

Process Manufacturing, Recreational Vehicle and Laboratory Industry Reference Committee

Skills Forecast and Proposed Schedule of Work 2018–2022



Administrative Information

Name of Industry Reference Committee (IRC):

Process Manufacturing, Recreational Vehicle and Laboratory (PMRVL)

Name of Skills Service Organisation (SSO):

Innovation and Business Skills Australia (IBSA Manufacturing)

About the Industry Reference Committee

The **Process Manufacturing, Recreational Vehicle and Laboratory** Industry Reference Committee comprises nine members and was constituted in May 2017.

The 2018 Industry Skills Forecast and Proposed Schedule of Work was reviewed and approved by the membership below.

Mr Keith Monaghan (Chair)

Mr Ian Curry

Mr Stuart Lamont

Ms Leah Simmons

Ms Julie Warren

Mr Nigel Haywood

Ms Ceridwen Jones

Mr Han Michel

Mr Grahame Aston

Industry Reference Committee Signoff

The 2018 PMC Manufactured Mineral Products Training Package Skills Forecast and Proposed Schedule of Work was approved as the result of a properly constituted IRC decision.

IRC Chair: Mr Keith Monaghan

Date: May 2018

www.ibsa.org.au

manufacturing@ibsa.org.au

IBSA Manufacturing

Level 11, 176 Wellington Parade

East Melbourne, Victoria, 3002

Call (03) 9815 7099

This IRC Skills Forecast and Proposed Schedule of Work has been prepared on behalf of the PMRVL Industry Reference Committee for submission to the Australian Industry Skills Committee (AISC).

This document has been produced with the assistance of funding provided by the Commonwealth Government through the Department of Education and Training.

Contents

Administrative Information	--
Industry Reference Committee Signoff	--
Executive Summary	01
What is the Manufactured Mineral Products Industry?	01
Critical Workforce Challenges and Opportunities	01
Forecasting Skills Priorities	02
Training Package Priorities	02
Sector Overview	03
Industry Snapshot	03
Training Snapshot	06
Challenges and Opportunities	08
Employment and Skills Outlook	12
Employment Outlook	12
Skills Outlook	13
Key Drivers for Change and Proposed Responses	15
Training Product Review - Current Activities	16
Training Product Review – Priorities 2018-2022	18
Proposed Schedule of Work 2018-19 to 2021-22	18
Appendix A: Training Package Enrolment Snapshot	19
Appendix B: Future Skills Outcomes	22
Trends	22
Considerations for Training	24
Appendix C: Occupation Classifications	25

Executive Summary

The Industry Reference Committee (IRC) Skills Forecast and Proposed Schedule of Work identifies priorities for training package development work to meet the needs of industry. This document is based on research, analysis and consultations with IRC members and other stakeholders and provides evidence of current and emerging industry skills needs.

What is the Manufactured Mineral Products Industry?

The Manufactured Mineral Products (MMP) industry uses minerals sourced from the extractive industries, such as quarrying, to produce a range of products used by other downstream industries. It has close links to the construction industry which uses its principal products. Manufactured mineral products are also used in a variety of other industries including food and beverage, heavy industry and landscaping.

Victoria and New South Wales are the major hubs for manufactured mineral products, with more than 1,000 businesses in each state (approximately two-thirds of the industry). The industry is dominated by micro and small businesses, which comprise 92% of all businesses in the sector.

The industry is heavily regulated, particularly in relation to state and local government environmental regulations. Workplace health and safety is also a critical issue in the sector.

Critical Workforce Challenges and Opportunities

The manufactured mineral product industry has declining levels of employment, an ageing workforce, and is dominated by micro and small businesses. Technological innovation and demand for new products is being hampered by a lack of available capital and significant competition from overseas companies. Process automation is impacting employment levels in the cement and lime manufacturing sector. Future employment levels in all subsectors of the MMP industry are expected to decline in the next five years.

Forecasting Skills Priorities

The low level of enrolments in the Training Package (only 37 learners across the six qualifications in the current Package) is the key issue affecting skill forecasting. In response to declining levels of enrolment in PMC Manufactured Mineral Products qualifications, a review of the Training Package is underway. In addition, the nature of employment in this sector (declining levels, an ageing workforce and dominated by very small businesses) means it will be challenging for the Vocational Education and Training (VET) sector to meet the future skill needs of workers in the MMP industry.

Furthermore, as technology impacts on the products being developed by manufactured mineral product businesses and, in some parts of the industry, where technology impacts on the work being undertaken, the VET sector will need to respond with more generic workplace skills and to ensure the technical nature of the content on offer in MMP units is suitable. This will, however, be contingent on businesses in the sector having access to the capital they need to invest in new technologies.

Training Package Priorities

Given the low number of enrolments in qualifications from this Training Package, work is currently underway to review the training package to determine which PMC Manufactured Mineral Products Training Package coded units can be replaced with MSM Manufacturing Training Package coded units.

Sector Overview

Industry Snapshot

The manufactured mineral products (MMP) industry uses minerals sourced from the extractive industries. This industry produces a range of products which are typically used by other industries rather than directly consumed by the public. Downstream industries include building and construction (cement, concrete products, glass, clay and ceramic, fibre cement products), civil construction (cement, concrete products, asphalt), food and beverage (glass bottles and jars), heavy industry (refractories), automotive industry (glass) and landscaping industry (concrete blocks and pavers).

Most of the subsectors of this mature industry are experiencing competitive pressures from cheaper imports. Increasing automation is assisting businesses in some parts of the industry to maintain market position, while in other subsectors, such as ceramic and concrete products, manufacturers are using their small scale to their advantage.

The qualifications in the PMC Manufactured Mineral Products Training Package are:

- PMC20116 Certificate II in Manufactured Mineral Products
- PMC30116 Certificate III in Manufactured Mineral Products
- PMC40116 Certificate IV in Manufactured Mineral Products
- PMC50116 Diploma of Manufactured Mineral Products
- PMC60116 Advanced Diploma of Manufactured Mineral Products
- PMC80116 Graduate Certificate in Refractories Engineering.

