

# artibus

# INNOVATION

Developing industry skills

## Construction, Plumbing and Services

### IRC Skills Forecast and Proposed Schedule of Work

Version: 1.0

Date: 30th April 2018



**Artibus Innovation**

373 Elizabeth Street, North Hobart, Tasmania 7000

PO Box 547, North Hobart, Tasmania 7002

T: 03 6218 2841 | E: enquiries@artibus.com.au | W: artibus.com.au

***Disclaimer***

This report has been prepared by Artibus Innovation (Artibus) from primary and secondary sources and is intended to provide general guidance only. Artibus and its employees and other parties associated with the production of this report make no representations about the accuracy, veracity or completeness of information within it and are not liable for any omissions, errors or inaccuracies. Artibus may update, amend or supplement this document at any time, but has no obligation to do so. Artibus disclaims all liability resulting from any decisions, opinions, assumptions and actions taken in response to, and resulting from, the information provided in this report.

***Acknowledgement of Support***

Artibus Innovation is funded by the Australian Government Department of Education and Training through the Training Product Development Programme.

# Construction, Plumbing and Services IRC Skills Forecast and Proposed Schedule of Work

## Table of Contents

Executive Summary	1
Skills Forecast	3
Administrative Information	3
Sector Overview	3
CPC Construction, Plumbing and Services Industry Sub-Sectors	4
Peak Bodies and Associations	9
Construction, Plumbing and Services Qualifications	10
Challenges and Opportunities	12
Employment and Skills Outlook	15
Employment Outlook	15
Skill Shortages	18
Ranking of 13 Generic Workforce Skills	20
Key Drivers for Change and Proposed Responses	21
Proposed Responses and Risks of Not Proceeding	29
Proposed Schedule of Work	31
2018-2019 Project Details	33
References	43
Appendix A: Units of Competency for Proposed Projects	50

# Construction, Plumbing and Services

## IRC Skills Forecast and Proposed Schedule of Work

### Executive Summary

The Construction and Plumbing Services sector is a significant driver of economic activity in Australia and is projected to grow by 2.5% in the next five (5) years. The sector is made up of the following:

- residential building and non-residential building construction
- building structure services
- building installation services
- land development and site preparation; and
- building completion services.

### Key Skills Needed and Drivers for Change

The Construction Training Package is currently being substantially updated at the trade level. The industry is experiencing a range of skill shortages and workplace changes. Some of the major challenges and opportunities the industry is facing include new technologies and increased demand for smart and green construction and an ageing workforce. These are affecting jobs, processes, tasks, materials and skill shortages.

There is a need to attract new workers, retrain and upskill current workers. The priority for training package development is to complete trade level work and then focus on higher-level skills supporting career progression.

Technologies relating to automation, building information modelling (BIM), modular construction and pre-fabrication are having an impact on the many construction processes, methods and jobs. Therefore, there is a need to ensure that our training package prepares both current workers and new entrants with the skills to manage these technologies efficiently and effectively.

### Proposed Schedule of Work

2018-2019 will see the focus of our work shift from finalising building construction and installation services projects to those qualifications that support the building completion services sectors - plastering, wall and ceiling lining, tiling, painting and decorating etc. Work will also include the review and update of the post trade qualifications including the Certificate IVs and Diplomas in construction, which reflect more the project management and specialist technical sectors of the industry.

This skill forecast also proposes work being undertaken through cases for change in BIM, off -site construction and pre-fabrication, automation, robotics and digital skills plus environmental sustainability. These issues are cross industry and will affect the current training package and potentially require the development of new components to meet future needs.

## Proposed Schedule of Work Timeline

2016/17 .

