by 2011 and the relative change in these over the inter census period were:

⁹ [ANZSCO- Australian and New Zealand Standard Classification of Occupations- First Edition, Revision 1](#) (cat. no. 1220.0).

¹⁰ Managers Professionals, Technicians and Trades Workers Community and Personal Service Workers Clerical and Administrative Workers, Sales Workers, Machinery Operators and Drivers and Labourers

- Professionals (including those formerly labelled as paraprofessionals)
- Clerical and Administrative Workers
- Technician and Trades workers
- Managers
- Community and Personal Service Workers.

Table 1 Occupational Distribution in Greater Brisbane Labour Market, 2011

Industry	Managers	Professionals	Technicians & Trade Workers	Community & Personal Service Workers	Clerical & Administrative Workers	Sales Workers	Machinery Operators & Drivers	Labourers	Inadequately described	Not Stated	Not Applicable	Total
Agriculture, Forestry and Fishing	-8.3	-0.9	-0.8	-0.1	-0.3	-0.4	-0.4	-9.9	0.0	0.0	0.0	-21.0
Mining	24.9	49.7	14.5	0.7	20.2	0.3	16.5	3.8	1.8	0.1	0.0	132.6
Manufacturing	0.3	0.1	-1.2	0.1	-0.3	-0.2	-1.1	-1.8	-0.2	0.1	0.0	-4.4
Electricity, Gas, Water and Waste Services	5.1	9.9	5.7	0.1	6.7	1.1	5.3	1.9	0.5	0.1	0.0	36.3
Construction	1.9	2.0	7.2	0.0	2.0	0.0	2.0	1.6	-0.1	0.1	0.0	16.7
Wholesale Trade	1.1	1.6	0.4	-0.1	0.2	-0.1	0.5	-1.4	0.0	0.1	0.0	2.2
Retail Trade	0.2	0.5	-0.6	-0.2	-0.2	4.1	-0.1	-1.2	0.0	0.1	0.0	2.5
Accommodation and Food Services	2.8	-0.1	2.9	5.7	0.4	1.5	-0.1	3.1	-0.1	0.2	0.0	16.4
Transport, Postal and Warehousing	1.5	2.8	1.3	0.3	3.0	0.5	6.6	1.0	0.3	0.2	0.0	17.4
Information Media and Telecommunications	1.7	1.4	-2.1	0.0	-3.3	1.0	-0.5	-1.3	-0.3	0.0	0.0	-3.4
Financial and Insurance Services	0.9	3.3	0.0	0.0	2.2	-1.0	0.2	0.0	-0.3	0.1	0.0	5.5
Rental, Hiring and Real Estate Services	0.1	-0.7	0.2	-0.2	-0.7	-0.6	-0.1	-0.4	-0.3	0.1	0.0	-2.5
Professional, Scientific and Technical Services	4.9	17.9	3.2	0.1	4.1	0.4	0.0	-0.7	0.7	0.1	0.0	30.6
Administrative and Support Services	2.8	2.7	0.5	0.8	3.3	0.7	0.6	4.3	0.2	0.1	0.0	16.0
Public Administration and Safety	2.7	4.6	-0.5	5.2	4.1	0.0	0.1	0.3	1.9	0.1	0.0	18.6
Education and Training	1.5	8.9	0.0	2.5	1.9	-0.1	0.0	0.3	0.4	0.0	0.0	15.6

Industry	Managers	Professionals	Technicians & Trade Workers	Community & Personal Service Workers	Clerical & Administrative Workers	Sales Workers	Machinery Operators & Drivers	Labourers	Inadequately described	Not Stated	Not Applicable	Total
Health Care and Social Assistance	1.5	13.5	0.7	8.9	4.5	0.0	0.0	0.5	0.5	0.1	0.0	30.3
Arts and Recreation Services	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Other Services	1.3	0.9	5.3	3.7	1.4	-0.2	0.0	0.1	0.3	0.0	0.0	12.7
Total	0.8	2.4	0.6	1.0	0.9	0.3	0.3	0.0	0.1	0.1	6.3	12.8

Source: DEEWR (2012)

Over the inter-census period Professionals become the largest single occupational group in Greater Brisbane (see Table 2). However, the term Professional covers a large variety of particular occupations. Attachment A provides more disaggregated data on Professions. In essence the growth in the Professionals category is symptomatic of the general increase in the level of education and training in the society as a whole and the need for greater levels of education and skill to undertake a greater proportion of tasks.

Another feature of the increase in Professional groupings is the fact that females (53.2%) made up the bulk of those employed as professionals which reflects two related facts; the increased number of health and community service occupations in the Professional occupations and the growth in female completion of tertiary study (particularly at the undergraduate level). This point is supported by an analysis of the distribution of employment in GBLM by industry. The top employing industries in 2011 are shown in Figure 2. The largest single employing industry is Health Care and Social Assistance, which is 77% female.

2.2 Inter-census shifts in education and skill distribution

For education, the data in Table 3 confirms the trends discussed in our initial report.

Table 2 Higher Levels of Education, All persons GBLM

	2011			2006		
	Total	Males	Females	Total	Males	Females
Post Graduate	63,929 (3.9%)	53.9%	46.1%	40,744 (2.8%)	56.7%	43.3%
Grad Dip and Cert	29,356 (1.8%)	37.3%	62.7%	21,378 (1.5%)	37.9%	62.1%
Bachelor degree	239,317 (14.5)	44.2%	55.8%	182,534 (12.4%)	44.7%	55.3%
Advanced Diploma	132,718 (8.0%)	43.2%	56.8%	105,615 (7.2%)	43.9%	56.1%
Certificate 111/1V	253,721 (15.4%)	69.8%	30.2%	205,411 (13.9%)	73.7%	26.3%
Year 12	318,192 (19.3)	46.8%	53.2%	280,355 (19.0%)	46.5%	53.5%
Year 11 or below	435,072 (26.3)	42.2%	57.8%	445,472 (30.2%)	41.3%	58.7%
Total	1,651,494 (100%)	48.8%	51.2%	1,474,169 (100%)	48.6%	51.4%

Source: DEEWR (2012)

The main points are:

- a 56% increase in persons in the GBLM completing post graduate degrees (from 40,744 to 63,929);
- strong increases in completions of graduate diplomas and graduate certificates;
- a 31% increase in the number of persons holding bachelor degrees;

- a corresponding reduction in people reporting grade 11 or less as their highest level of educational attainment; and
- continued male domination of trade qualifications.

The DEEWR (2012) *Skill Shortages December 2011* also supports some of our projections from our previous report. This survey provides some insights into how quickly the market is changing¹¹. It concludes that:

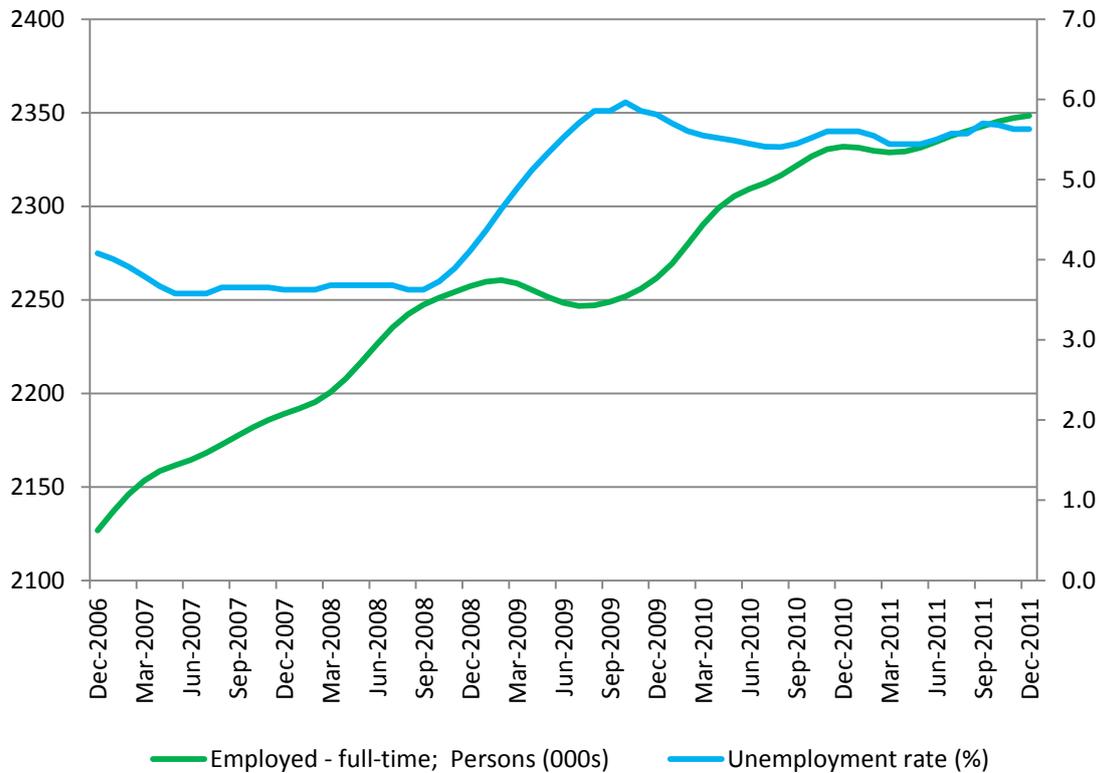
- the Queensland labour market was starting to ease in the sense that job fill rates were improving with applicant numbers and numbers of suitable applicants per vacancy increasing compared to previous years. This was most noticeable in the technicians and trades occupations;
- the size of the Queensland labour force was 2,348,400 workers, the third largest in Australia¹²;
- unemployment rose, to December 2011, by 0.7% (compared with a National average of 0.2%) adding an additional 16,400 persons to the stock of unemployed;
- conversely, employment growth in Queensland over the last year was the highest of all the states, rising by 1.1 per cent; and
- the Queensland trend unemployment rate fluctuated marginally over the six months to December 2011, around a median level of 5.5%, slightly above the national rate of 5.3%, and above all the other States and Territories except Tasmania.

Figure 1 shows the employment and unemployment rates for Queensland over the period 2006 to 2011.

¹¹ Labour Economics Office (Queensland, 2012) *Skill Shortages Queensland*, Department of Education, Employment and Workplace Relations, www.deewr.gov.au

¹² Up slightly on the estimates shown in Figure 1

Figure 1 Unemployment Rate and Employment, Queensland, December 2006 to December 2011



Data source: DEEWR (2012) p. 7.