The MMP industry includes the following industry Australian and New Zealand Standard Industrial Classification (ANZSIC)¹ groups and classes:

- 201 Glass and Glass Product Manufacturing
- 202 Ceramic Product Manufacturing
- 2021 Clay Brick Manufacturing
- 2029 Other Ceramic Product Manufacturing.
- 203 Cement, Lime, Plaster and Concrete Product Manufacturing
- 2031 Cement and Lime Manufacturing
- 2032 Plaster Product Manufacturing
- 2033 Ready-Mixed Concrete Manufacturing
- 2034 Concrete Product Manufacturing
- 209 Other Non-Metallic Mineral Product Manufacturing.

A summary of the business landscape for the Manufactured Mineral Products industry is included in Table 1.

Table 1 – Business landscape in key sectors/subsectors

Industry Sector/ Subsector	Number of Businesses at 30 June 2016	% Change from 30 June 2015	Types of Businesses
Manufactured Mineral Products	3,479	Less than 1%	42% non-employing 50% small 7% medium <1% large

ABS, 2017, 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016

¹ ABS publication: 1292.0 - Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006 (Revision 2.0)

Business Landscape

Despite very modest growth in the number of businesses operating in the MMP sector between 2015 and 2016, more broadly there has been significant retraction and amalgamation within the industry in recent years. This has seen some parts of the industry offshore their manufacturing operations (e.g. automotive glass and other flat glass manufacturing). Industry downturn, the transition of the resources sector from construction to production, the introduction of robotics and automation to the industry, and import competition are all impacting on this industry. The health of the construction sector also has a strong influence on the MMP industry. Government-initiated infrastructure projects have seen an increase in demand for the large-scale manufacture of products such as precast noise walls for freeways, bridges, walls for buildings and pipes, and the manufacture of pre-mixed concrete for use on building sites. Infrastructure investment has also triggered demand for a range of other products manufactured by the MMP industry.

The numbers employed in the MMP industry have contracted in recent years. Between the 2006 and 2011 Censuses, employment in the industry was relatively stable at approximately 37,000 people. By 2016 the number employed had declined to only 26,292 persons, a decline of 30% in five years. The industry is also ageing, with 34% of employees aged 50 years and over. By contrast, in 2006 workers in this age group made up only 27% of the workforce.

Key Industry Stakeholders

Most of the subsectors within the MMP industry have their own industry association. These include the Australian Glass and Glazing Association, Australian Stone Advisory Association, Cement, Concrete and Aggregates Australia, Cement Industry Federation, and the National Precast Concrete Association. The Housing Industry Association and Master Builders Australia also represent some businesses involved in the MMP industry.

Regulation and Licensing

Businesses in the MMP industry are subject to significant levels of regulation. Typically, their products must conform with relevant Australian Standards – and their manufacturing processes must comply with a range of Commonwealth, state and local government regulations designed to manage environmental risks. These include legislation and regulations managed by the Clean Energy Regulator, as well as those administered by the State Environmental Protection Authorities and local governments relating to the allowable emission of pollutants (e.g. air pollution).

Testing of products is an important step in the production process required to be adopted by a number of businesses in the MMP sector. Samples are taken during production, and required tests are then carried out by testing laboratories that test a range of properties such as strength and grading. The National Association of Testing Authorities (NATA) is the national accreditation body that ensures organisations comply with relevant international and Australian standards.

Training Snapshot

Learner Training Profile²

In 2016, a learner enrolled in a qualification from the PMC Manufactured Mineral Products Training Package was more likely to be:

- Enrolled in a Certificate III level qualification
- Studying in South Australia or Queensland
- Aged 30 – 39 years of age
- Male
- An apprentice or trainee
- Enrolled at a private Registered Training Organisation (RTO).

Over the period 2014-2016:³

- The total number of enrolments in PMC Manufactured Mineral Products Training Package qualifications has declined by 86% (from 256)
- South Australia experienced the biggest decline down from 100 to 16 (46% of all enrolments). The only other state with double-digit enrolments in 2016 was Queensland with 10 enrolments (29%)
- While learners aged between 30 and 39 years are the largest cohort enrolled in PMC Manufactured Mineral Products qualifications (40% in 2016), they have declined by 75% in the three years to 2016
- Males dominate employment in the industry and consistently account for around 95% of enrolments in PMC Manufactured Mineral Products qualifications in 2014, 2015 and 2016.

Appendix A presents a graphical snapshot of enrolment data from the PMC Manufactured Mineral Products Training Package, including overall apprenticeship enrolments. They show that there was a small spike in enrolments in 2015 but they have declined in 2016.

The decline in enrolments in apprenticeships and traineeships is described by industry stakeholders as being driven in large part by the nature of the work undertaken. Concrete plants, for example, are geographically dispersed operations and are often run with minimal staff. Drivers are often contractors running their own business. Collectively this means it is difficult to find time for structured training – with no-one else left to run the operations while training occurs. It also highlights the difficulties in employing apprentices when most of the work can and is being done by sole operators.

² VOCSTATS VET Provider Collection, extracted on September 2017

³ Due to the very small numbers of PMC Manufactured Mineral Products enrolments, caution should be used when interpreting the enrolment data due to the National Centre for Vocational Education Research's (NCVER) data randomisation methods designed to protect student privacy.

Training Delivery

Only one learner was enrolled in a PMC Manufactured Mineral Products qualification at a TAFE Institute in 2016; the remaining learners were enrolled with a private provider. Government funded enrolments in PMC Manufactured Mineral Products qualifications were also mainly undertaken with providers other than TAFE Institutes.

In February 2018, there were six RTOs approved to deliver PMC Manufactured Mineral Products qualifications.⁴