**Completed**

Installation of Insulation units of competency  
Certificate III in Shopfitting  
Certificate III in Signs and Graphics

2018/19

**Nearing Completion**

- Certificate III in Concreting
- High Risk Work Qualifications (including HRW Licensing Units)
- Bricklaying, Blocklaying, Stonemasonry & Paving
- Plumbing & Fire Services Qualifications
- Construction Pathways

**Reviews in Progress**

- Construction Pathways Qualifications
- Certificate III in Carpentry (Joinery)
- Prepare to Work Safely in the Construction Industry ('White Card')
- Certificate III in Painting and Decorating
- Certificate III and IV in Demolition

2019/20

**Cases for Change**

Certificate II in Plumbing  
Advanced Diploma of Building Surveying  
Graduate Diploma of Building Surveying

**Proposed Cases for Change/Cross-SSO Projects**

Robotics and Automation

**Cases for Endorsement**

- Building and Construction Qualifications
- Certificate III in Roof Tiling
- Certificate III in Wall and Ceiling Lining
- Certificate III in Wall and Floor Tiling
- Certificate III in Solid Plastering
- Certificate IV in Swimming Pool and Spa Building
- Certificate III in Construction Waterproofing
- Certificate III in Remote Area Building Repairs and Maintenance

2020/21

**Qualification Maintenance**

General review and maintenance of training package:  
Certificate III in Shopfitting  
Certificate III in Signs and Graphics

**Proposed Research Projects**

- Building Information Modelling (BIM)
- Offsite Construction and Pre-fabrication.

*See proposed schedule of work section of skills forecast for qualification codes*

# Construction, Plumbing and Services

## IRC Skills Forecast and Proposed Schedule of Work

### Skills Forecast

#### Administrative Information

##### Skills Services Organisation (SSO):

Artibus Innovation

Artibus Innovation has been commissioned by the Australian government to support the IRCs for Construction, Plumbing and Services and Property Services. We look at skills training and qualifications for occupations in the building and property industries. We talk to employers, workers, trainers, regulators and other industry stakeholders. We explore current and anticipated skills needs, examine data on enrolments and outcomes, and make recommendations for change.

##### Industry Reference Committee (IRC):

Construction, Plumbing and Services

The Construction, Plumbing and Services IRC is responsible for national training package qualifications relevant to: Engineering and Technical services, building structures, building completion services, residential building construction and non-residential building construction, land development and site preparation, building installation services, architectural and other construction services.

#### Sector Overview

The Construction, Plumbing and Services sector comprises the construction of residential and non-residential buildings and the installation and repairs of plumbing as well as additions, alterations and the maintenance and repair of buildings.<sup>1</sup>

This industry is a significant driver of economic activity in Australia. The construction sector produces around 8% of Australia's Gross Domestic Product,<sup>2</sup> as it generates over \$350 billion in revenue and is projected to grow at an annual rate of 2.5% in the next five years.<sup>3</sup> At end of the financial year 2016-2017, the construction sector had the highest number of businesses operating in Australia, with a count of 371,599.<sup>4</sup>

The Construction, Plumbing and Services industry is largely made up of small-scale businesses that provide specialist construction services to building contractors, property developers and building and infrastructure owners.<sup>5</sup> The top four companies in the construction sector make up less than 10% of

---

<sup>1</sup> Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

<sup>2</sup> Australian Industry Group, Economics Research, July 2015, *Australia's Construction Industry: Profile and Outlook*

<sup>3</sup> IBISWorld: Industry at a Glance: <http://clients1.ibisworld.com.au/reports/au/industry/ataglance.aspx?entid=306>.

<sup>4</sup> Australian Bureau of Statistics, 8165.0 Counts of Australian Businesses, including entries and exits, Jun 2013 to Jun 2017, table 1: Businesses by industry division

<sup>5</sup> IBISWorld: Industry at a Glance: <http://clients1.ibisworld.com.au/reports/au/industry/ataglance.aspx?entid=306>.

the available market share<sup>6</sup>, and the top four companies in the plumbing sector make up less than 5% of the market share.<sup>7</sup> About 90% of the workforce in the industry is employed in the private sector<sup>8</sup> and most businesses are Australian owned with their sales occurring predominately in the domestic market.<sup>9</sup>