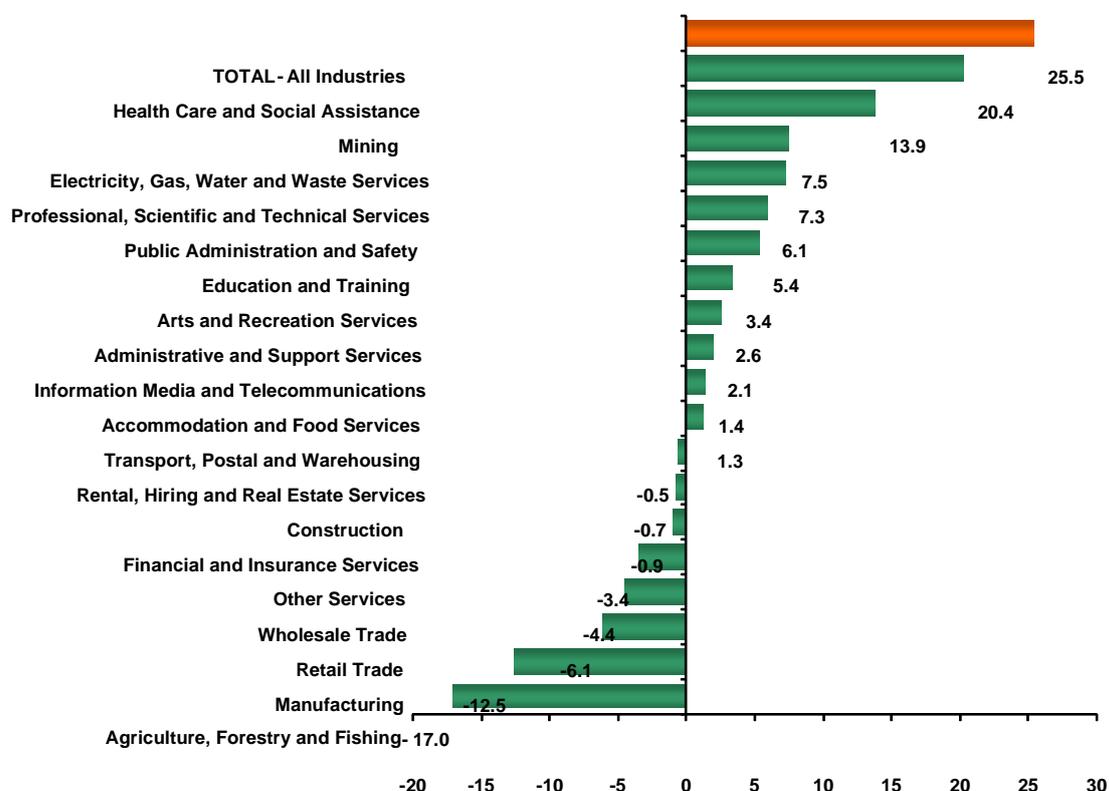
2.3 Trends in employment by Industry and Occupation

Health Care and Social Assistance is now the largest employing industry in Queensland, accounting for 11.7% of the State’s workforce. Retail trade (11.0%) and Construction (10.1%) were the next two largest categories.

Employment strengthened in 11 industries over the year to November 2011, with Mining experiencing the greatest growth of 29.6% (13,900 workers) followed by Electricity, Gas, Water and Waste Services, which increased by 24.5% or 7,500 workers.

Employment numbers weakened in eight industries. Agriculture, Forestry and Fishing declined by 18.8% (17,000 workers) and Manufacturing declined by 6.4% or 12,500 workers.

Figure 2 Industry Employment Growth, Year to November 2011 ('000s), Queensland



Data source: DEEWR (2012) Industry Employment Profiles, Queensland. Four quarter averages of original labour force survey data.

2.3.1 Employment by occupation

In occupational terms, employment growth over the year to May 2011 was greatest in the Professionals group, which grew by 6.2% or 26,500 workers. The numbers of Community and Personal Services Workers also grew significantly at 4.8%.

Employment losses across the state were greatest for Labourers, with a reduction of 4.3% or 11,600 workers.

Table 3 Employment by occupation, November 2010 and November 2011 ('000)

Occupation	Employment		Annual Change	
	Nov '10	Nov '11	No. ('000s)	Percent
Managers	290.3	289.8	-0.5	-2.0
Professionals	425.0	451.5	26.5	6.2
Technicians and Trade Workers	355.2	355.0	-0.2	-0.1
Community and Personal Services	213.1	223.2	10.1	4.8

Occupation	Employment		Annual Change	
Workers				
Clerical and Administrative workers	332.5	340.5	8.0	2.4
Sales Workers	241.0	232.9	-8.1	-3.4
Machinery Operators and Drivers	169.9	171.1	1.2	0.7
Labourers	272.4	260.8	-11.6	-4.3
All Occupations	2299.5	2324.9	25.5	1.1

Source: DEEWR (2012) Occupation Employment Time Series, Queensland. Four quarter averages of original labour force survey data.

2.4 Vacancy trends

The DEEWR Internet Vacancy Index (IVI) is based on new vacancies on four online recruitment websites, with January 2006 equalling 100.0. The IVI for Queensland stood at 86.4 in December 2011, which was a 3.1% increase over December 2010. The Queensland index was also above that for Australia (84.1).

Over the year to December 2011, there were 582,238 vacancies advertised in Queensland, an increase of 15.2% over the previous year.

The greatest growth of vacancy advertising in the State was in the Machinery Operators and Drivers group, which was up 27.1% over the year to December 2011. This was followed by the Technicians and Trade Workers group which increased by 22.7% and then Professional occupations, up by 20.7%.

Over this same period, vacancies for Sales Workers declined by 2.8 per cent. This was the only occupational group to record a decrease in advertising activity.

3 Professionals in the Labour Market

Our previous report identified Professionals as the fastest growing occupational group in the GBLM and predicted that this trend would carry on into the future. Similarly DEEWR found that this group was the fastest growing occupational group for Australia as a whole and has predicted that over the period 2012-2017, one in 3 new jobs will be for Professionals. In a report prepared in 2012, DEEWR points out that:

Employment of Professionals continued to rise during the global recession. Over the year to August 2009, employment of Professionals increased by 1.3 per cent compared with growth of 0.3 per cent in total employment and a 4.2 per cent fall for Technicians and Trades Workers¹³.

The DEEWR (2012) report provided a number of important stylised facts on the employment of Professionals in Australia that has relevance to the GBLM. These include:

- Professionals are the largest occupational group in Australia with 2.6 million workers.
- Professionals accounted for close to half of the almost one million new jobs created in Australia over the five years to May 2012 and over the next five years, one in three new jobs are expected to be for Professionals.
- Employers have faced skill shortages in a number of Professional categories over the past decade.
- DEEWR note that the year 2011-12 show a reduction in excess demand for professionals in comparison to the previous periods but still found that “one third of Professional occupations” was still assessed as being in shortage in that year.
- Shortages have historically been widespread and persistent for Health and Engineering Professionals¹⁴.
- The distribution of employment of Professionals across Australia shows significant variation across industry sectors.
- Percentage employment of Professionals across industries range from a low of 0.7% in Accommodation and Food Services to a high of 62.7% in Education and Training.

¹³ DEEWR. (2012). Professionals in the Australian labour market, November, p. 1.

¹⁴ DEEWR reported some easing in the skill shortages for Health workers , explaining this by reference to greater output from Educational institutions

DEEWR (2012) found that in 2011-12 the largest employing Professional sub-major occupational groupings are:

- Education Professionals
- Business, Finance and Human Resource Professionals
- Medical Practitioners and Nurses
- ICT Professionals
- Legal, Social and Welfare Professionals.

The recent rate of growth in the employment of Professionals (2011-2012) of 21.5% far exceeds the overall rate of growth for employment in Australia for the period 2008-2012 of 9.2%.

However, the term Professionals has quite a wide meaning and covers over 310 separate occupations¹⁵. While there is a reasonably high degree of substitution possibilities among the occupations listed as Professionals, some are highly industry or job specific and circumspection need be taken to avoid confusing aggregate trends in the demand for Professionals with trends in individual occupations. For example, while according to DEEWR projections Employment of Professionals is expected to grow by 10.4% over the period to 2016-17 and to account for approximately 30% of all new jobs. The growth will be disproportionately higher in the Health Care and Social Assistance industry particularly among Medical Practitioners and Nurses, and Health Diagnostic and Therapy Professionals.

As a result these occupations will face continuing skill shortages. As well, shortages are expected among engineering Professionals, with employers indicating that less than half the surveyed vacancies are currently filled.

The main reason employers found some applicants for these positions to be unsuitable was lack of experience and inadequate qualifications¹⁶.

Our previous report identified Professionals as the key group in future labour market projections for the GBLM. It also found that, from a base of under-representation in professional employment, the GBLM was increasing its rate of professional employment much more rapidly. In our revised estimates we predict a lower growth rate of professional employment than advanced in the initial report although still well above the Queensland average across all occupations.

¹⁵ DEEWR (2012) "Professionals on the Australian Labour Market" *Labour Market Research and Analysis Branch Department of Education, Employment and Workplace Relations*.

¹⁶ DEEWR (2012) p 1. This lack of experience criterion has special significance for the Services to Mining Industry as discussed later in the report.

3.1 Changes in gender segregation

In undertaking the original study, the emphasis was on structural and future changes across broad labour market categories. One important question, that we can now investigate, is how these changes were impacting on other aspects of the labour force such as gender segregation.

The analysis above highlighting the improved employment outcomes for women raises another important question which was not covered in the first report. Was this improvement in female employment caused by increases in the percentage of female employment across all industries (compositional change) or because “female” industries increased their share of employment (distributional change)? Calculation of an occupational segregation index will give some indication as to the answer. The data shown in Table 4 allows the calculation of an occupational segregation index, using the Duncan index of labour force segregation¹⁷. The occupational segregation indices for Brisbane are also compared to the average for the United States. A value of 0% indicates that the distribution of women across occupations is the same as that of men, while a value of 100% indicates that women and men work in completely different occupations. In addition, a positive number indicates an over representation of males compared to females and a negative number indicates an over representation of females to males.

Table 4 Occupational Segregation by Gender – Greater Brisbane Labour Market 2006 and 2011

	Brisbane 2006	Brisbane 2011	USA 2011
Professionals	-(2.1)	-3.2	-(4.2)
Clerical & Administrative	-(26.2)	-(26)	-(18)
Technicians & Trades	35.6	35.4	32.1
Managers	14.6	13.9	12.6
Community and Personal Service	-19.6	(18.8)	-(12.8)
Total Labour Force	3.4	2.7	4.1

Source: Calculated from ABS Census Data (2012) and drawn from Dolado et al (2012). Note a negative sign indicates an over representation of women

The data in Table 4 show that throughout the labour force, occupational segregation is low and diminishing from 3.4% (slight bias in terms of males) to 2.7% in 2011. However, the aggregate index masks some larger differences among the most popular occupations. Females (proportionately) slightly outnumber males in Professional occupations and this increased over the census period from 2.1% in 2006 to 3.2% in

¹⁷ Generally regarded as the default measure see for measuring gender segregation, for example, Villar, O. and Rio, c. (2010) Segregation of female and male workers in Spain: Occupations and industries* Revista Economica Publica . It does however only deal with aggregate numbers and doesn't answer questions like segregation of top positions.

2011. This reflects the growing significance of Professionals and Para-professionals in health related industries. At a more disaggregated level, the picture would be more diverse. Out of the five largest occupational groups, males are most significant in terms of percentage employment in Technicians & Trades (roughly unchanged at 35%) and Managers (approximately 14%). Females are the dominant group in Community and Personal Services, down about a percentage point to 18.8% in 2011.

Overall, the GBLM is less segregated than the US average as a whole, although comparisons between a city and a whole country can be problematic¹⁸.

Table 5 Industrial Segregation by Gender – Greater Brisbane Labour Market 2006 and 2011

	Brisbane 2006	Brisbane 2011	USA 2011
Health Care & Social Assistance	-(27.6)	-(27.4)	-(26.5)
Retail Trade	-(6.3)	-(7.1)	-(12.3)
Manufacturing	24.2	24.2	19.7
Professional, Scientific and Technical	4.3	6.2	2.6
Construction	35.3	-35.4	-39.5
Total Labour Force	3.4	2.7	4.1

Source: Data calculated from Census data and drawn from Dolado et al (2012)

The level of employment segregation by industry is more noticeable and relatively unchanged over the census period. Females are over represented in Health Care and Social Assistance and Retail industries. Males are over represented in Construction and Manufacturing, and less significantly in Professional, Scientific and Technical industries.

The close similarity between the occupational and industrial segregation indices by gender between the census periods is another indication of a stable and mature labour market.