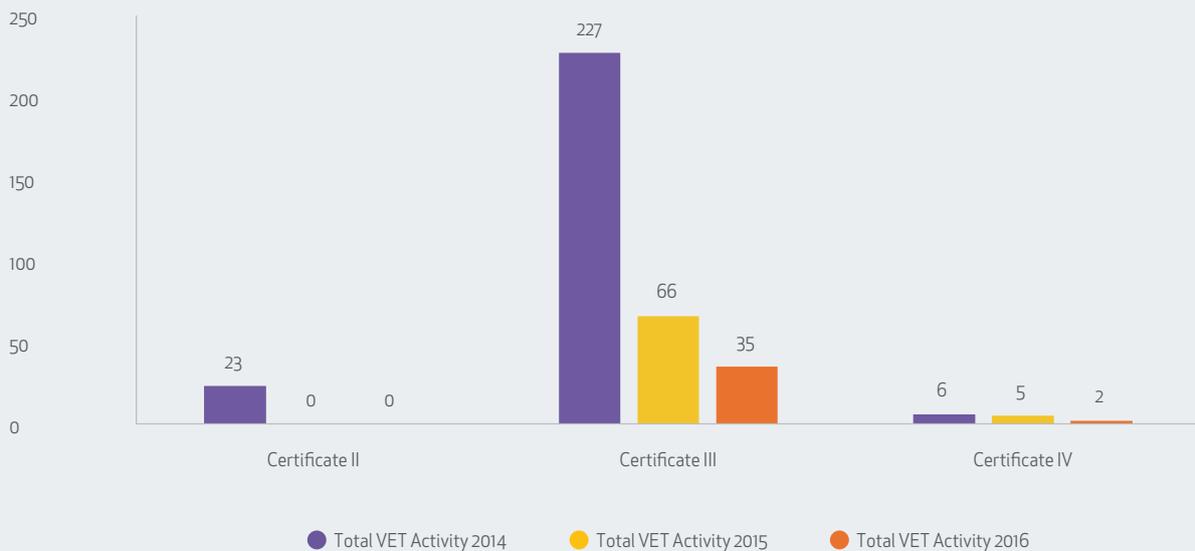
- There were 2 registered providers of the Certificate II in Manufactured Mineral Products (1 TAFE Institute and 1 private RTO, both based in New South Wales; however the private RTO offered scope in all states and territories).
- 6 RTOs have the Certificate III in Manufactured Mineral Products on scope (2 TAFE Institutes, 1 enterprise RTO, 1 industry RTO and 2 private RTOs). The private and enterprise RTOs had scope in all states and territories, the industry RTO in South Australia and the TAFE Institutes in New South Wales and Western Australia.
- Only one Queensland private provider is approved to deliver the Certificate IV in Manufactured Mineral Products and has scope in all states and territories.
- There are no providers currently approved to deliver the Diploma of Manufactured Mineral Products, the Advanced Diploma of Manufactured Mineral Products or the Graduate Certificate in Refractories Engineering.

⁴ Data accessed from <https://training.gov.au> on 12 February 2018

Qualification Uptake

The uptake of qualifications in the PMC Manufactured Mineral Products Training Package is illustrated in Figure 1 below.

Figure 1 – Total enrolments in Manufactured Mineral Products qualifications



VOCSTATS VET Provider Collection, extracted on September 2017

The enrolment data reflect the importance of the Certificate III qualification in 2014 and the large decline in enrolments in 2015 and 2016. The only government funded activity in these qualifications between 2014 and 2016 is in the Certificate III. In 2016, government funded activity was around 70% of total VET activity.

Challenges and Opportunities

Megatrends affecting all of the sectors covered by the Process Manufacturing, Recreational Vehicle and Laboratory IRC were identified by IRC members in a future skills workshop conducted in 2017.

A summary of the outcomes of this workshop can be found in **Appendix B**.

More specific challenges and opportunities for the sectors related to the PMC Manufactured Mineral Products Training Package are discussed below.

For Industry and Employers

In relation to the training needs of the industry, the key challenge appears to be the declining level of formal, accredited training being accessed by the industry. In part this is undoubtedly due to the declining employment levels in the sector, the increasing use of automation, and the threat from offshore competition.

Society and Culture

In addition to the preponderance of sole operators, the ageing of the workforce within the MMP sector is another likely driver of the decline in training occurring within the sector over the past five years (with lower levels of participation in education and training by people as they age).⁵

Business and Economics

Ninety two percent (92%) of businesses in the MMP sector employ fewer than five people.⁶ Almost half (42%) are sole operators. With the sector being dominated by so many small firms, there are challenges for them in terms of dealing with competition from larger, overseas businesses as well as in accessing sufficient capital to innovate (including through automation). Smaller businesses typically also have less time and fewer resources available to invest in skills and training.

Those elements of the MMP industry which are linked to the residential building sector are generally predicted to perform well in the short-term, although the volatility of the residential construction sector is acknowledged and has an impact on many MMP businesses. Irrespective of the strength of the residential construction sector, overall demand for clay bricks is in decline (as consumer preferences change). Producers of products for the commercial building sector and the infrastructure sector are also expected to experience growth in the short term although some variability is expected.

Resources and Environment

The MMP sector is highly susceptible to changes in environmental regulations and increasing environmental awareness amongst consumers. The requirement for higher levels of energy efficiency in non-residential buildings and consumer demand for cheaper energy prices are driving demand for glass wool insulation products.

Organisations involved in concrete production are subject to increased regulatory oversight as technology allows for improved specification of precast concrete products. At the same time, an increased focus on the environmental impact of concrete manufacturing has required businesses to do more to reduce pollution.

⁵ ABS, 2017, 4234.0 Survey of Work-Related Training and Adult Learning Australia 2016-17

⁶ ABS, 2017, 8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016

Technology

For businesses in the MMP sector, the overall degree of change they are facing from technology is assessed as 'medium', except in the cement and lime manufacturing sector where there is a high level of technological change occurring due to automation.

A range of technological innovations has been introduced to the concrete manufacturing sector; for example, innovations which reduce the level of corrosion due to salt air, improved use of 'extenders' to enable manufacturers to produce more diversified products, and improvements to the durability and flexibility of concrete products.

Within the clay brick sector, process automation continues to improve quality control, reduce fuel costs and make other improvements to efficiency.

Political and Institutional

Despite the MMP industry being heavily regulated, no further new regulations are envisaged. Ongoing environmental improvements and monitoring are envisaged as consumers and governments demand higher standards.

Supply-side Challenges and Opportunities

The extremely small numbers of learners enrolled in MMP qualifications warrants further investigation.

The most popular qualification, the Certificate III in Manufactured Mineral Products, is government funded. Although New South Wales and Victoria are the states with the highest concentration of MMP businesses, collectively they had only 7 students enrolled in MMP qualifications in 2016.

As noted earlier, the ageing of the MMP workforce and the proliferation of micro and small businesses are also contributing factors behind the declining enrolment levels in MMP qualifications.

It is understood that typically, companies across this sector are not engaged in the national training system. Feedback suggests employers do not believe national accreditation would be of value either to the company in terms of required skill development, or the individual, in terms of recognition and transferability. In some cases, the complexity of state variations also posed a significant barrier for accredited training to take place.

There are also issues in accessing quality providers who could implement training in a tailored and meaningful way, or work with the company's complex shift schedules. It seems the small number of RTOs that are effectively delivering in this space are well supported by their client base.