The construction industry is heavily regulated at all levels of Government. Building regulations and planning approval systems are the responsibility of the state and territory governments, as is the registration of builders and the accreditation and registration of professionals.<sup>10</sup> Regulations regarding buildings projects and materials have recently come under review in Australia due to fires in two high-rise residential buildings, Melbourne Dockland's Lacrosse Tower and London's Grenfell Tower. A Senate inquiry into *non-conforming building products* was established in 2017 in response and the interim report of this inquiry identified substantial shortcomings in Australia's regulatory regimes covering the import, installation and use of non-conforming building products, particularly the inappropriate use of highly flammable Aluminium Composite Cladding containing PE core on multi-storey dwellings.<sup>11</sup>

The Australian Building Ministers' Forum (BMF) have commissioned a further report by independent experts, Professor Peter Shergold AC and Ms Bronwyn Weir, on *Assessment of the Effectiveness of Compliance and Enforcement Systems for Building and Construction Industry across Australia*. The outcomes of this report are likely to have a far-reaching effect on the regulatory framework, building compliance, and construction materials in the construction industry.

## CPC Construction, Plumbing and Services Industry Sub-Sectors

### Residential Building and Non-Residential Building Construction

The Residential Building and Non-Residential Building Construction sector primarily involves the construction of houses or other residential buildings and non-residential buildings such as hotels, hospitals, prisons, or other buildings. Also involved in this sector is carrying out alterations, additions or renovations to these buildings and managing these tasks.<sup>12</sup>

In residential construction, the four largest home building companies (Metricon, ABN Group, BGC and Simonds Homes) contribute to less than 10% of annual industry revenue and in apartment and townhouse construction, the four largest companies are expected to account for only 21.6% of industry revenue in 2017-18 (Probuild, Multiplex (BHCA), Meriton Apartments, Dylam).<sup>13</sup> Businesses

---

<sup>6</sup> Ibid

<sup>7</sup> IBIS World: Australia Industry Reports, Plumbing Services: <http://clients1.ibisworld.com.au/reports/au/industry/competitivelandscape.aspx?entid=324#BTE>

<sup>8</sup> Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly, November 2017, Table 27. Employed Persons by Sector (public/private) and Industry Division of Main Job.

<sup>9</sup> IBISWorld, October 2017, Australia Industry Reports - Construction: Competitive Landscapes <http://clients1.ibisworld.com.au/reports/au/industry/competitivelandscape.aspx?entid=306>, IBISWorld, December 2017, Australia Industry Reports – Plumbing Services: Competitive Landscapes <http://clients1.ibisworld.com.au/reports/au/industry/competitivelandscape.aspx?entid=324#BTE>

<sup>10</sup> IBISWorld: Industry at a Glance: <http://clients1.ibisworld.com.au/reports/au/industry/ataglance.aspx?entid=306>.

<sup>11</sup> Senate Economic References Committee (6 September 2017), *Non-conforming Building Products Inquiry: Interim Report – Aluminium composite cladding*, p.7, accessed 18/04/2018.

<sup>12</sup> Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

<sup>13</sup> IBISWorld, 2017, Industry Reports on House Construction and Multi-Unit Apartment and Townhouse Construction in Australia

in residential building are location based and service local and regional populations. Most companies are domestically owned, but there is a growing level of foreign ownership in apartment and townhouse construction.<sup>14</sup> Typically, businesses in the industry operate in narrow regional markets.<sup>15</sup>

The non-residential building construction industry operates in areas such as industrial, commercial and institutional building construction. The four largest companies generating less than 10% annual revenue for commercial and industrial building (LendLease, Multiplex, CIMIC Group and Probuild Contractors) and the four largest companies in commercial building generating less than 20% industry revenue (CIMIC Group, Lendlease, CCCI and BHCA Pty Limited).<sup>16</sup> The industry is characterised by small-scale businesses, though it also contains some of the country's largest building firms.<sup>17</sup> While the industry sector has a significant amount of foreign ownership, the industry is still mostly Australian owned.<sup>18</sup>

This sector operates in a highly regulated environment, which includes licensing and registration requirements for workers, state and local government building standards, approvals and zoning regulations, pollution controls and workplace health and safety standards.<sup>19</sup>