3.2 Skilled persons not working in their area of training or not in the workforce

A recurring theme in the skilled labour shortage debate is the issue of the significant number of people that work outside of the area for which they hold a qualification(s) or outside of the workforce altogether. The famous paper by Arrow and Capron (1959)¹⁹ demonstrated the dynamic nature of certain labour markets: for example,

¹⁸ Principally due to the inclusion of data from rural areas

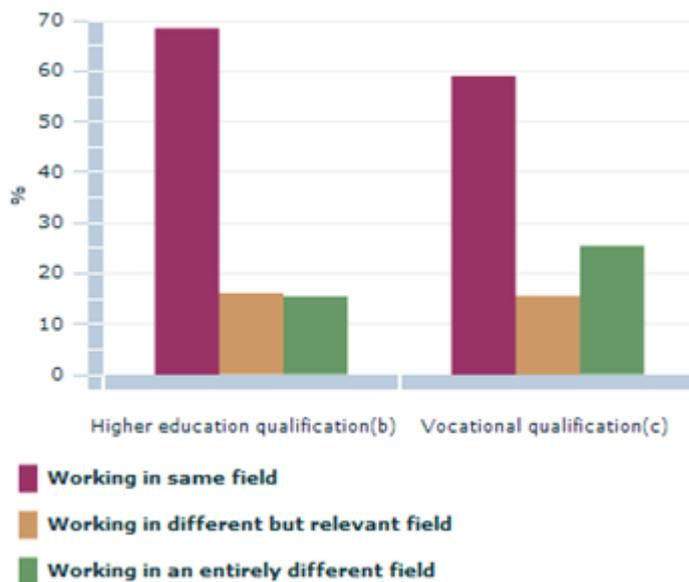
¹⁹ Arrow, Kenneth J., and William M. Capron 1959 " Dynamic shortages and price rises: The engineer-scientist case," *Quarterly Journal of Economics* (May): 292-308

qualified graduates were observed to move between science and engineering related occupations relatively frequently, in response to flexible wage rates. This study found that wage incentives were a pre-condition to labour mobility. This implies that in the absence of an equilibrium wage being offered, there is little evidence to suggest that those who chose not to work in an area of their training or qualification can be induced back into the workforce or to their “expected occupation”.

The number of persons that do not work in an area normally matching to their qualifications is large. Well known cases include, law graduates that don’t become practicing lawyers, nurses that leave nursing and teachers who do not work as teachers. The phenomena also include those with vocational training who often moved into supervisory or managerial jobs. Data gathered by the Australian Bureau of Statistics (ABS) divides the Australian workforce into 3 categories:

- employed people working in same field to their main qualification;
- employed people working in a different but related field to their qualification; and
- employed people working in a completely different field to qualification.

Figure 3 Employed Persons; whether working in “expected” field of employment



Data source: ABS catalogue 6220.0 - Persons Not in the Labour Force, Australia,

Figure 3 shows that there is significant proportion of the workforce not working in an area matching their qualification. The data shows that about 70% of those with higher education qualifications and about 60% of those with vocational qualifications work in

the same field as their major qualification. Among those with higher education qualifications, an equal proportion of people (approximately 12-15%) work in fields related to their qualifications and in an entirely different field. For those with mainly vocational training qualifications, approximately 25% work in unrelated areas and approximately 15% work in related areas. As the ABS argue:

“People pursue different educational pathways for different reasons, including personal interest and career advancement, and these different pathways can affect how relevant their qualifications are to their job. Furthermore, people can obtain more than one qualification. The likelihood of working in the same or relevant field as one’s qualifications is higher (83%) when all qualifications are considered. In terms of higher level of qualifications, in 2010-2011, 79% of employed people with a qualification were working in a field that was the same or relevant to their highest qualification.” (ABS (2007)p.3)

However, the implications of this data released by the ABS and the extent to which this data assists in addressing skill shortages is not clear. It may be argued that the current system is inefficient in attracting or retaining people with the relevant qualifications for their position. However, the nature of higher education is that skills are transferable.

Therefore, redistributing the workforce to address shortfalls in one area is likely to be self-defeating in that it may well create skills shortage elsewhere. An intuitively more fruitful strategy would be to induce those who have left the workforce (for issues other than age related retirement) to re-enter the workforce.

3.3 Qualified persons outside the workforce

The ABS does not produce regular data on the qualifications of those outside the workforce. However, there are a number of potential sources of data:

- professional organisations and unions often maintain database on lapsed members, part of which may be due to a career shift (see Table 6 for an example); and
- training organisations and educational institutions maintain a data on the numbers of qualified persons educated – comparing this data with the actual number of employed people in that occupation (after controlling for immigration and net outflow of overseas students) provides meaningful data on the education background of those who have left the workforce.

Table 6 Nurses and Midwives, Workforce Status, 2011, by State

Classification type	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Not Stated	Grand Total
Nurse										
Registered Nurse (RN)	3,803	66,781	2,836	45,723	19,824	5,999	59,598	25,045	8,302	237,911
Non-practicing (RN)	32	1,124	17	258	140	62	347	170	85	2,235
RN & EN	21	556	30	499	232	21	982	199	6	2,546
Enrolled Nurse (EN)	698	13,191	394	10,893	7,725	1,309	19,675	4,998	84	58,967
Non-practicing EN	11	275	3	58	51	19	118	43	1	579
Non-practicing RN & EN		2		1						6
Midwife										
Registered Midwife (RM)	48	424	40	350	347	14	741	238	83	2,285
Non-practicing (RM)		21			3		18	2	2	46
Midwife and nurse										
Registered Nurse (RN)	629	10,294	534	6,505	2,357	658	8,406	3,108	251	32,742
Non-practising (RN)	3	292	2	46	12	9	46	24	13	447
RN & EN		3					8	3		14
Enrolled Nurse (EN)	1	5		2	4		16			28
Non-practising EN							1			1
Grand Total	5,246	92,968	3,856	64,335	30,695	8,091	89,959	33,830	8,827	337,807

Data source: Cited in NHWDS (2011) "Nurses and Midwives, from National health Workers Series, No.2 Australian Institute of Health (2011)

Unfortunately, none of these three sources of data provide accurate information regarding the qualification of people outside of the workforce. For example, it is widely believed that a large number of trained nurses have left the workforce. However, the data shown in Table 6 provided by the Nursing Federation indicate that this may only be a small number. According to the data in Table 6 out of 45,723 registered nurses in Queensland only 258 (approximately 0.5 of a per cent) are shown to be non-practicing.

However, based on meetings with industry stakeholders, the data presented in Table 6 is clearly an under estimate. The reason for this low number is that those who leave the profession do not necessarily keep up active membership in the union. The actual percentage of non-practicing qualified registered nurses is more likely to be much higher.

The data in Table 7 suggests that 22.3% of qualified nurses are in other occupations and about 15.5% are outside of the workforce. Unfortunately the data are not split up by reason for being outside the workforce.

Table 7 Labour Force Status of Females (a) with Nursing Qualifications (b) - 2001

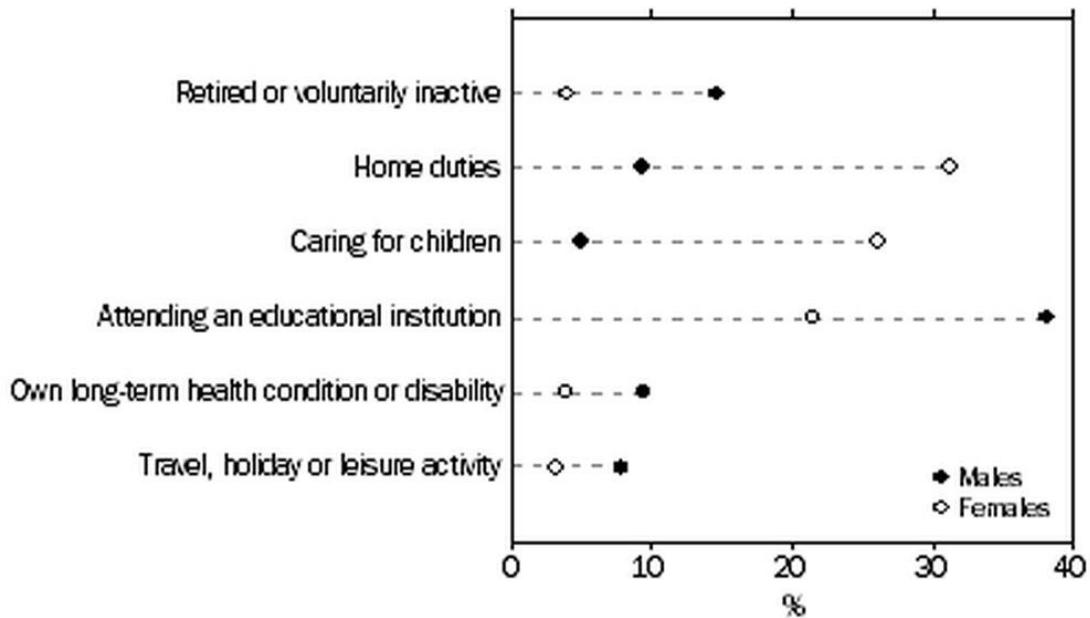
	Females %
Employed	83.5
Nursing professional	61.3
Other occupation	22.3
Unemployed	1.0
Not in labour force	15.5
Total	100.00
<hr/>	
Total (000s)	183.4
<hr/>	
	%
Unemployment rate	1.2

a Aged 15-64 years. **b** Bachelor degree of higher in a nursing field.
Source: ABS Survey of Education and Training 2001

Can these workers be induced back into the workforce?

As with those working in areas unrelated to their education, qualified persons leave the workforce for a number of reasons. The principle of these is shown in activity data shown in Figure 4.

Figure 4 Selected main activity when not in the labour force for Australia, by sex, September 2012



Source: ABS Cat No. 6220.0. Persons not in the labour force, Australia, September 2012.

Some of these such as caring for children, short term illness and travel are of relatively short duration (in the context of a working life) but these tend to be relatively minor reasons for leaving the workforce. Other reasons such as “retired or voluntarily inactive” and home duties are more prominent in terms of incidence and as a result is more difficult to reverse.

In examining the literature on re-entry into the workforce a major theme is that this decision is both supply and demand driven. In general, leaving an occupation for which you have been trained is a major decision and workers will not return unless the factors that led them to leave in the first place are improved and normally will also require incentives in the form of higher wages and better conditions²⁰. Barak, et.al (2003) found that most skilled workers return to the workforce as a result of a combination of supply issues such as boredom and demand issues such as wage incentives. However, they found that most return only in a part-time capacity²¹. Duration out of the workforce was also an important factor that influences whether a skilled worker will return to the workforce because qualifications decay in value over

²⁰ See, for example, Price, K. et.al. (2004) “ What hinders and what helps” Searching for Solutions to mature age unemployment and the residential aged care crisis” *Australasian Journal on Ageing*’ 23 (4) 177,183 and “ Shacklock, K. and Fulop, L (2007) “Managing worker exit and re-entry practices; A revolving door’ *Asia Pacific Journal of Human Resources*

²¹ Barak, M., Mor, J., Levin, A (2003) “ Antecedents to Retention and Turnover among Child Welfare, Social Work and other Human Service Employees” *Social Science review* 75(4) 625-61

time²². Dobrev (2005) found that the most skilled workers also have the longest periods of employment and retire later than the average workforce, which limits the extent to which they can be enticed back into the workforce²³

.In summary, inducing trained staff in an occupation into another area of skill shortage (or skills deficiency), ether from other occupations and/or from outside the workforce to address skills shortages is likely to have a limited outcome. In terms of balancing the skills needs and shortages in a particular occupation, the central issue may be in addressing the supply side or demand side constraints that caused the original exodus.

²² Benson, J. and Brown, M. (2007) "Knowledge Workers, What keeps them committed; What turns them away" *Work, Employment and Society* 21(1) 121-41

²³ Debrev, S (2005) " Career Mobility and Job Flocking" *Social science Research* 34 93) 800-20

4 Structural changes in education and implications for the supply of skilled labour of the Melbourne University Model

In broad terms, skill enhancements in Australia (and in Greater Brisbane) come from four main areas; tertiary graduates, graduates from vocational education, skilled migrants and skill enhanced existing workers (either through re-training or re-entry into the workforce). Recently, some major changes took place in the Australian University course structure. These changes will have implications for both the output and quality of graduates and the time required to educate (or train) students. In the forefront of these changes is the “Melbourne Model”.