For Learners and Training Package Development

In addition to the challenges outlined above, industry stakeholders also questioned the awareness levels of businesses within the sector in relation to availability of training and the benefits accredited training offers. They also noted that unlike other sectors, the Manufactured Mineral Products industry is not regulated and therefore does not mandate specific training for workers.

Due to the nature of work, many organisations advised that making time for training is challenging, particularly navigating in-house, on the job, and off-site arrangements.

Larger organisations indicated they are increasingly looking at training for their staff in competitive systems and practices qualifications (from the Sustainability Training Package) to help their workforce prepare for and manage a more automated workplace.

For training to meet the needs of contractors, as more of them enter the industry, it will be required to incorporate:

- flexibility
- Statements of Attainment
- a recognition that full qualifications may not be the solution business requires; and
- there may also be a need for small business management skills to be offered.

Cross-industry Challenges and Opportunities

Competition from offshore businesses, an ageing and autonomous workforce which does not perceive value in the training on offer, as well as the challenges of automation are all issues impacting on the MMP sector along with many other manufacturing and related business (e.g. agriculture, printing) in Australia.

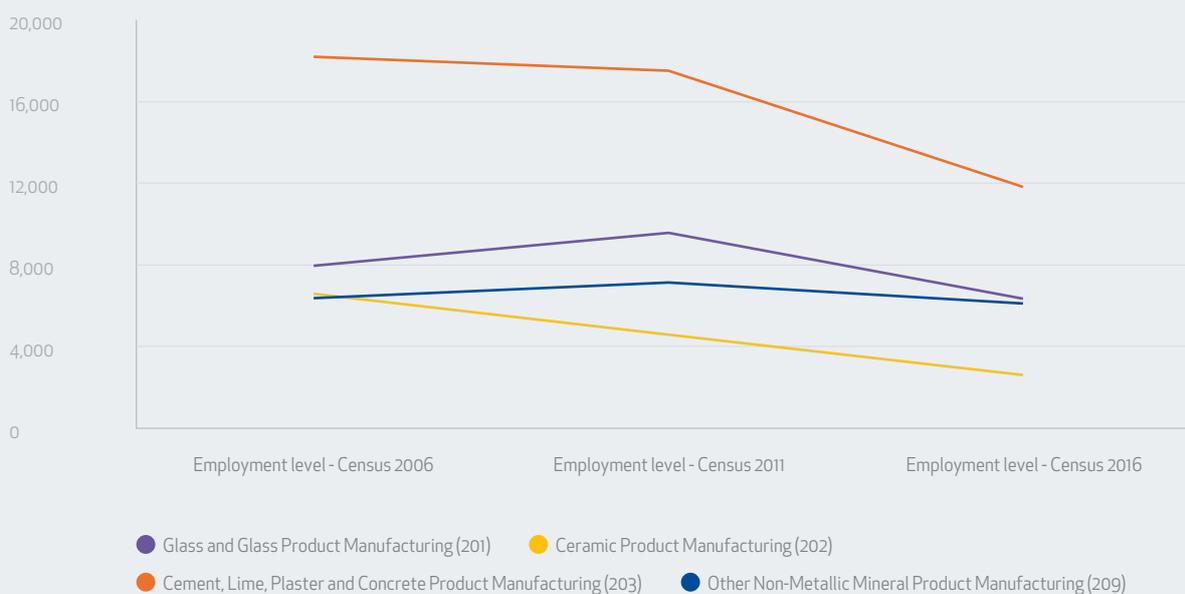
Employment and Skills Outlook

Employment Outlook

The employment outlook for the MMP sector has declined across all industry subsectors (see Figure 2 below). The decline has been most significant in the Cement, Lime, Plaster and Concrete Product Manufacturing sector.

Labour Market projections for the five years to 2022 signal further declines in employment in all sectors of the MMP industry (see Table 2).

Figure 2 – Employment in ANZSIC industry subsectors related to PMC Manufactured Mineral Products qualifications



ABS Census of Population and Housing; 2006, 2011 and 2016

Table 2 – Employment growth and projections

ANZSIC Code	Industry	Employment level – May 2017	Projected employment growth – five years to May 2022	
		('000)	('000)	(%)
201	Glass and Glass Product Manufacturing	6.5	-0.5	-7.9
202	Ceramic Product Manufacturing	3.4	-1.0	-28.9
203	Cement, Lime, Plaster and Concrete Product Manufacturing	13.5	-0.5	-3.4
209	Other Non-Metallic Mineral Product Manufacturing	8.5	-0.6	-6.6

Department of Jobs and Small Business Labour Market Information Portal (LMIP) Industry Employment Projections May 2017 – May 2022

Workforce Supply Challenges and Opportunities

The key workforce supply issues facing the MMP industry are the age of the workforce and its extreme concentration in small and micro businesses. Plants are automating and this is likely to exacerbate these identified trends and make accredited training in full qualifications even less attainable for most workers in the industry.

Skills Outlook

This Industry Skills Forecast has identified a decreasing demand for training in full qualifications and a need for greater flexibility if the sector is to increase its use of accredited training. Some industry stakeholders identified that the increasing number of sole traders may trigger an interest in small business management training.

A further driver of skills for the MMP industry (as with all elements of the manufacturing sector) are the skills needed to respond to changes in technology. In the cement and lime manufacturing subsector these skills will be related to process automation (assuming the capital is available for firms to invest), while in the other parts of the industry technological innovations will be more closely related to product innovation. Demand for qualifications from the Sustainability Training Package is evident in some organisations as businesses deal with automation and ready their workforce to maximise its benefits.

As with all industry sectors, there is also an increasing demand for generic skills to complement and support industry-specific technical skills and knowledge.

IRC members have ranked the importance of key generic workforce skills as indicated in Table 3 below. In several cases, there were only particular aspects of the generic skill area that were seen as important, and these have been highlighted within the text in the table.

IRC members observed that although they would expect that learners would already possess the necessary underpinning Language, Literacy and Numeracy (LLN) and Science, Technology, Engineering and Mathematics (STEM) skills when enrolling in qualifications, this is often not the case. Therefore, it is important that qualifications specify the required underpinning skills within the standards.

It was also suggested that workplace health and safety should be added to the list of generic skills, as its high level of importance is evident across all of the industry sectors under the remit of this IRC.