### **Land Development and Site Preparation**

Businesses in Land Development and Site Preparation primarily subdivide and amalgamate land into lots as well as prepare and service land for sale.<sup>20</sup> Similarly, businesses in Site Preparation services typically conduct earthmoving work in preparation for construction, such as levelling sites, excavating foundations, digging trenches and removing overburden. This sector also includes businesses that hire out earthmoving equipment.<sup>21</sup>

The sector is characterised by small and medium sized businesses, operating in local and regional markets. Many of the businesses working in land development and subdivision are small-scale residential property developers, though there are several large companies, which include government land organisations and private land and property developers.<sup>22</sup> The site preparation industry also includes many small-scale contracting firms and medium-size regional players that specialise in providing site preparation services for construction contractors or local public works authorities.<sup>23</sup>

In contrast to other sectors on the industry, the largest businesses working in site preparation are typically from other industries, such as equipment and material wholesaling or manufacturing, or road and mine construction.<sup>24</sup>

---

<sup>14</sup> Ibid

<sup>15</sup> Ibid

<sup>16</sup> IBISWorld, 2017, Industry Reports on Institutional Building Construction in Australia and Commercial and Industrial Building Construction in Australia

<sup>17</sup> IBISWorld, 2017, Industry Reports on Institutional Building Construction in Australia and Commercial and Industrial Building Construction in Australia

<sup>18</sup> Ibid

<sup>19</sup> IBISWorld, 2017, Industry Reports on House Construction and Multi-Unit Apartment and Townhouse Construction in Australia

<sup>20</sup> IBISWorld, 2017, Australia Industry Reports on Land Division and Subdivision and Site Preparation in Services

<sup>21</sup> Ibid

<sup>22</sup> Ibid

<sup>23</sup> Ibid

<sup>24</sup> Ibid



This sector is highly regulated with mandatory licensing and permits for equipment operators and demolition work, as well as land use zoning, treatment of waste, permitted construction materials, population density requirements and minimum property elevation.<sup>25</sup> Both state and local governments oversee licensing and regulation, which creates a high degree of variation between localities in planning regulations and restrictions because councils tend to operate independently of one another.<sup>26</sup> In terms of workers licences, the machinery used in site preparation work requires specific certifications in order to be operated, which are set out by state and territory authorities.<sup>27</sup> For demolition work, different licences, permits and notifications are also required in different states and territories.<sup>28</sup>

### **Building Structure Services**

Businesses in the Building Structure Services Industry offer services such as concreting, laying and repairing clay and concrete bricks, blocks and pavers, tiling, slating or shingling roofs, building structural steel components for buildings, bridges, overhead cranes and electricity transmission towers.<sup>29</sup>

The Building Structure Services industry is also characterised by small-scale businesses, often with less than 20 employees.<sup>30</sup> There are no major businesses in the industry and few barriers to entering and exiting the industry. This creates high competition amongst operators. The size of many businesses tends to increase and decrease in line with phases in the housing cycle. Many businesses also grow and diversify into providing a broader range of construction services.<sup>31</sup>

The level of regulation and licensing in this sector varies according to the trade involved, with each type of building structure services subject to its own building codes, insurance requirements and operator certifications. For example, there are limited formal qualifications and licensing requirements for concreters, although many hold qualifications in aligned building trades.<sup>32</sup> On the other hand, the brick and block laying industry is generally regulated through apprenticeship-qualified tradespeople and roofing services are subject to Australian Standards in which businesses can incur legal damages for failures to comply.<sup>33</sup>

### **Building Installation Services**

---

<sup>25</sup> Ibid

<sup>26</sup> IBISWorld, 2017, Australia Industry Reports on Land Division and Subdivision and Site Preparation in Services

<sup>27</sup> Ibid

<sup>28</sup> Australian Business Licence and Information Service, 2017, custom search 'demolition,' accessed on 16/01/2017 at <https://ablis.business.gov.au/search/customsearch#>

<sup>29</sup> Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006, and IBISWorld, 2017, Industry Reports on Concreting, Bricklaying, Roofing and Structural Steel Erection Services in Australia