This section examines how current changes in the Australian educational institutions will determine the flow of new skills. Further, the implication of these reforms on the number of skilled migrants required in the future is also assessed.

In 2008, the University of Melbourne began re-shaping its teaching and learning program with the aim of:

- reshaping its undergraduate curricula;
- introducing more professional graduate programs; and
- strengthening the preparation for doctoral research.

Under this model, undergraduate offerings will be scaled back and 6 broad groups of “new generation” Degrees will be offered:

- Bachelor of Arts
- Bachelor of Biomedicine
- Bachelor of Commerce
- Bachelor of Environments
- Bachelor of Music
- Bachelor of Science.

Students undertaking these degrees will complete at least one major sequence (related set of subjects) and take at least one-quarter of their degree from subjects outside their core program. For the interim, previous course offerings will run until the degree/programs have been completed. Concurrent with this will be a post-graduate two year master degree offerings such as:

- Juris Doctor
- Master of Applied Commerce (Accounting)
- Master of Architecture
- Master of Construction Management
- Master of Forest Ecosystem Science
- Master of Landscape Architecture
- Master of Music Therapy
- Master of Nursing Science
- Master of Property
- Master of Psychology
- Master of Social Work
- Master of Teaching
- Master of Urban Planning.

Students are free to merge into any of these offerings on the basis of their performance at undergraduate level rather than entry to professional courses occurring at the undergraduate level and on the basis of school based entry scores, which authorities argue is a poor predictor of university performance²⁴. Therefore, students wishing to study Law, will need to undertake a three year undergraduate degree and then a two year Juris Doctor. For courses in Business and economics, the 4th year honours degree will be abolished and students in these areas will be required to undertake a five year undergraduate/masters degree²⁵.

The Melbourne University claimed the basis of this new course-offering model is to respond to global trends in education and employment as reflected in the comment

²⁴ See, McKenzie, K and Schweitzer, Z (2010) "Who Succeeds at University: Factors Affecting Academic Performance of First Year Students at Australian Universities" Higher Education Research and Development (HERDSA) July 2010.

²⁵ Reviews of the Melbourne Model have been mixed with Simons, M (2010) ' Dangerous Precedent, The Melbourne Model', www.themonthly.com.au expressing largely critical views and the Age " Melbourne Still Top of the class" July 2010 expressing positive views

made by internationally respected educationalist, Professor James Wilkinson (Harvard University) who recently claimed:

“I don’t think Australian higher education has any choice but to diversify and innovate now. There’s a long lead time in education. It is not smart just to think that what worked well in the past might work well in the future.” (Simmons, 2010, p.3)

Supporters of the plan cite the educational benefits of requiring students to experience a wider range of subjects and approaches. In addition, entry to professional courses such as Law and Medicine will now be based on performance in undergraduate degrees rather than school entry scores, which tend to favour students from private schools. Some of the other proposed benefits of the Melbourne Model include allowing students to have:

- deep knowledge in their discipline and a *breadth* of understanding – preparing them for lives and careers in a world in which the “real-world” require;
- multidisciplinary understanding;
- an international curriculum consistent with other countries; and
- opportunities for undergraduate students to develop business connections outside of university – through internship opportunities, enhanced opportunities for international programs and community partnership²⁶.

Others criticise the model for being inflexible and for increasing the costs of education by adding at least a year to current professional courses²⁷.

Variations of the Melbourne Model are being trialled at the University of Western Australia and Monash University. However, the Federal Government has only agreed to fund the additional (master’s) year at the University of Melbourne and so the high cost of implementation may slow the rate to which the new course-offering model will be rolled-out. However, one inevitable outcome from such a system change would be a shift to a higher proportional number of postgraduates being produced through the university system compared to undergraduates. In response to this foreseeable outcome, Melbourne University, and its supporters, are arguing for quality rather than quantity in tertiary education, with the implication that universities such as Melbourne University will reduce their overall student load as well as changing the mix between undergraduates and postgraduates.

²⁶ See, “Growing Esteem” University of Melbourne White paper, 2010

²⁷ See for example, Hare, j (2013) “Post Grad Surge Unsustainable” the Australian 24/04/2013, citing QUT Vice Chancellor Peter Coaldrake

There are international precedent for this move. European universities were engaged in the Bologna Process, designed to create internationally comparable degrees. In the United States, colleges of arts and sciences are flanked by specialist graduate schools, such as at Harvard.

The decreased Government funding to universities is also one of the main factors driving the reform in the system. Therefore, education has become an export industry. By making Australian education systems comparable internationally, the Melbourne Model is offering a solution to underfunding.

In terms of income, one-fifth of a typical university's income comes from the Commonwealth teaching grant; the rest comes from student fees and competitive research grants. In all cases, there have been shortfalls. The Commonwealth grants have not covered the cost of teaching and the research grants have not covered the cost of research. As a result, Universities have responded by lowering costs, increasing class sizes, and by commercialising education, research and professional advice.

Commenting on the changes in the funding of Australian Universities the OECD (2011) claimed²⁸:

“In one generation the nation has gone from free tertiary education to among the most highly priced courses found anywhere in the OECD.” (p.16)

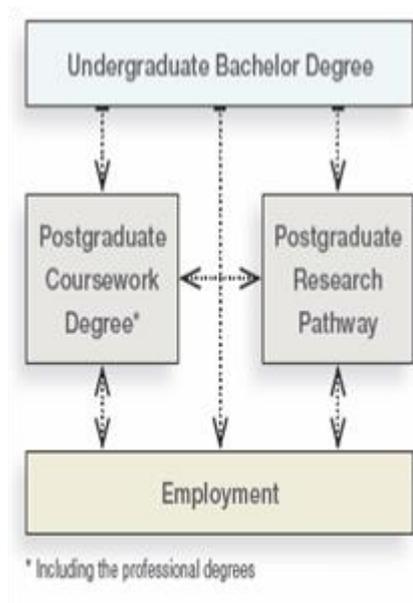
The Melbourne Model makes the Australian postgraduate programs more competitive internationally. Universities will have more freedom to charge fees, and hence more freedom to pursue an independent vision of excellence in post -graduate education. The Melbourne University has decided to stop growing, and to move away from being undergraduate program focused towards having a balanced proportion of students in undergraduate and postgraduate courses by 2015. Professional degrees such as law, medicine, engineering and education – will be removed from the undergraduate sector. Instead, all undergraduates will complete three years of a broad educational program. Hundreds of specialist undergraduate degrees will be reduced to a handful of “new generation” degrees.

The Melbourne Model has already spawned some limitations. The Western Australian Model (shown below in diagram form) appears to fit the standard Australian Universities model of undergraduate and postgraduate qualification bands better because it implies less disruption to the standard framework²⁹.

²⁸ See, OECD (2011), [Education at a Glance 2011: OECD Indicators](#), OECD Publishing

²⁹ See, The Melbourne Model is looking rather Anorexic,” The Age, July 22 , 2009

Figure 5 Western Australian model



The implications of these changes are that the large capital city universities will place a cap on undergraduate student numbers and increase the relative proportion of postgraduate students. The impact on the regional universities and smaller city based universities is more difficult to predict. Given the likely restriction on numbers of undergraduate students enrolled at the larger universities, regional universities may increase the level of undergraduate enrolments in the mass education areas of commerce and arts.

5 The Services to Mining Industry

In the previous report the Mining industry and mining-related industries were identified as a major source of labour force demand, both in their own right and in those industries that depend upon them. While, the importance of the Mining (Extraction) Industry to Queensland is well established, less established is the increasing importance of an efficient services-to-mining industry as a means of maintaining the growth of the mining industry. The importance of this link has been recognised by The MCA and more recently by the Productivity Commission³⁰. In 2007 the Queensland Resources Council commissioned Synergies to examine the relatively underdeveloped state of Services to Mining (especially in mining exploration), in Queensland compared to Western Australia³¹.

The report concluded that expansion of services to support mining exploration in Queensland to a level proportional to that of Western Australia (after controlling for differences in resource type) would produce a total gain in Gross State Product (GSP) flow-on of \$260.00 million four years after the increase in support services which is equivalent to an ongoing annual benefit of \$125.95 million starting in the 5th year³².

However, it was identified that one of the principal constraints to successfully building a strong Services to the Mining industry was the lack of skilled labour³³.

5.1 Defining the Services to Mining Industry

Within the Australian and New Zealand Standard Industry Classifications (ANZSIC) the Mining Industry Division is divided into two basic activities: mine operation and mining support activities. Mine operation includes operating mines, quarries, or oil and gas wells for a business' internal operations or for others on a contract or fee basis, as well as mining sites under development. Mining support activities include mining services on a contract or fee basis, and exploration as well as geophysical surveying.

The ANZSIC 2006 categorizes Services to Mining into the following relevant industry subgroups:

³⁰ See, Mineral Council of Australia (2010) "Inquiry into Regional Skills Relocation" Submission to the House of Representatives, July and The Productivity Commission (2012) Minerals and Energy Resource Exploration, Productivity Issues Paper, December for confirmation of the importance of the Services to Mining Industry to the health of the Mining (extraction) Sector

³¹ See, Synergies (2007) "Expanding Queensland's Mining Exploration Capacity" report undertaken for the Queensland Resources Council, Brisbane

³² Synergies (2007) p 7.

³³ See, National Centre for Vocational Education Research (NCVER) 2007, p. 23

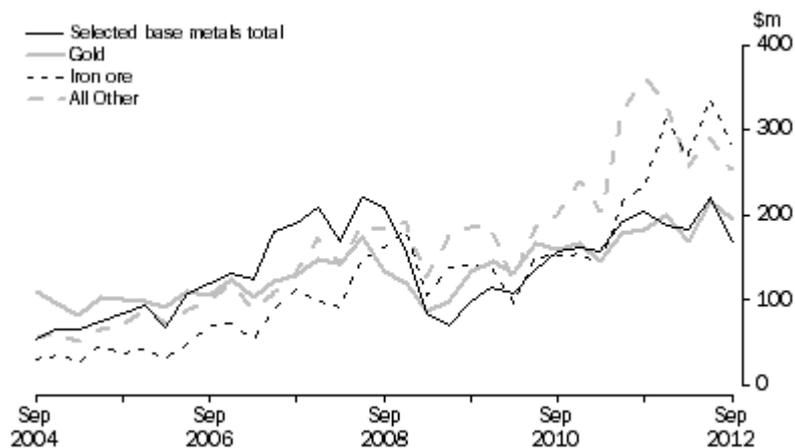
- (a) Coal mining
- (b) Oil and gas extraction
- (c) Metal ore mining
- (d) Other mining - non-metallic mineral mining and quarrying
- (e) Services to mining - exploration and other mining support services³⁴.

Of these industries, the ‘services to mining’ sub-industry identified under point (e) is the most relevant for defining an overall “Services to Mining Industry” for our analyses. Specifically, the ANZSIC further decomposes the ‘Services to Mining’ industry into:

- Exploration activities (petroleum and mineral exploration); and
- Other mining support services³⁵.

Under the ANZSIC classification, exploration is the most significant activity, both in terms of the scale of operation and economic value added, within the Services to Mining industry subgroup. However the activities that are considered as other Services to Mining industry are not transparent in the ANZSIC.

Figure 6 Mining Exploration in Australia – Original Series



Data source: ABS (Dec 2012) Catalogue 8412.0 – Mineral and Petroleum Exploration, Australia, Sep 2012

However, since the GFC, mining exploration activities have been volatile in Australia. The data in Figure 6 show that in original terms, mineral exploration expenditure fell

³⁴ ABS. ANZSIC 2006, p. 41 and 416.

³⁵ Ibid, p. 477.