Customer service skills are important for sectors that include retail businesses, such as the Recreational Vehicles sector. However, the IRC commented that the 'customer' can also be defined as the next person on the production line, and that getting the 'product' to this person is critical in the manufacturing process. Similarly, customers can also be defined as different organisations within the supply chain.

Table 3 - Key Generic Workforce Skills

Combined Manufacturing IRCs	Process Manufacturing, Recreational Vehicle and Laboratory IRC
1 Design mindset/Thinking critically/Systems thinking/ Solving problems skills	1 Technology use and application skills
2 Technology use and application skills	2 Design mindset/Thinking critically/Systems thinking/ Solving problems skills
3 Learning agility/Information literacy/Intellectual autonomy and self-management skills	3 Managerial/Leadership skills
4 Communication/Collaborations including virtual collaboration/Social intelligence skills	4 Language, Literacy and Numeracy (LLN) skills
5 Science, Technology, Engineering and Mathematics (STEM) skills	5 Science, Technology, Engineering and Mathematics (STEM) skills
6 Language, Literacy and Numeracy (LLN) skills	6 Learning agility/Information literacy/Intellectual autonomy and self-management skills
7 Data analysis skills	7 Customer service/Marketing skills
8 Managerial/Leadership skills	8 Communication/Collaboration including virtual collaboration/Social intelligence skills
9 Customer service/Marketing skills	9 Data analysis skills
10 Environmental and Sustainability skills	10 Environmental and Sustainability skills
11 Entrepreneurial skills	11 Financial skills
12 Financial skills	12 Entrepreneurial skills

Key Drivers for Change and Proposed Responses

The challenges and opportunities and the employment and skills outlook described in this report, indicate the need for skill development solutions in a number of priority areas. These are outlined in table 4 below.

Table 4 – Priority skills and key drivers for change

Priority Skills	Key Driver for Change	Proposed Response
Regulatory/Legislative		
Ongoing environmental improvements	Consumer demand and building standards	Review qualifications as environmental regulation changes are introduced
Industry Specific		
Relevance of a separate Training Package for the MMP industry	Declining enrolments	Review PMC Manufactured Mineral Products Training Package and consider whether it needs to continue to be a standalone Package
Engaging workers in training	An ageing workforce dominated by small and micro businesses is retreating from formal training	Training needs to be more flexible, and offer more individual units and skill sets in preference to full qualifications
Business skills		
Business skills	Given the size of the businesses in the sector, an increased emphasis on business management skills is beneficial	Consider the inclusion of options for business skills development within MMP qualifications
Technology		
Changing skill needs arising from automation	Increasing levels of automation in parts of the MMP industry	Investigate the impact of automation and determine the implications for skill development
Changing skill needs arising from new technology	Increasing use of new technologies in product development	Investigate the impact of new technology on products being developed in the sector

Training Product Review - Current Activities

In February 2017 IBSA Manufacturing was commissioned to undertake training package development work on behalf of the Process Manufacturing, Recreational Vehicle and Laboratory IRC on the PMC Manufactured Mineral Products Training Package.

The project involves the mapping of the Certificate II, III and IV qualifications in the PMC Manufactured Mineral Products Training Package to the associated Process Manufacturing qualifications in the MSM Manufacturing Training Package. The purpose is to establish the MSM qualifications as the key industry training outcome, to determine gaps, and identify implications on packaging rules to accommodate sector needs.

As part of this work, 79 units of competency were reviewed, with a further comparison between PMC Manufactured Mineral Products and MSM Manufacturing Training Packages to determine which PMC Manufactured Mineral Products coded units can be replaced with MSM Manufacturing coded units.

The project also allows for the development of 5 new units:

- Working with materials and processes (concrete technology/precast)
- Implementing Australian Standards
- Using batch command control systems
- Mechanical maintenance for concrete plants
- Mathematics, measurements and angles.

This work strongly supports the CISC-AISC priorities by removing duplication across training packages, deleting obsolete units of competency and qualifications, and ensuring the training packages better support individuals to move easily from one related occupation to another.

This project is due to be submitted to the AISC in June 2018.

AISC Cross-Sector Projects

The AISC identified a number of emerging cross-sectoral themes in previous IRC skills forecasts. The AISC sought to strategically address these common skills issues and commissioned nine cross-sector projects. The aim of these projects is to address changing skills needs across industries in a coordinated and efficient way and, where opportunities exist, to create flexible and transferable training package components that will benefit industry, learners and the broader VET sector.

There are a number of cross-sector projects that will potentially directly impact upon the PMC Manufactured Mineral Products training package.

- The **Automation Skills** Cross-Sector Project is focused on current and emerging developments in automated processes to determine the cross-sector skills required to use robotics, drones and remote operation systems. Outcomes of the project may result in recommendations for updated content for at least one unit of competency in the PMC Manufactured Mineral Products Training Package.
- The **Teamwork and Communication** Cross-Sector Project investigated the similarities in the key themes of teamwork and communication to develop common units to be used across multiple industry sectors. Outcomes of the project may result in the replacement of one unit of competency in the PMC Manufactured Mineral Products Training Package with a cross-sector unit.

Training Product Review – Priorities 2018-2022

As outlined in the Current Activities section above, training package development work is currently being undertaken to review the entire training package to determine which PMC Manufactured Mineral Products Training Package coded units can be replaced with MSM Manufacturing Training Package coded units.

The 2017 return of the PMC Manufactured Mineral Products Industry Skills Forecast identified a number of priorities for training package development which included:

- Need for skills in advanced manufacturing development; new designs, technologies and processes will be required to manufacture, supply and install new products which will impact job design and skills required
- Investigating embedding skills/units of competency for supervisors within existing qualifications.

The priorities identified in the 2017 Proposed Schedule of Work and other emerging priorities are currently being considered as part of the PMC Manufactured Mineral Products Training Package review.

Some of the priorities previously identified by the Process Manufacturing, Recreational Vehicle and Laboratory IRC in the 2017 Skills Forecast cycle also align with the cross-sector projects which are presently underway.

For this reason, the IRC would like to await the outcomes of the activity order and cross-sector project work which is already underway before submitting a Proposed Schedule of Work.