<sup>30</sup> IBISWorld, 2017, Industry Reports on Concreting, Bricklaying, Roofing and Structural Steel Erection Services in Australia

<sup>31</sup> Ibid

<sup>32</sup> IBISWorld, 2017, Industry Reports on Concreting Services in Australia

<sup>33</sup> IBISWorld, 2017, Industry Reports on Bricklaying and Roofing Services in Australia

This sector involves construction work such as plumbing and drainage installation and repair, air conditioning and heating installation and fire and security alarm testing.<sup>34</sup> There are four industries within this sub-sector.

1. The Plumbing Services industry provides general plumbing or drainage services, including installing and repairing water supply, sewer lines, septic tanks, drainage and gas systems, however it does not construct large-scale sewerage or storm water drainage systems. The plumbing sector alone generates over \$14 billion in revenue and is expected to have an annual growth rate of 2% in the next five years.<sup>35</sup>
2. The Fire and Security Alarm industry installs and repairs security systems and fire protection, detection and control systems.<sup>36</sup> Coverage of this industry is provided across two training packages: The Construction, Plumbing and Service and The Property Services training packages.
3. The Electrical services industry installs electrical wiring or fittings, as well as repair and maintain existing electrical equipment and fixtures.<sup>37</sup> This industry is covered by the Electrotechnology Training Package.
4. The Air-Conditioning and Heating industry specialises in installing household, industrial and commercial heating equipment, as well as refrigeration and air conditioning equipment. This industry is also covered by the Electrotechnology Training Package.

The Building Installation Services is characterised by small-scale businesses that work in local areas.<sup>38</sup> There are some large scale businesses in the Fire and Security Alarm Industry, though they only account for less than 30% of annual industry revenue (Mather & Platt, UTC Australia Commercial Holdings Pty Ltd, Hills Limited and ARA Fire Protection Service).<sup>39</sup>

This industry is heavily regulated, with plumbing, gas and electrical workers being required to hold specific licences to operate. Both plumbers and electricians must be licenced by the appropriate authority (typically, government departments or commissions) in their specific state or territory.<sup>40</sup> Workers in fire and security alarm installation services are required to follow codes of conduct and building code requirements. It is illegal to install security systems or monitoring devices without a licence issued by state and territory police services.<sup>41</sup>

### **Building Completion Services**

The Building Completion Services sector involves work that ‘finishes’ a building such as plastering, carpentry, tiling, painting and decorating and glazing.<sup>42</sup> Glazing however, is covered in the Furnishing Training Package.

---

<sup>34</sup> Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

<sup>35</sup> IBISWorld: Industry at a Glance: <http://clients1.ibisworld.com.au/reports/au/industry/ataglance.aspx?entid=306>.

<sup>36</sup> IBISWorld, 2017, Industry Reports on Plumbing, Electrical, Air Conditioning and Heating and Fire and Security Alarm Services in Australia

<sup>37</sup> IBISWorld, 2017, Industry Reports on Plumbing, Electrical, Air Conditioning and Heating and Fire and Security Alarm Services in Australia

<sup>38</sup> Ibid

<sup>39</sup> IBISWorld, 2017, Industry Report on Fire and Security Alarm Services in Australia

<sup>40</sup> Australian Business Licence and Information Service, 2017, custom search ‘plumbing,’ accessed on 16/01/2017 at

<https://ablis.business.gov.au/search/customsearch#>, and

[http://www.erac.gov.au/index.php?option=com\\_content&view=category&layout=blog&id=79&Itemid=515](http://www.erac.gov.au/index.php?option=com_content&view=category&layout=blog&id=79&Itemid=515)

<sup>41</sup> IBISWorld, 2017, Industry Report on Fire and Security Alarm Services in Australia

<sup>42</sup> Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

The Building Completion Services sector is typically low in market share concentration and is characterised by small scale businesses, often with less than 20 employees or consisting of individual contractors.<sup>43</sup> Businesses generally work in local or specialised niche markets with few businesses operating in more than one state or territory.<sup>44</sup>