15.7% (or -\$166.4m) to \$894.7m in the September quarter 2012. Exploration on areas of new deposits fell 15.3% (or -\$54.7m) and expenditure on areas of existing deposits fell 15.9% (or -\$111.7m). These recent falls are due to a decline in expenditure on iron ore exploration (down 16.6% or -\$55.7m) and a decline from expenditure on coal exploration (down 19.4% or -\$41.1m). The data also shows that expenditure on mineral exploration has been on a gradual recovery phase since 2008-2009.

5.2 Exploration and other services Activity

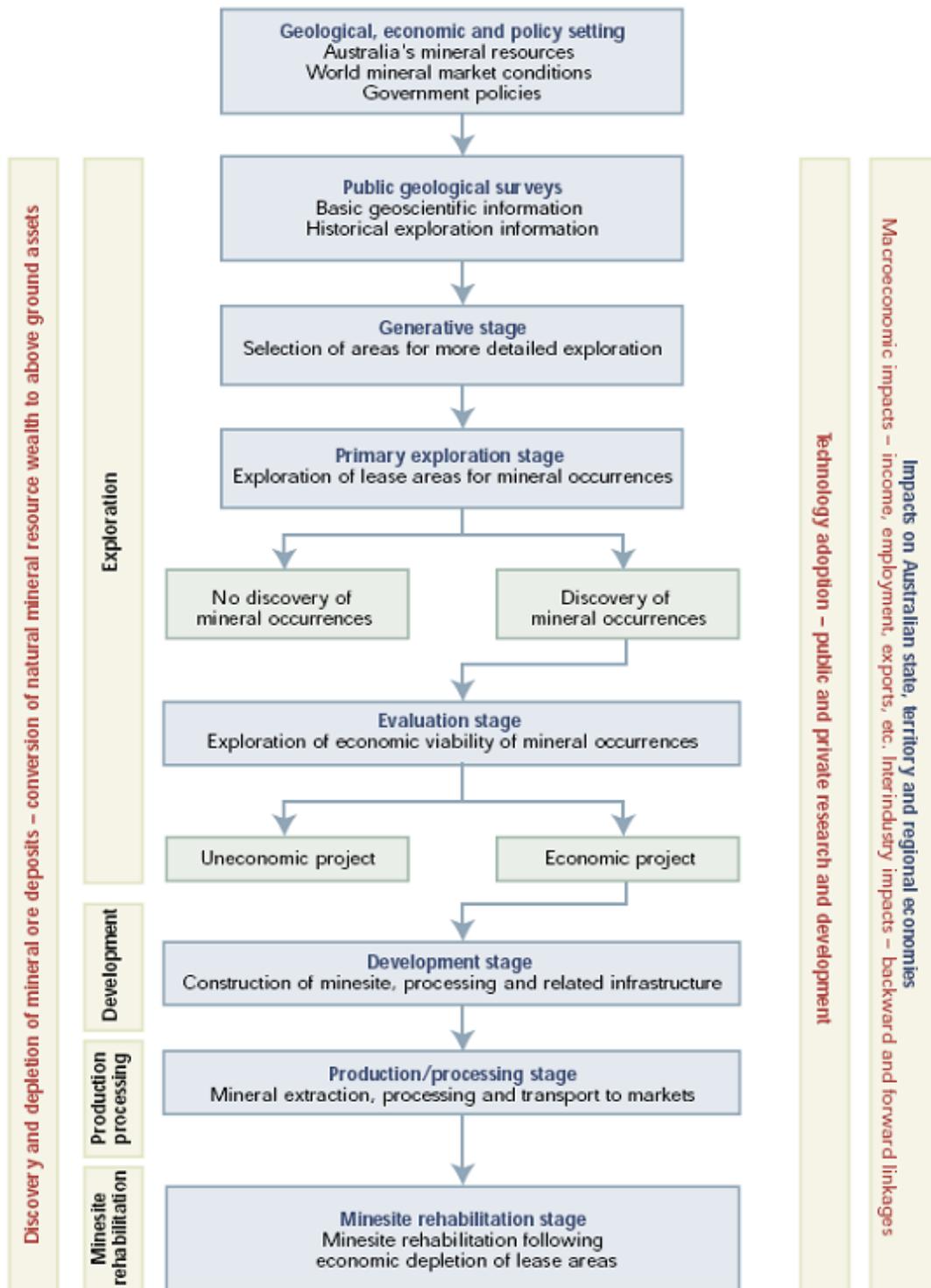
Exploration refers to the search for, and appraisal of economic concentrations or deposits of naturally occurring solid, liquid (excluding water) or gaseous materials on or below the surface of the earth. It includes activities to identify, delineate and assess these concentrations or deposits.

Such activities could include:

- geological, geophysical, and geochemical techniques and analysis involving satellite, airborne and land-based activities;
- drilling of boreholes, stratigraphic, wildcat, appraisal and field extension wells;
- bulk sampling from a pit, shaft or additional sink hole for appraisal purposes;
- management of tenements and other land access matters;
- commercial feasibility studies of extraction; and
- resource and reserve calculations.

Exploration excludes *development of a mine*, which refers to activities to prepare a deposit or an extension of one for production. Such activities could include removal of overburden, sinking of shafts, drives and winzes, drilling and completion of production wells, and construction of facilities required for mining and early stage processing activities. However, there are considerable scientific and business applications to the Services to Mining Industry.

Figure 7 Phases of, Influences on and Effects of Exploitation of Deposits



Data source: ABARE (2002), *Mining exploration in Australia: Trends, Economic Impacts and Policy Issues*, Canberra

5.3 The economic significance of the Services to Mining Industry

Using Synergies economic modelling, the potential benefit from a revamp and fully functioning Services to Mining Industry was estimated. Specifically, the estimated benefit is around \$260-300 Billion per annum if both the supply and demand side labour market constraints are addressed.

It is possible to investigate the labour market requirements of the Services to Mining Industry by reference to backward and forward linkages of the industry, which will trace out its linkage to the other sectors of the economy. To do this, a 12 sector Input-Output (IO) table (with mining exploration included as one of these sectors) was created for the Queensland economy³⁶. An IO table provides a snapshot of the purchases and sales between industries and households of an economy at a specific point in time³⁷.

There were some difficulties faced in achieving this. The ABS, in its sectoral break up for the Australian National Accounts, does not define a specific mining exploration sector. State Governments and the ABS do publish aggregated annual expenditure of mining exploration but do not identify the components of the expenditure (for example; the proportional cost of labour and inputs sourced from other industries). However, the ABS does delineate a 'Services to Mining' industry of which the Mining exploration will be a component (albeit the largest) part.

The 12 sectors which underpin the Synergies IO model for Services to Mining were selected from the ABS IO tables for Australia which lists the direct purchases by the Services to Mining sector from 107 industries. From these data, which measure the relative importance of each industry as a supplier to Mining Services, it is possible to determine the labour and raw materials linkages which are needed to establish a successfully functioning "Services to Mining industry". For example, from this process it can be seen that scientific research, technical and computer services are the most significant input suppliers to the industry.

Utilising these purchases it can be seen that the Services to Mining industry is underpinned by four main input supply chains:

- Wholesale and Retail Services (31% of inputs) - industries which supply these inputs include Wholesale trade, Wholesale Mechanical repairs, Other Wholesale,

³⁶ See, Synergies (2007)

³⁷ Originally this time was 2006 to coincide with Census data. This has now been updated to 2011 Census data

Retail Trade, Retail Mechanical Repairs, Accommodation, Cafes and Restaurants, and Utilities and Transport;

- Construction and Infrastructure Services (15% of inputs) – these inputs include construction and building services and purchases of equipment;
- Scientific Research/Technical and Computer Services (40% of inputs) – these inputs include geotechnical services, photographic and scientific equipment services, electronic equipment, communication services, research and computing services, library services, printing and services to printing; and
- Financial/Legal and Business Services (14% of inputs) – these inputs include banking, non-bank finance, insurance, services to finance, investment and insurance, legal, accounting, marketing and business management services and Government administration (including Community Services).

The commodity resourcing patterns from these aforementioned input supply chains may be used to delineate a *Services to Mining* industry and from that the likely labour market requirements. To cross-check and to help fully define the Services to Mining Industry it could be assumed that the purchasing structure for other Services to Mining mirror that of mining exploration. However, there are likely to be some significant areas of difference between the inputs purchased by the mining exploration sector and the other services to mining sector. For example, the mining exploration sector is likely to purchase considerably less from construction and infrastructure services than the other services to mining sector. Also, a number of the subcategories of retail and wholesale trade purchased by the other services to mining sector are unlikely to be relevant to mining exploration.

On the other hand there is likely to be a higher percentage of inputs originating from financial/legal and business services and scientific research technical and computer services.

To account for these differences adjustments were made based on an assessment of the relevance of an input to Services to Mining gathered from discussions with industry stakeholders. Sectors such as financial/legal and business services, scientific, research, technical and computer services and certain complementary wholesale and retail activities were identified as the primary sectors that support the mining industry. The purchasing profile of these identified sectors were then used to approximate a *Services to Mining* industry for Queensland.

The input purchasing profile (including labour) consists of:

- Wholesale and Retail Services, including purchases from manufacturing and utilities (25%);
- Construction and Infrastructure Services (5%);
- Scientific Research/ Technical and Computer Services (45%); and
- Financial/Legal and Business Services (25%).

Compared to the other services to mining sector, the derived Services to Mining Industry has a higher proportion of inputs of financial/legal and business services and less from construction and infrastructure services.

Below are the sub-sectors included within the 12 sector IO model to estimate the purchases of the Services to Mining industry and therefore its likely labour demand patterns:

- Wholesale Trade;
- Retail Trade;
- Direct sales of manufactures;
- Purchases of Buildings and equipment;
- Scientific Research;
- Technical Services;
- Computer services;
- Geotechnical services;
- IT Services;
- Library Services;
- Communication Services;
- Financial Services (Bank) and Non-Bank;
- Legal Services;
- Investment and Insurance;
- Business Services (accounting and marketing); and
- Government Services.

The procedure used to derive a mining exploration industry is subjective. However, we consider that the above list is likely to encompass the breath of input suppliers to a Services to Mining industry in Queensland.

After specifying the input side of the Services to Mining sector it is then necessary to specify an output side. Outputs produced from the Services to Mining industry are typically sold to:

- within-sector activities (sales between firms in the same industry, for example where a smaller firm is used as a sub-contractor to a larger firm);
- the mining industry (subdivided in intensity between the main subcategories of mining);
- exports businesses; and
- finance/legal and business services.

Sales from the Services to Mining industry are observed to be more concentrated than purchases. The greater concentration of sales indicates that most linkages between the Service to Mining industry and the rest of the economy are backward linkages. However, the pattern of causation is complicated. While expansion of the minerals industry should promote increased spending upon Services to Mining, these need not be the case. While experts agree that new exploration activity is vital to the continued growth of the Mining industry, established companies are often reluctant to explore and or develop Greenfield sites, preferring instead to concentrate activities in areas where mining is already occurring.

Greenfield sites are directed at discovering new resource deposits. This exploration is a high-risk, high-reward venture with potentially large returns to those successfully discovering viable deposits. This type of exploration is often undertaken by smaller (junior) mining or exploration companies who often on-sell any significant commercial discoveries.

In contrast Brownfield exploration relates to exploration activity in areas with established reserves and is often the preserve of major companies adjacent to their existing mines to gain a greater understanding of the quantity and/or quality of known resources. This enables mining companies to extend the operating life of an existing mine and better utilize existing infrastructure. As a result, brownfield exploration is less likely to be a key driver of the size of the mining industry as whole.

The Economic Development and Infrastructure Committee, Parliament of Victoria³⁸ argues that exploration activity is fundamental in determining the size of the mineral and energy resource sector. They argue that as production depletes known reserves, commercial mining or extraction activities can only commence and continue if exploration is successful.

A reduced rate of discovery may result in the national mineral inventory being gradually depleted and the Australian mining industry becoming unsustainable in the long run with potentially serious economic consequences. (Schodde and Guj, p. 1, 2012)³⁹.