Proposed Schedule of Work 2018-19 to 2021-22

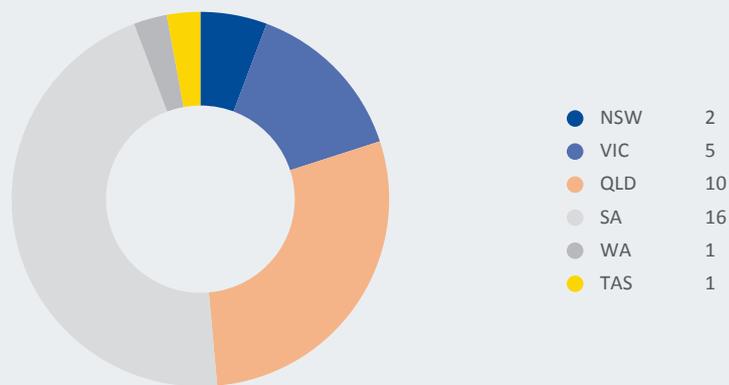
As the PMC Manufactured Mineral Products Training Package is currently being redeveloped to meet the future needs of the industry, the Process Manufacturing, Recreational Vehicle and Laboratory IRC have agreed that a Proposed Schedule of Work not be submitted in this Industry Skills Forecast.

The IRC will consider any additional priorities for training package development for the manufactured mineral products sectors in the 2019 Skills Forecast.

Appendix A: Training Package Enrolment Snapshot

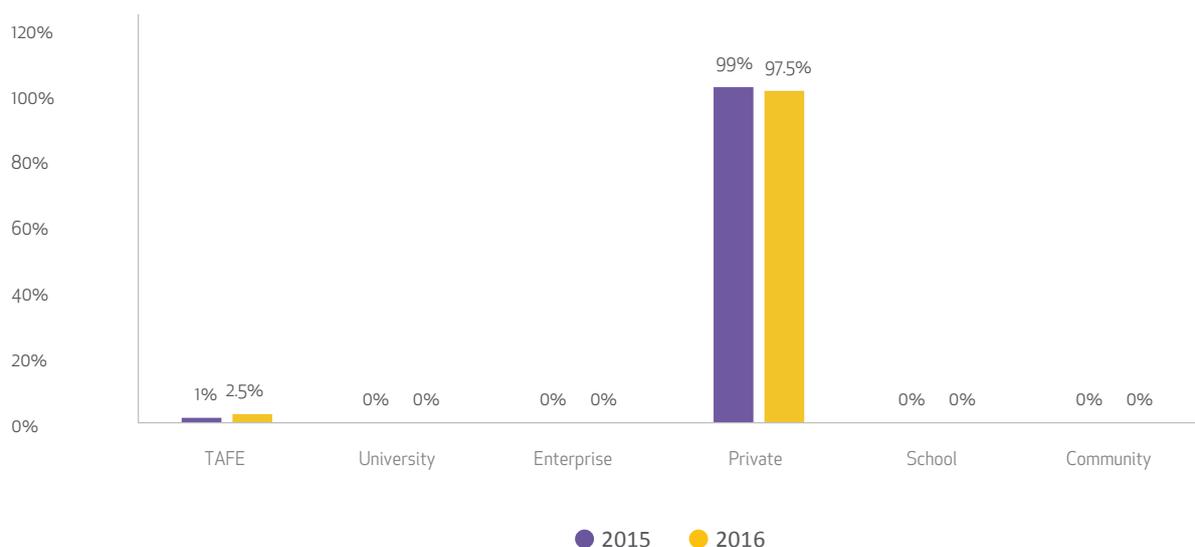
Program enrolments in PMC Manufactured Mineral Products qualifications by State/ Territory of student residence

2016 Total VET Activity



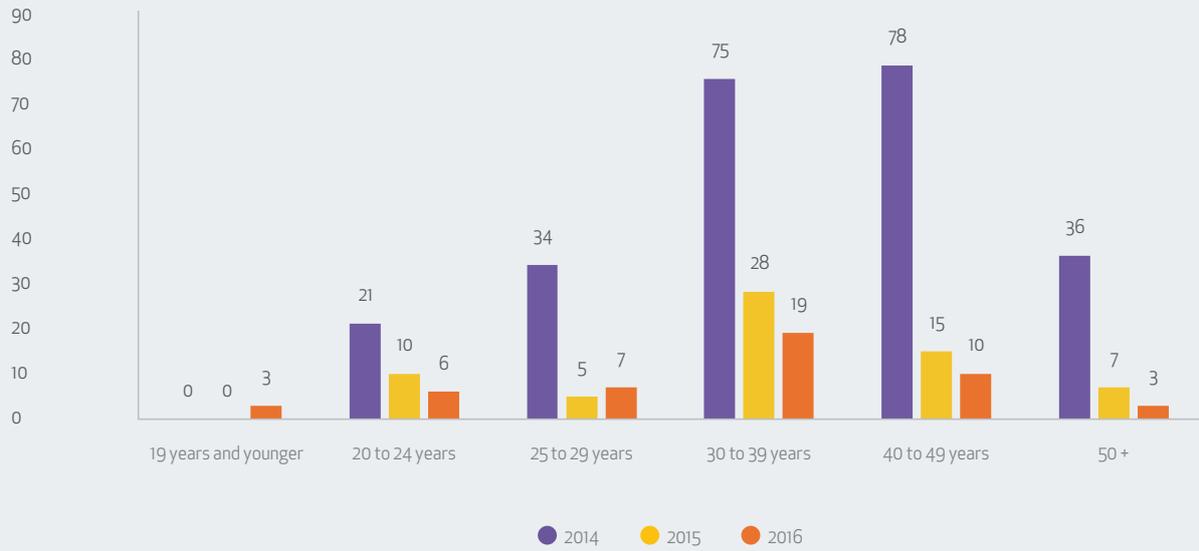
Program enrolments in PMC Manufactured Mineral Products qualifications by Training Organisation Type

Percentage of 2015 - 2016 Total VET Activity



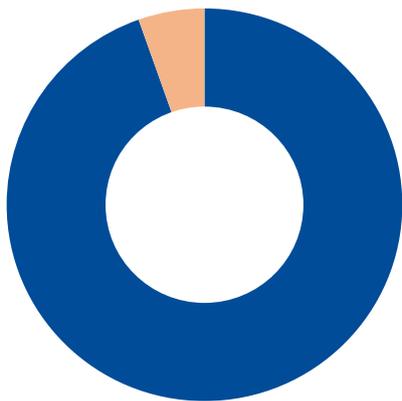
Program enrolments in PMC Manufactured Mineral Products qualifications by Age Group