In terms of regulation and licensing, there is a similar regulatory environment to other building and construction trades across the plastering and ceiling services, carpentry, and glazing trades. Trades are all expected to have formal qualifications obtained through an apprenticeship though this is not a legislated requirement in every State and Territory.<sup>45</sup>

### **Other Construction Services**

This sector mainly includes services that are not otherwise classified, such as scaffolding, dogging, rigging, post-tensioning, waterproofing of buildings, and swimming pool and spa building.<sup>46</sup> Landscape Construction Services<sup>47</sup> such as planting, land forming, building retaining walls and paths and installation of garden drainage and watering systems as well as the Hire of Construction Machinery are also classified under Other Construction Services.<sup>48</sup>

These sectors are typically characterised by small-scale businesses that operate at the local level.<sup>49</sup> There are a few large scale businesses operating in the metal cladding, waterproofing and scaffolding services industry, such as SBP Australia, ASKIN Performance Panels, Waco Kwikform, Cape Australia, Polyseal Waterproofing Technologies and AWS Services.<sup>50</sup>

Across this sector, licensing requirements vary depending on the type of work. In the Construction Machinery industry relevant qualifications and licensing are mandatory for equipment operators, project directors and supervisors. National high-risk work licences are also needed for working on all types of cranes.<sup>51</sup>

In the Metal Cladding, Waterproofing and Scaffolding industry, contractors are required to have high-risk work licensees for scaffolding and rigging.<sup>52</sup> However, many other services do not require formal qualifications or licensees.<sup>53</sup>

---

<sup>43</sup> IBISWorld, 2017, Industry Reports on Plastering and Ceiling, Carpentry, Tiling and Carpeting, Painting and Decorating, and Glazing Services in Australia

<sup>44</sup> Ibid

<sup>45</sup> IBISWorld, 2017, Industry Reports on Plastering and Ceiling, Carpentry and Tiling and Carpeting in Australia

<sup>46</sup> Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

<sup>47</sup> This is covered by the Agriculture, Horticulture and Conservation and Land Management Training Package, not the Construction, Plumbing and Services Training Package

<sup>48</sup> IBISWorld, 2017, Industry Reports on Landscaping Services, Construction Machinery and Operator Hire and Metal Cladding, Waterproofing and Scaffolding Services in Australia

<sup>49</sup> Ibid

<sup>50</sup> IBISWorld, 2017, Industry Report on Metal Cladding, Waterproofing and Scaffolding Services in Australia

<sup>51</sup> IBISWorld, 2017, Industry Report on Construction Machinery and Operator Hire in Australia

<sup>52</sup> Australian Business Licence and Information Service, 2017, custom search 'rigging,' accessed on 17/01/2017 at <https://ablis.business.gov.au/search/customsearch#>

<sup>53</sup> IBISWorld, 2017, Industry Report on Metal Cladding, Waterproofing and Scaffolding Services in Australia

## Architectural, Engineering and Technical Services

This sector includes designing buildings and structures, surveying and mapping services and sign writing.<sup>54</sup> The Architectural, Engineering and Technical Services sector encompasses a variety of services, including Engineering and Architectural Services, which provide architectural design and drafting services and engineering consulting relating to the design and development of infrastructure projects.<sup>55</sup> The qualifications in the CPC training package however, are in signs and graphics and building surveying.

## Peak Bodies and Associations

- Australian Manufacturing Workers' Union (AMWU)
- Australian Workers Union
- Australian Industry Group
- Communications, Electrical and Plumbing Union (CEPU)
- Construction, Forestry, Mining and Energy Union (CFMEU)
- Housing Industry Association
- Master Builders Association
- Master Painters Association
- Master Plumbers' Australia Association
- Master Plumbers' NSW Association
- National Fire Industry Association
- The Association of Wall & Ceiling Industries Australia and New Zealand
- State Training Advisory Boards and Industry Training Funds

---

<sup>54</sup> Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

<sup>55</sup> IBISWorld, 2017, Industry Reports on Architectural Services and Engineering Consulting in Australia