5.4 General factors impeding Growth in the Services to Mining

The Policy Transition Group's (PTG) report to the Australian Government (2011) identified the factors that are impeding the development of the Services to Mining industry both for Australia in general and specific to the Queensland and Greater Brisbane areas. These are:

- *Geological factors*: particularly access to high quality reliable pre-competitive geoscience data is critical in reducing this risk.
- *Political and social factors*: these issues relate to the levels of political and economic stability including well defined property rights and the rule of law to provide certainty to exploration activities.
- *Technological factors*: these factors define the feasibility of commercial extraction.
- *Economic factors*: these relate to the profitability of extraction which is determined by the risks associated with the availability of capital and skilled workers, labour costs, workplace practices and transport infrastructure. There is also market risk associated with the current and likely future demands for the resource arising from changes in consumer tastes and technology.
- *The supply of a suitably mobile workforce*: this factor relates, in part, to the labour skills and labour cost issues raised previously in this report but it also examines the work ready capacity of the existing workforce in terms of their ability to travel to the areas where services to mining are in most need.

³⁸ Economic Development and Infrastructure Committee (2012) Inquiry into Greenfields mineral exploration and project development in Victoria, Victorian Government May 2012

³⁹ See, Schodde and Guj (2012) "Mineral and Energy Resource Exploration Issues Paper", Productivity Commission, Canberra p.1

It is worth noting that in this report we are most interested on the constraints to growth posed by lack of skilled labour. Therefore the readiness of the existing workforce to travel to specific mines raised in the last factor is not examined with greater focus.

5.5 Skilled Labour Issues in the Mining Industry and Services to Mining Industries

There is ample evidence that skills shortages have been prevalent in the resources sector, especially in Western Australia and Queensland. Several occupations critical to mineral and energy exploration, such as geologists, geophysicists and surveyors, are currently listed on the Australian Government's Skills Shortage List as being subject to a national shortage.

The presence of skills shortages has encouraged exploration companies to turn to employee sponsored migration to recruit new workers. In 2011-12, over 800 geologists were approved for an employer sponsored 457 visa to work in Queensland, Western Australia and South Australia⁴⁰. Recent debate over the apparent misuse of 457 visas is bringing this form of labour supply into question. However, it should point out that the 457 visas were designed as a temporary means for addressing the skills gap in Australia until domestic training improves or fully fledged migration can take place.

For the mining industry, most of the issue on shortage of skills relates to the extraction phase of mining⁴¹. For example, in 2008 at the beginning of the GFC the minerals sector workforce comprised 35% tradespersons and related workers; approximately 35% semi-skilled workers (principally plant operators and drivers); 10% professionals; 9% and 5% managers and administrators⁴². Over recent years the greatest growth has been in the technician and trades category⁴³.

In terms of education, the National Centre for Vocational Education Research (NCVER) data shows that around 30% of minerals sector employees hold a diploma or above qualification (around 20 per cent have a bachelor degree or higher); 28% held a Certificate level III or IV qualification; 5% hold a Certificate I or II level qualification; and 37% had no identified qualification. The majority of employees work full time, and their median age is 40 years compared with a median age for all industries of 37 years.

⁴⁰ (DIAC 2012).

⁴¹ Most of this data on Mining Industry workforce was derived from Productivity Commission (2012)

⁴² No more recent (post GFC) audit of the Mining workforce in aggregate has been undertaken

⁴³ See, for example National Institute of Labour Studies (2008). *The Labour Force Outlook in the Australian Minerals Sector: 2009 to 2020*. NCVER (2007). *Mining: Industry & Training 2007*; exploring the relationship between industry and the VET system. And 5 ABS (November 2010). 6291.0.55.003. Labour force Australia

Coal sector employees are older on average than those in the metalliferous mining sector⁴⁴.

Women comprise around 18% of the workforce for the mining industry compared to a national participation rate of 46.5%. However, women only represent 3% of all employees at mine sites and minerals processing operations⁴⁵.

The minerals industry is the largest private sector employer of Indigenous people, with 5% of its direct workforce identifying as Indigenous. Most operations in remote and regional locations prefer local workers and are committed to increased employment of local Indigenous people who can meet their employability requirements. However, many Indigenous people located in these areas have low levels of literacy, numeracy and fitness for work attributes which reduces their ability to take up training opportunities. A labour force training priority is to more comprehensively engage Indigenous persons in the workforce training programs.

Whilst the minerals industry has a preference for employing locally, in many remote and regional areas the local population is simply not large enough to meet the skilled labour needs of the industry. As a result, a number of policy initiatives are required to encourage new entrants to the industry in terms of relocation or joining the FIFO workforce.

The Productivity Commission report suggests that employee turnover in the minerals sector is high⁴⁶. For example, at some FIFO sites the turnover was as high as 30% at the height of the mining boom. The ABS found that 12% of mining workers in February 2008 had changed their employer in the previous 12 months. There are other indications that labour churn is becoming significant.

The characteristics of the Services to Mining industry are less known. The exploration section (including geophysical surveying) has a higher percentage of tertiary trained workers (upwards of 30%) and a lower percentage of Trades and Technicians (around 20%). More male employees work in exploration but females hold a roughly equal position in the business services area of the mining industry.

Labour supply constraints, both in quantity and skills, has long been a complaint of the industry. The Mineral Council of Australia argues that

⁴⁴ NCVER (2013) " Training and Education Activity in the Mining Industry", report undertaken for the Mining Council of Australia

⁴⁵ NCVER (2013) p. 3

⁴⁶ See, Productivity Commission (2012) Mineral and Energy Resource Exploration Issues Paper, pp. 1-5

“Lack of consistent and comprehensive data on projected education and training needs has been a key issue in the past for policy makers and those with responsibility for purchasing VET sector training. Each State Training Authority has a unique model for establishing demand and investment in education and training and these must be aligned”⁴⁷.

They argue that the “Government’s labour market forecasts of the minerals industry have consistently underestimated the skills shortages of the sector”. This is particularly true of specialised occupations, such as mining engineering and specialized exploration services. In addition the Council is critical of the lack of reliable and transparent labour market data for the industry as a whole⁴⁸.

The Council also argues for institutional reform claiming that a successful workforce development strategy must be developed from the ground (enterprise level) up and point to the example of Skills DMC and its trialling of workforce development plans at mine sites. This program allocates Productivity Places Program to (PPP) positions to fill the identified skills gaps.

The minerals industry has consistently advocated a demand driven purchasing model with strong industry involvement rather than the provider supply driven approach that has been the key element of past “skills purchasing market”⁴⁹. However, to implement such a labour force program is difficult in that, while the demands of industry may change quickly the lead time in setting up educational programs is relatively long and so a partial disequilibrium between industry needs and the output from training institutions is almost inevitable. Accordingly, to address this partial disequilibrium, two partial solutions are available; expansion of the number of on the job training (perhaps by increasing the recognition of prior experience in the accreditation of qualifications⁵⁰) and increasing the use of workforce placements during formal training. The Mining Council itself has proposed a number of labour skilling and training recommendations.

⁴⁷ Minerals Council (2011)

⁴⁸ The Council argues that “Accurate data on current and future skills needs of the minerals sector can only be obtained from enterprises that have completed and maintained current, comprehensive workforce development plans, taking into account current and future activity” , p 29.

⁴⁹ See Mineral Council Submission on Regional Skills Relocation

⁵⁰ Such programs are currently being formalised by institutions such as Deakin University <http://www.deakin.edu.au/careers-at-deakin/why-deakin/emp/prior-service.php>

5.6 Minerals Council recommendations on labour force training

Specifically, the Mineral Council of Australia recommends that:

1. The national workforce development strategy proposed by the National Resources Sector Employment Taskforce is to be developed and implemented so that the skills needs of the Australian minerals industry in remote and regional Australia are included in a national response to labour force mobility.
2. The Federal and State governments should improve on soft infrastructure, particularly in the areas of childcare and education and training. The availability of meaningful, valued jobs for women in mining towns is critical to attract more people to remote and regional Australia.
3. Governments continue to focus on and expand programs to improve language, literacy, numeracy and work-readiness skills of Indigenous peoples as the primary strategy to attract more Indigenous Australians to the minerals industry.
4. It is also important that the Australian Government, in partnership with industry, actively resource and implement its Memorandum of Understanding with the Mining Council of Australia on Indigenous Employment and Enterprise Development.
5. The Federal and State Governments should work with industry to establish a local or regional industry-endorsed national entry level qualification for plant operator and driver occupations in the minerals sector with clear identification of employability attributes required.
6. Governments should partner with industry to establish more Centres of excellence for education and training in the minerals sector.
7. The Australian Government should develop and implement appropriate training programs to assist displaced and unemployed jobseekers to transition to regional areas and jobs in the minerals sector.
8. It is necessary to improve the level of compatibility between the publicly funded VET sector and the needs of the minerals industry.
9. A simplification of the level of appropriate education, training and employment initiatives for the minerals industry in remote and regional Australia is required to encourage the industry to engage in the these programs.

10. Governments (Australian, State and Local) should provide hard and soft infrastructure to attract workers and their families to regional and remote areas in Australia.
11. Governments should work with industry to improve the attractiveness of the FIFO model through measures including attention to family needs to prolong the average employment period of the industry.

5.7 Implications for Services to Mining Industry in Queensland and the GBLM

The issues that face the Mining sector in Australia are also relevant for Queensland but with additional issues; principally, the scope for Queensland to develop a Services to Mining Industry compatible with the size of its Mining Extraction. The Synergies (2007) report identified the relative under-development of the Services to Mining Industry in Queensland compared to Western Australia. This was particularly noticeable among junior miners who participate in Greenfield mining. Currently there is little to indicate that the Services to Mining industry in Queensland has achieved its potential growth since the release of the Synergies study, six years ago. The one possible exception to this is the Coal Seam Gas (CSG)/ Shale oil industry. Queensland currently has around 90% of Australia's known shale oil resources which is equivalent to approximately 22 billion barrels of oil⁵¹. However; the industry in Queensland has had a troubled history.

Specifically, the development of the shale oil industry in Queensland has progressed as follows⁵²:

- In the late 1990s – the Stuart Shale Oil Project was built in Gladstone (this was the only major shale oil project in Queensland up to 2008).
- July 2004 – Queensland Energy Resources announced an end to the Stuart Shale Oil project in Australia.
- October 2004 – the Stuart Shale Oil Project was shut down (after the company Southern Pacific Petroleum ran out of money and ceased to operate).
- August 2008 – a 20 year moratorium on shale oil mining in Queensland was placed by the Bligh Queensland Government.

⁵¹ Available online: <http://mines.industry.qld.gov.au/mining/unconventional-petroleum-resources.htm>.

⁵² Available online: (1) <http://www.greenpeace.org/australia/en/about/victories/> and (2) <http://www.farmingahead.com.au/News/general/02/05/2013/187527/community-s-fears-as-shale-oil-production-begins>.

- February 2013 - the Newman Queensland Government lifted the 20 year moratorium, raising the prospects of rapid development of the industry and the almost certain creation of a skilled labour supply issue.

The move to lift the moratorium on the shale oil industry is particularly relevant in light of the booming CSG industry in Queensland. Specifically, the

- Queensland's coal seam gas (CSG) industry has grown rapidly over the past 15 years with the annual number of wells drilled risen from 10 in the early 1990s to over 720 in 2011-2012⁵³.
- Exploration and development activity in the CSG industry remains strong and continues to be at the forefront of Queensland's petroleum industry.
- The industry continues to experience labour shortage in the geo-technical and drilling areas.
- These labour shortages are impacting on current petroleum infrastructure plans. In particular in the construction of additional pipelines to interstate markets and to supply gas to the Gladstone LNG plants.
- The labour shortage issue is centred around the Bowen (Permian coal measures) and Surat (Jurassic Walloon Coal Measures) basins which represent more than 79% of the total gas produced in the state. These shortages have implications for the GBLM both in the opportunity to provide FIFO workers and in facilitating training facilities.