2014 - 2016 Total VET Activity



Program enrolments in PMC Manufactured Mineral Products qualifications by Sex

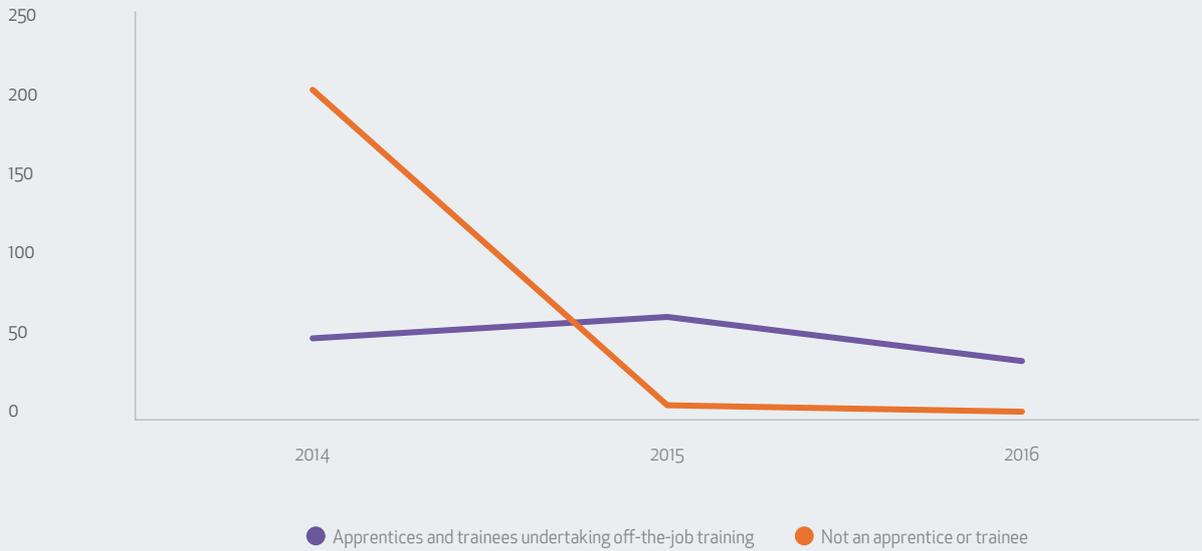
2016 Total VET Activity



Male	35
Female	2

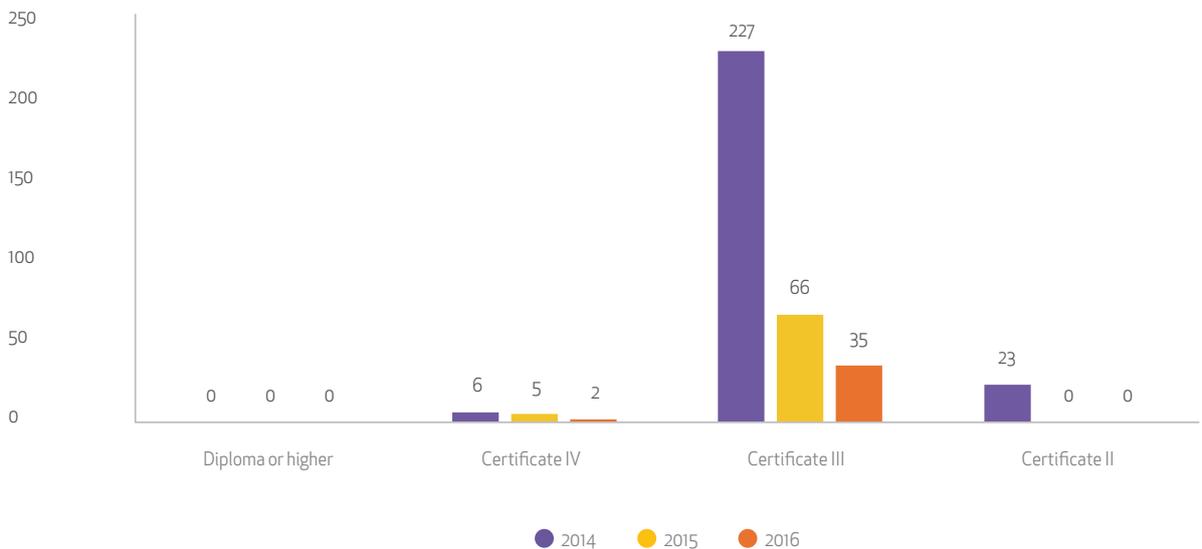
Program enrolments in PMC Manufactured Mineral Products qualifications by Apprentice/Trainee undertaking off-the-job training

Total VET Activity 2014-2016



Program enrolments by qualification level in PMC Manufactured Mineral Products qualifications

2014 - 2016 Total VET Activity



All data in this Appendix is sourced from the VOCSTATS VET Provider Collection. 2016 Government Funded and Total VET Activity Program enrolments extracted September 2017

VOCSTATS data are 'randomly' adjusted by small amounts by a data perturbation tool to avoid the release of confidential data. Hence numbers are only approximate. The perturbation impact is negligible for most practical purposes. The effect can be significant and must be considered when interpreting small numbers.

Appendix B: Future Skills Outcomes

The Australian Industry and Skills Committee (AISC) commissioned the Future Skills and Training Resource which summarises data on current and future Australian and international megatrends, to support Industry Reference Committees (IRCs) in developing their Industry Skills Forecasts and Proposed Schedules of Work.

The following trends and considerations are based on Process Manufacturing, Recreational Vehicle and Laboratory IRC discussions. This appendix presents the preliminary thinking of IRC members in order to stimulate broad discussion in industry.

Trends



Technology

Technology will have an extreme impact on the Process Manufacturing, Recreational Vehicle and Laboratory sectors and will change the industry sectors as they're currently known, as well as have an effect on learning and creating knowledge.

The key trends affecting the sectors are:

Artificial Intelligence (AI) and Machine Learning: AI technologies are an established trend and have been implemented across the sectors in various ways. A significant challenge is for policy and regulation to keep up with the pace of change and implementation. Industry also needs to be better at promoting the employment and skilling opportunities of technology adoption.

Cross-Disciplinary Science: This is an emerging trend requiring people and teams to have a functional knowledge across a number of disciplines.