## Construction, Plumbing and Services Qualifications

Table 1: *Qualifications for CPC Training Package by Sub-Sectors*

<b>Residential Building and Non-Residential Building Construction</b>	<b>No. of Enrolments 2016<sup>56</sup></b>	<b>No. of Completions 2016<sup>57</sup></b>
CPC10111 Certificate I in Construction	44,337	6,067
CPC20112 Certificate II in Construction	2,830	652
CPC20211 Certificate II in Construction Pathways	22,710	3,166
CPC40110 Certificate IV in Building and Construction (Building)	22,590	6,611
CPC40208 Certificate IV in Building and Construction (Contract Administration)	445	120
CPC40308 Certificate IV in Building and Construction (Estimating)	709	113
CPC40408 Certificate IV in Building and Construction (Sales)	0	0
CPC40508 Certificate IV in Building and Construction (Site Management)	510	77
CPC40611 Certificate IV in Building and Construction (Specialist Trades)	49	0
CPC40708 Certificate IV in Building and Construction (Trade Contracting)	23	0
CPC50210 Diploma of Building and Construction (Building)	13,686	2,733
CPC50308 Diploma of Building and Construction (Management)	1,466	572
CPC60212 Advanced Diploma of Building and Construction (Management)	289	138
<b>Land Development and Site Preparation</b>		
CPC10111 Certificate I in Construction	44,337	6,067
CPC20112 Certificate II in Construction	2,830	652
CPC20211 Certificate II in Construction Pathways	22,710	3,166
CPC30413 Certificate III in Demolition	190	4
CPC41013 Certificate IV in Demolition	115	4
<b>Building Structure Services</b>		
CPC10111 Certificate I in Construction	44,337	6,067
CPC20112 Certificate II in Construction	2,830	652
CPC20211 Certificate II in Construction Pathways	22,710	3,166
CPC20812 Certificate II in Metal Roofing and Cladding	202	4
CPC30111 Certificate III in Bricklaying/Blocklaying	3,613	732

<sup>56</sup> NCVET, 2016, Data Product: Total VET students by industry – Total VET program enrolments, accessed online on 20/02/2018 at: <https://www.ncver.edu.au/data/collection/students-and-courses-collection/total-vet-students-and-courses>

<sup>57</sup> Ibid

CPC32313 Certificate III in Stonemasonry (Monumental/Installation)	348	83
CPC30313 Certificate III in Concreting	2,698	912
CPC30812 Certificate III in Roof Tiling	725	125
CPC31111 Certificate III in Steel Fixing	131	76
CPC31611 Certificate III in Paving	3	0
<b>Building Installation Services</b>		
CPC20712 Certificate II in Drainage	131	76
CPC20912 Certificate II in Urban Irrigation	0	0
CPC32413 Certificate III in Plumbing	14,374	1,710
CPC32513 Certificate III in Plumbing (Mechanical Services)	59	10
CPC32612 Certificate III in Roof Plumbing	1,027	250
CPC32713 Certificate III in Gas Fitting	227	14
CPC40912 Certificate IV in Plumbing and Services	5,341	732
CPC50412 Diploma of Plumbing and Services	0	0
CPC50612 Diploma of Hydraulic Services Design	111	4
CPC32813 Certificate III in Fire Protection	673	102
CPC50509 Diploma of Fire Systems Design	74	0
CPC80115 Graduate Certificate in Fire Systems Design Management	0	0
<b>Building Completion Services</b>		
CPC10111 Certificate I in Construction	44,337	6,067
CPC20112 Certificate II in Construction	2,830	652
CPC20211 Certificate II in Construction Pathways	22,710	3,166
CPC30211 Certificate III in Carpentry	26,024	4,454
CPC30611 Certificate III in Painting and Decorating	4,840	1,296
CPC31011 Certificate III in Solid Plastering	755	168
CPC31211 Certificate III in Wall and Ceiling Lining	2,508	516
CPC31511 Certificate III in Formwork/Falsework	569	194
CPC31311 Certificate III in Wall and Floor Tiling	2,390	629
CPC30116 Certificate III in Shop fitting	0	0
CPC31912 Certificate III in Joinery	426	81
CPC32011 Certificate III in Carpentry and Joinery	2,540	313
CPC32211 Certificate III in Joinery (Stairs)	5	0