A related issue is the within-industry competition faced by the Services to Mining Industry. While the skills required for the extraction and exploration (broadly defined) activities are not entirely equivalent, the two sub-sectors do compete for labour forces especially in the trades and professional areas. It is perhaps for this reason that expansion in the extraction sector of the Mining industry is not matched by a similar expansion in the Services to Mining industry. It would be difficult to expect extraction and exploration companies to develop labour force policy in unison but an over-sighting role from a central authority in jointly developing a commonly skilled and interchangeable workforce might have more success. As well, training organisations need to develop specialist training modules for exploration activities which are currently not available in Queensland to the required level.

⁵³ <http://mines.industry.qld.gov.au/assets/coal-pdf/csg-update-2013.pdf>

The third constraint for Queensland is competition for labour from other states, noticeably Western Australia. As Brisbane develops as a service hub for the Mining industry it increasingly confronts labour force competition for skilled labour from similar hubs in Darwin, Perth and Sydney.

6 The Capacity for Queensland Education and Training Institutions to Cope with the Anticipated Demand

In our first report we highlighted the projected slowdown in the rate of enrolments and graduations from Queensland based education and training providers⁵⁴. This prediction was based upon national trends in student numbers (including a noticeable drop in overseas student enrolments) and announced policies of major institutions such as the University of Queensland to cap enrolments and move towards a model which increased the ratio of post-graduate students within the overall student intake. This would both slow the rate of increase in enrolments, and, due to the increased resources needed for post graduate students, lead to a gradual decline in total enrolments.

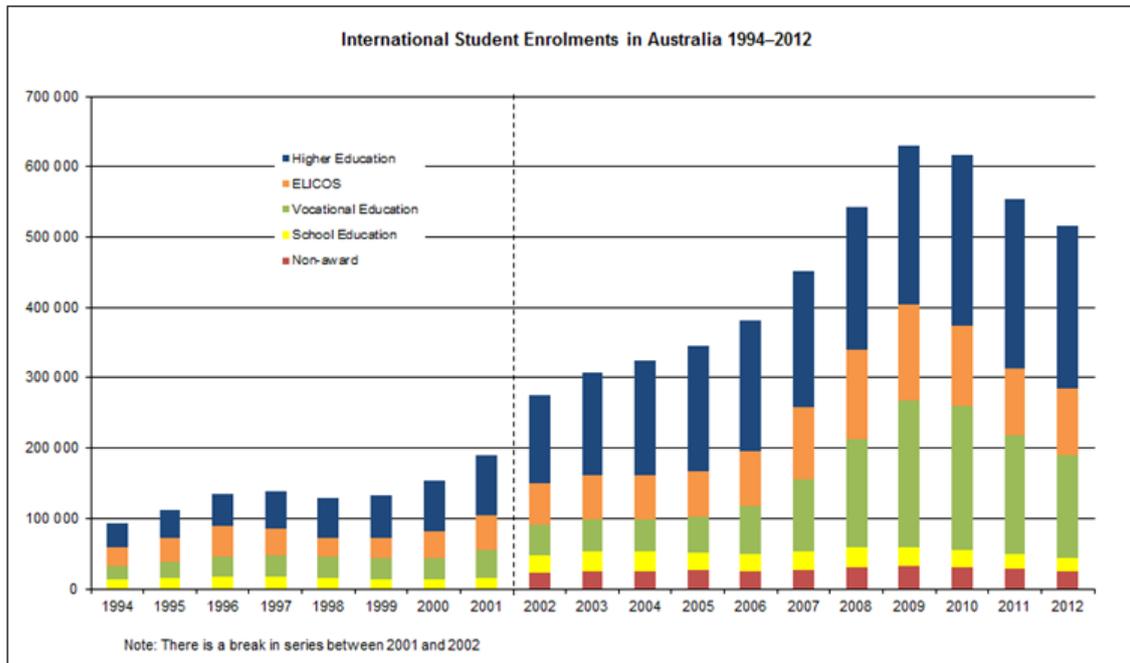
Since our initial estimate a number of factors have occurred which leads us to re-evaluate our original conclusions, although the likely situation in the short to medium term on enrolments and completions is far from straightforward. These factors include:

- The greater use, by institutions, particularly the regionals, of a demand based model of student enrolment. This system allows universities to over- enrol (exceed their quota by attracting fee paying students) and which will probably lead to a rise in total undergraduate enrolments;
- the continued decline in overseas enrolments; and
- The emergence of the “Melbourne Model” of higher education which alters the structure of post graduate degrees and may add an additional year of study to some professional courses.

These factors and their likely implications for overall skilled labour supply are discussed below. International student enrolments both within Australia and for Queensland as a whole (though not for the University of Queensland) continued to decline in 2012.

⁵⁴ In particular, see table 12 of Synergies (2011)

Figure 8 International Student Enrolments in Australia 1994-2012



Data source: AEI International Student (2012)

AEI’s International Student Data for the 2012 calendar year show there were 515,853 enrolments by full-fee paying international students in Australia on a student visa. This is 38,506 fewer enrolments than in 2011, and represents a decline of 6.9%. This compares with an average annual growth rate of 6.5% for enrolments since 2002⁵⁵.

However, compensating (in numbers if not income) is the rise in undergraduate enrolments arising from the new demand driven model introduced in 2009. This system allows Universities to “over enrol” students beyond their Commonwealth funded allocation through charging fees. This has seen average growth in undergraduate enrolments of 2% in 2012. In the transition to a demand driven funding system, the cap on over enrolments was lifted from 5% in 2009 to 10% in 2010 and 2011. The take up was not immediate however, as of 22 February 2013, there were 273,878 applications made through TACs, an increase of 0.5% compared with the same time in 2012. This follows on from an increase of 2.7% between 2011 and 2012.

Nationally, Year 12 applications increased by 2.2% while non-Year 12 applications decreased by 1.5% in 2013. Above-average Year 12 offer rates were recorded in

⁵⁵ See, <http://www.austrade.gov.au/Education/Student-Data/2012/Summary>

Queensland (87.2%), WA (86.3%) and NSW/ACT (85.4%) in 2013. However, not all these translated into applications or (eventually) enrolments.

Table 8 Tertiary Preference Applications by State and Territory

Highest preference applications by State and Territory	2012	2013	%Change
NSW/ACT	87,009	88,690	1.9
Victoria	72,274	72,069	-0.3
Queensland	56,912	56,607	-0.5
Western Australia	19,304	18,941	-1.9

Source: <http://www.austrade.gov.au/Education/Student-Data/2012/Summary>

In terms of the trends in enrolments by area between 2012 and 2013;

- Health received the largest number of applications (70,876 or 25.9% of all applications).
- Agriculture, Environmental and Related Studies recorded the largest increase in applications (7.3%). This was followed by Natural and Physical Sciences (4.0%).
- Society and Culture received the largest number of offers (51,314 or 23.0% of total offers).
- Agriculture, Environmental and Related Studies recorded the largest increase in offers (9.2%). This was followed by Natural and Physical Sciences (3.3%).
- Applications for Agriculture, Environmental and Related Studies and Natural and Physical Sciences are most likely to get an offer (offer rates of 101.1% and 99.4% respectively).
- Commerce (including Economics and Management) although the second largest field, fell by 3-4%, possibly as a result of structural changes.

Finally there are changes in course structure and duration ushered in by the Melbourne Model, even though this is applicable to relatively few campuses. As a result of these changes, we have modified our student outcome table for Queensland (2013-2021) shown in the original report⁵⁶. The modified table appears below.

⁵⁶ Also the stated intentions of the large Universities in Queensland as regards enrolments.

Table 9 Summary of trends in non-school qualifications for the period 2013-2012, Queensland

Non-school qualifications	Growth rate 2006-2012	Forecast of graduating numbers between 2012-2021 using past trend from 2006-2011	Likely graduating number between 2012-2021 according to university intakes
Postgraduate diploma or graduate (postgraduate degree)	4.7 %	39,327	20,750
Graduate diploma or graduate certificate	2.18 %	13,258	11,940
Bachelor degree	3.50 %	176,040	105,800
Advanced diploma or diploma	4.50%	136,530	40,245
Certificate III/IV	5.52 %	128,700	38,670
Certificate I/II	-2.60 %	-26,970	-16,580

Note: Results were derived from shift share analysis using historical data from ABS Cat No. 6227.0. In addition, graduating numbers for the period 2013-2021 estimated in column 3 and 4 includes both domestic and international students.

Compared to output over the period 2006-2012, the period 2013-2021 will still see a slowdown in the numbers of enrolments and graduations. However, the gap has lessened from our initial estimates with significantly larger estimates for undergraduate (Bachelor) degrees and Graduate Diplomas. Postgraduate numbers are up about 2 -3 per cent on our earlier predictions, with domestic students taking up some of the predicted decline in the growth rate in international students.

Nevertheless our conclusions are essentially the same; a significant proportion of the skilled labour required for the GBLM over the next decade will need to come from overseas or inter-state. Our previous hopes for an influx of skilled persons currently not in the labour force seem unlikely, given the analysis undertaken in this report.

7 Consultations

Industry opinion and consultation was sought in two ways. The first comprised of a review of publically available comments made by the MCA. The views expressed by this peak body have been reported in depth above. The second was to seek one-on-one interviews with Queensland companies that provide services to the Mining industry.

7.1 Views of the MCA

As previously addressed, the Minerals Council of Australia (MCA) has put forward a number of suggestions to streamline and improve the structure of the labour market for Mining. Overall, they see a key and more focused role being played by the Federal Government. In summary, the Government's role is to;

- co-ordinate a national strategic approach to drive reforms to the VET system;
- put industry skill outcomes and higher employment level as the measure of success; and
- restructure the education and qualification training system to a demand driven training system rather than the existing supply driven situation⁵⁷.

In relation to the last point, the MCA considers the key roles for all Governments in restructuring the training system are to:

- ensure the quality of training providers, particularly in regard to the rigor of training delivery and assessment through the use of off-site standard equipment benchmarks and appropriate job hazard analysis⁵⁸;
- provide publicly available information on Registered Training Organisations (RTO) performance to assist enterprises in purchasing quality training; and
- implement a national schools' curriculum with enhanced capacity in language and STEM⁵⁹ subjects, and consistency in education systems between jurisdictions to avoid disadvantaging children whose family re-locates to pursue employment and career opportunities.

⁵⁷ Essentially meaning a training system that responds more to emerging industry needs rather than a continuation of the tradition craft or trades based approach common to most educational systems

⁵⁸ According to the MCA, " while the Australian Quality Training Framework (AQTF) provides a framework for assessing the systems and processes carried out by Registered Training Organizations (RTOs), it has not yet driven the quality improvements that would engender industry confidence in the VET product"

⁵⁹ STEM subjects refers to science, technology, engineering and mathematics subjects.

The Mining Council of Australia also argues that State Governments, as the owners and employers of the TAFE system, have a role in managing the TAFE system to deliver outcomes responsive to the needs of industry and the economy. They are particularly critical of the tendency for TAFE providers of supporting:

“popular or low cost community courses not directly related to national productivity” (MCA, 2011)

Finally they argue that the training role for industry in the schools system is largely undeveloped in Australia and have concerns about the standards of teaching at the secondary and tertiary level. Specifically their recommendations regarding the overall issue of labour force productivity and improvement are:

- to ensure that all Australians, including those in remote and regional Australia, are able to participate in the minerals industry workforce;
- promotion of Governments and industry partnerships to ensure that publicly funded training for skills is focused on areas that contribute most to the national economy and that lead to sustainable and meaningful employment;
- focusing of Governments’ programs to improve language, literacy and numeracy and work readiness skills of school leavers and the disengaged;
- State Governments to drive the implementation of new School-Based Apprenticeships and Traineeships in collaboration with industry with the focus of addressing relevant to skill shortage occupations in the minerals sector;
- support of regional higher education markets through more responsive regional loadings;
- the establishment of cross-sectoral collaboration to grow the pool of skilled labour in regional Australia and act as a buffer for the cyclical nature of mining;
- multi-skilling of agricultural labour and farmers to allow them to operate as a reserve labour force during periods of mining booms;
- development of a memorandum of understanding with the National Farmers Federation to allow joint labour force training development;
- strategic skills focus across all industries to prevent dislocation caused by demand in one particular sector; and
- incentive schemes to encourage people to work in regional Australia.