Society and Culture

The key trends affecting the Process Manufacturing, Recreational Vehicle and Laboratory sectors are:

Changing Work and Career Values: This is an emerging trend which will become more prevalent in workplaces, particularly with technology expansion and the acceptance of automation. Workers will have the flexibility to undertake roles which interest them, and employers can also benefit from the broader perspectives gained from employees' experience in other areas. However, if workplace changes are imposed on workers, the benefits for individuals are not always positive.

Global (and Social) Mobility: Higher level skills and industry knowledge are leaving Australia to follow industry jobs moving offshore. Lower level, technical skills are required and increasingly filled by migrants, and this poses language, literacy and numeracy challenges to workplaces. Social mobility, fuelled by social media and the internet, is having a significant impact on the industry, particularly on how people are learning, and on their career and work choices.

Political and Institutional

The Process Manufacturing, Recreational Vehicle and Laboratory sectors operate in highly regulated environments, with workplaces required to adhere to stringent workplace, health and safety requirements and many workers requiring licences to undertake their job roles.

The key trends affecting the sectors are:

Political Instability and Polarisation/Political Appetite for Reform: Frequent changes in governments impact the implementation of reform agendas that are important for industry sustainability.

Governments also need to ensure funding for training is funnelled to the right skill areas so that workers can access training, particularly to meet regulatory requirements.

Resources and Environment

The key trend affecting the Process Manufacturing, Recreational Vehicle and Laboratory sectors is:

International Sustainability Action: International regulations are emerging as a key driver of change, with Australia looking to harmonise to international standards, such as those around emission targets.

More generally, resources are more widely understood and accepted as finite challenges faced by the industry, related to disposal of process waste, cost of energy use and access to ICT-related infrastructure. Younger generations are also more concerned about environmental issues, leading business and society to give more value to sustainability and the environment.

Business and Economics

The key trends affecting the Process Manufacturing, Recreational Vehicle and Laboratory sectors are:

Empowered (Informed and Demanding) Customers: Business is guided by social and cultural dynamics. Changes in consumer demands are being driven by social media movements, which will impact not only product design, but also job design.

Changing Workplace Dynamics: There is an emerging trend with teams becoming increasingly fluid in terms of sizes, interactions and tasks. The relational aspect of working together will matter more than technical aspects. A tension exists between the drive toward innovation and the need for standardisation in the manufacturing environment. 'Structured flexibility' will become prevalent in the industry.

Start Up Thinking: Australian manufacturers have a 'can do' attitude and are innovators, often requiring 'outside the box' solutions, but current systems do not always support this. Hyper-competition is driving faster product development and business cycles. Innovation is sometimes hampered by bureaucracy as well as management within organisations. Employees need to be provided with conscious opportunities to innovate, generate ideas and test designs in supportive environments.

Access to Quality Internet: This is an important requirement for every business, particularly as workforces are increasingly spread across different geographical locations.

Financial Viability: While impacted by access to and cost of resources, the key challenge for businesses in the industry sectors is to remain financially viable in order to stay competitive and continue to employ and train people.

Considerations for Training

Employers / Industry

Skills mismatch is a huge problem, and industries are running their own workshops and campaigns to attract industry entrants. However, the gap is too large for industry to address alone.

SMEs' engagement with workforce development and training remains a challenge due to market pressures.

The VET system must become more flexible to respond to industry needs; otherwise industry will go around the system.

Learners / Workers

The flexibility that now exists in mobility, social media, and connectivity needs to translate to new training models and approaches. Flexibility and higher order 'soft skills' are essential attributes now and in the future.

Learners and workers will seek to demonstrate to employers their capacity to think, try new things, and take risks. These abilities will need to be part of the training approach.

Learners and workers will combine VET and higher education alongside independent learning to gain employment or pursue entrepreneurial paths.

Government

Regulation will be a pivotal challenge to technology adoption and filling of skills gaps. Ways of evaluating progress, impact and achievement need to be reviewed.

Government involvement in all areas and aspects of the VET system will need to continue. The barriers in relation to industry having and accessing appropriate training to meet their needs requires management. This includes ensuring national and state funding skills lists accurately represent industry demand and that appropriate funding mechanisms, which reduce the cost burden on learners, are in place to enable training for these key skills.

Industry needs an active role in VET to ensure system-wide engagement.

Education and Training

Inflexibility in cross-industry training is a key issue to be addressed. Society and industry expect the VET system to focus more on industry value chains and lifecycles, and align training with new/expanding industries.

Educators' and trainers' roles are under pressure to be reconceptualised. Greater industry demand for skill sets and 'just in time' learning means these are increasingly used instead of the traditional training package model. Full qualifications as we know them have reduced relevance for employers and employees; continued support for a skills-driven training model is evident.

Registered training organisations are also impacted by financial viability and are grappling with how to deliver flexible, customised training at competitive rates to industry.

Appendix C: Occupation Classifications

For the purposes of analysing employment trends, the following Australian and New Zealand Standard Classification of Occupations (ANZSCO) occupation classifications have been used.

ANZSCO Classifications

ANZSCO Major Class	Related ANZSCO Occupation	Employment Count 2011	Projected percentage growth May 2017 – May 2022
3129: Building and Engineering Technicians		19,639	1.7%
	312911: Maintenance Planner	5,324	
	312912: Metallurgical or Materials Technician	3,742	
	312913: Mine Deputy	5,814	
	312999: Building and Engineering Technicians nec	4,43	
3999: Other Miscellaneous Technicians and Trades Workers		14,953	-0.7%
	399914: Optical Mechanic	646	
	399916: Plastics Technician	267	
	399999: Technicians and Trades Workers nec	3,188	
7111: Clay, Concrete, Glass and Stone Processing Machine Operators		3,305	-5.8%
	711100: Clay, Concrete, Glass and Stone Processing Machine Operators	39	
8399: Other Factory Process Workers		10,116	
	839911: Cement and Concrete Plant Worker	946	
	839912: Chemical Plant Worker	1,645	
	839913: Clay Processing Factory Worker	325	
	839916: Glass Processing Worker	745	
	839918: Recycling Worker	2,297	
	839999: Factory Process Workers nec	2,072	

ABS publication 1220.0 - ANZSCO -- Australian and New Zealand Standard Classification of Occupations, 2013, Version 1.2

ABS Census of Population and Housing 2011

Department of Jobs and Small Business Labour Market Information Portal (LMIP) Occupation Projections May 2017 – May 2022