7.2 Local firm consultations

The views and recommendations of the MCA take place at a macro level. To gain greater insight into current labour market conditions in the Services to Mining industry in Queensland, consultation with local firms that provide services to the mining industry was undertaken.

7.2.1 Company Consultations

To draw upon local knowledge on the state of the labour market and the extent of the skills shortages problem for the Services to Mining industry, views from human resourcing companies, environmental consultancies, and project management firms were gathered.

In brief, these discussions suggest that the mining industry in Queensland is experiencing a slowdown with the exception of the petroleum and gas industry, in particular the CSG-LNG industry, to which is booming. Shocks to the mining industry - in the forms of lower commodity prices, reduced commodity demand from Asia-Pacific (in particular China), global economic slowdown, introduction of the mining tax and *Fair Work Act 2009*, has had significant impacts on the growth of the mining industry in Queensland. As a result, the mining industry (in particular the coal companies) has managed the downside risk to revenue through project cancellations and employment contract terminations - approximately 5,000 jobs have been cut this financial year⁶⁰. In contrast, the petroleum and gas industry have not been affected and has continued to employ professionals where required.

At the moment, due to the recent redundancies in the mining industry, the labour market has loosened in the six months. However, stakeholders have expressed that shortage of skilled labour will continue to be a problem once the mining industry recovers from the recent shocks.

Concern over the impact of the bottlenecks at the Brisbane Airport on the Mining industry and Services to Mining industry was expressed by one stakeholder. The stakeholder explained that the bottleneck at the Brisbane Airport affects:

- the FIFO model;
- rosters of mining companies; and

⁶⁰ Available online:
<http://www.miningnews.net/storyview.asp?storyid=9644151§ionsource=s88&highlight=%QUEENSLAND%RESOURCES%OUNCIL%>

- happiness of workers – hence the acceptability to work on site.

Accordingly, the stakeholder believes upgrades at the Gold Coast Airport and Sunshine Coast Airport is necessary to service the Mining industry.

There was a broad agreement among stakeholders that skills shortage and skills gap are acute for experienced professionals rather than graduates. In particular, the problem is the greatest in two areas:

- Professionals with 5-6 years of technical experience: as these individuals can step-up to senior management roles and oversee junior staffs; and
- Professionals with more than 8 years of experience at least 8 years of experience who have in-depth technical knowledge and has the aptitude for marketing and managing the company.

In particular, the difficulty to attract the appropriate skills set is greater for smaller boutique companies than larger companies. As a result, smaller boutique companies have in the past been required to pay above market to attract the necessary skills.

- One stakeholder also noted that mining companies are now committed to facilitating their own in-house trainings to up-skill existing workers to resolve their shortage in experienced professionals/technicians. Some examples include: Hitachi which has opened an \$80 million Brisbane mining headquarters: announced in November 2012, Hitachi Construction Machinery recently opened the first stage of its new 80,000 square metres facility in Wacol, Brisbane⁶¹. The facility will remanufacture components as well as assemble mining and construction equipment. Hitachi's national mining group will also be headquartered at the facility, as well as engineering services, product and service support and training. The site features a specialised mining and construction workshop to assemble Hitachi Electric Drive dump trucks, up to 360 tonnes size.
- New Ertech Holdings Building in Western Australia: announced in November 2012, the new Ertech Holdings Building has a site area of 12,000 square metres and includes offices, training areas and a workshop. In-house workshop training has been the focus of Ertech Holdings since 2000⁶².

All stakeholders agree that relocation of existing employee and attracting international skilled labour (for example, under the 457 visa) is more complicated than resourcing

⁶¹ Available online: http://www.theajmonline.com.au/mining_news/news/2012/november/november-29-2012/top-stories/hitachi-opens-80m-brisbane-mining-headquarters .

⁶² Available online: <http://www.ertech.com.au/news/new-ertech-holdings-building-opened-by-premier/> .

locally at the site where the labour is needed. This is because a combination of factors affects the willingness of skilled labour to relocate to Queensland, including factors such as salary, family relocation benefits and other arrangements, and the perceived liveability and opportunity of the Greater Brisbane area and other main urban centres in Queensland.

8 Policy implications

This supplementary report further considers issues relevant to the GBLM that were not specifically dealt with in the main report (and its subsequent update). It did this in a number of ways. First it examined in greater detail recent industrial and occupational growth in the GBLM including the views by Government agencies, to supplement and cross-check the Synergies analysis. This analysis had highlighted Professionals as the most important labour market group in terms of both projected growth and projected demand over the next decade. This supplementary report disaggregated the broad category of Professionals to show that labour demand, though high, varied across sub groups. Health professionals and specialised engineering graduates were identified as the group is most short supply over the next decade.

Allied to this is the labour supply issues that will emerge if the Services to Mining industry in Queensland expands to its potential. While Queensland has a highly developed mining extraction industry it lags behind the leader, Western Australia, in terms of Services to Mining, including exploration and the geo technical and business support systems. Discussion with local companies engaged in hiring specialist labour in this area shows that the industry demands not only graduates but looks to staff with at least 6-7 years experience. The challenge to the local industry is to create jobs for graduates that enable them to achieve this level of work experience or to increase the amount of on-the job training for graduates during their degrees.

The report also considered the potential importance of the reserve army of persons who were not working in areas where they initially trained, either through moving to other occupations or through leaving the workforce. The conclusions were that the “recoverable” amount of skills from these areas was quite small unless the conditions that led persons to abandon their intended occupation were removed. In terms of policy development it is likely that more effort should be placed in the initial training periods to match people up with the occupation to which they are best suited.

The report also provided the first estimates of occupational segregation by gender within the GBLM. It found that some male bias did exist but that its level was less than overseas labour markets and reducing. This is in line with the growth in health and community service related occupations where women are over-represented. The policy implication is one of benign neglect. Any residual gender discrimination (in terms of numbers employed) is rapidly disappearing

In our previous report Synergies suggested that the local supply of skilled graduates would not be sufficient to cope with the expected demands up to year 2021. Changes and potential changes in the structure of undergraduate and postgraduate qualification offerings under the Melbourne Model raise further concerns over the capacity of the

domestic training institutions to cope. Abolishing the honours year under this Melbourne Model will increase the length (and cost) of training in some occupations and may further reduce the supply of locally trained graduates. The policy implication of this Melbourne Model for the GBLM is that efforts should be placed to influence the local Universities to avoid following this model or to make sure that adequate federal funding is provided. Offsetting this is the expected increase in domestic students following the greater take up of the demand model of student recruitment.

Based on the feedback received in industry consultation and the review of the recommendations proposed by the MCA, we consider that partnerships between industries and training providers will be crucial to address the skills shortage. In particular, up-skilling the labour force maybe simpler and more cost-effective than attracting international labourers or interstate and intrastate workers.

Finally, we provided an in depth report of the Services to Mining Industry and the labour supply issues arising. This involved a consideration of industry views both from the Mining Council of Australia and from local labour hire companies. The Mining Council took a long term view in which they predict continuing labour market shortages. The policy options they advise, which are relevant to the GBLM are:

- A greater mapping of the skill set relevant to resource exploration.
- An investigation of the determinants of the high cost of employing skilled workers, such as geologists and mining surveyors, in Australia compared to countries such as the United States and Canada.
- A greater input from the industry into the training and education of the skilled workers required for resource exploration.
- A greater analysis of the performance of the vocational education and higher education sectors in educating and training the skilled workers required for resource exploration.
- A cost –benefit analysis of the employer sponsored migration.
- A rigorous analysis of the impact of workplace relations regulation on productivity in mineral and energy production.
- The impact of the burden of legislative requirements on the rate of new exploration.

A Characteristics of Professionals

Table 10 Labour Force Characteristics of Professionals

Occupation	Employ't May 2012	Employ't change 5 years to May 2012		Unemploy't	Female	F-T share of employ't	Median age	Median earnings ⁶³	Projected employ't level by 2016-17
	'000	,000	%	%	%	%		%	,000
Professionals	2575.4	455.8	21.5	1.8	52	76.1	40	1400	2693.1
Arts and Media Professionals	108.1	20.9	24.0	3.6	49	63.7	40	1150	82.3
Business, Finance and Human Resource Professionals	378.1	29.2	8.4	2.1	49 ²	84.5	38 ²	1346 ²	392.3
Educations Professionals	483.1	40.9	9.2	1.2	70	65.7	43	1384	510.1
Engineers	132.3	27.3	26.0	1.3	27 ³	93.5	38 ³	1500 ³	158.1
Health Diagnostic and Therapy Professionals	157.3	42.0	36.4	1.0	74 ¹	70.5	42 ¹	1350 ¹	171.8
ICT Professionals	230.6	45.0	24.3	2.8	17	93.2	37	1534	241.6
Information Professionals	142.8	35.1	32.6	2.2	49 ²	78.9	38 ²	1346 ²	124.2
Legal, Social and Welfare Professionals	191.7	35.4	22.6	2.2	60	72.1	43	1252	197.7
Medical Practitioners and Nurses	335.1	62.8	23.1	0.8	74 ¹	63.4	42 ¹	1350 ¹	411.4
Sales, Marketing & Public Relations Professionals	117.4	27.2	30.1	3.0	49 ²	86.1	38 ²	1346 ²	133.2
Science Professionals and Veterinarians	108.9	28.5	35.5	1.2	27 ³	83.0	38 ³	1500 ³	106.6
Transport and Design Professionals and Architects	152.7	34.3	29.0	3.0	27 ³	79.2	38 ³	1500 ³	150.9
All Occupations	11,517.0	974.1	9.2	5.1	46	70.3	39	1100	12,285.8

Note: 1 data are for broad grouping of Health Professionals. 2 data are for broad grouping of Business, Human Resource and Marketing Professionals. 3 data are for broad grouping of Design, Engineering, Science and Transport Professionals.

⁶³ Full-time weekly earnings

B DEEWR Skill Shortage Research, Professionals, 2011-12

Table 11 The Professional Workforce disaggregated by Skill Shortage

Professional Occupations	Occupation Rating
Business, Finance and Human Resource Professionals	
Accountants	NS
Economists	NS
Librarian	NS
Design, Engineering, Science and Transport Professionals	
Architect	NS
Agricultural Consultant/Scientist	S
Chemical Engineer	D
Civil Engineering Professionals	S
Electrical Engineer	S
Electronics Engineer	NS
Geologist	S
Mechanical Engineer	S
Medical Laboratory Scientist	NS
Metallurgist	NS
Mining Engineer (excluding Petroleum)	S
Park Ranger	NS
Petroleum Engineer	S
Quantity Surveyor	D
Surveyor	S
Urban and Regional Planner	NS
Veterinarian	NS
Education Professionals	
Early Childhood (Pre-primary School) Teacher	S
Primary School Teacher	NS
Secondary School Teacher	NS
Special Needs Teacher	D
Health Professionals	
Audiologist	S
Dentist	NS
Hospital and Retail Pharmacist	NS
Medical Diagnostic Radiographer	NS
Medical Radiation Therapist	NS
Midwife	S
Occupational Therapist	D
Optometrist	S
Physiotherapist	R

Professional Occupations	Occupation Rating
Podiatrist	NS
Registered Nurses	D
Sonographer	S
Speech Pathologist	NS
Legal, Social and Welfare Professionals	
Psychologist	NS
Social Worker	NS
Welfare Worker	NS