<b>Other Construction Services</b>		
CPC30511 Certificate III in Dogging	4,978	35
CPC30711 Certificate III in Rigging	1,689	161
CPC30911 Certificate III in Scaffolding	1,896	220
CPC31411 Certificate III in Construction Waterproofing	1,677	915
CPC31712 Certificate III in Post-Tensioning	0	0
CPC32912 Certificate III in Construction Crane Operations	3	0
CPC40808 Certificate IV in Swimming Pool and Spa Building	6	5
<b>Architectural, Engineering and Technical Services</b>		
CPC30216 Certificate III in Signs and Graphics	0	0
CPC60115 Advanced Diploma of Building Surveying	460	4
CPC80215 Graduate Diploma of Building Surveying	0	0

## Challenges and Opportunities

This section involves a brief overview of the challenges and opportunities to the Construction, Plumbing and Services Sector. For a more detailed discussion, see the Key Drivers for Change and Proposed Responses section below.

### *The Challenges*

The industry will face some major challenges over the next few decades with an increase in older workers, the introduction of new technologies and increased demand for smart and green construction. These challenges will affect jobs, processes, tasks, building materials and have the potential to cause critical skills shortages. These challenges also bring exciting growth opportunities for the industry.

### **Increase in Older Workers**

The construction industry has aged in the last 20 years. Older workers (50+) now account for 23.6% of the workforce, while in November 1997, they only accounted for 17.5%. This is particularly significant since the percentage of the construction workforce under the age of 30 has only increased by 0.6% and the percentage of those aged 30-49 has decreased 6.7%<sup>58</sup> (see Graph 4).

This means that the skill replacement gap is increasing. Vital skills are at risk of being lost as larger cohorts of workers retire and there are proportionally fewer younger workers in the industry to replace their skills. This is compounded by an industry that has been growing and is projected to

---

<sup>58</sup> Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly, Data Cube EQ12 - *Employed persons by Age and Industry division of main job (ANZSIC), November 1984 onwards*  
<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003Nov%202017?OpenDocument>

continue to grow.<sup>59</sup> This will drive the need to retrain and upskill current workers with skills needed for new technologies and focus training package development priorities on the higher-level skills that will be needed to support career pathways and higher level skills.

### **The Introduction of New Technology**

The introduction of new technologies such as automation, Building Information Modelling (BIM), modular construction and pre-fabrication will impact and change many construction processes, methods and jobs. The major challenge is that many jobs and tasks currently performed by people will not exist in the next few decades, either completely or partially. The jobs that are projected to be most affected are lower-skilled jobs that are often routine in nature where computers or robotics will be able to perform tasks more efficiently than humans.<sup>60</sup>

### **The Demand for Smart and Green Construction**

With the need for action on climate change and sustainability becoming a focal point globally, so too comes a demand for green and smart buildings. Such buildings have been noted as being lower in operating costs, higher in value, higher in rental and occupancy rates and beneficial for the health and productivity of occupants.<sup>61</sup> The trend is evident and growing in Australia, and with this will come a shift in occupational practices, tasks and processes.<sup>62</sup>

### *The Opportunities*

With challenges come opportunities. New technologies and smart and green practices need to be adopted and the workforce will need to be trained, re-trained and upskilled with the skills and knowledge to use these new technologies and for new jobs and tasks that arise.<sup>63</sup>

The review and development of the Construction, Plumbing and Services training package presents the opportunity to do this. Of relevance to this review and development are three cross-sector projects that are examining these challenges in the Australian workforce; automation, digitisation and environmental sustainability.

The Automation cross-sector project is being led by Skills Impact with the aim to review 241 existing units of competency across 32 training packages in areas where automation has the potential to rapidly transform work tasks or processes. Seven Construction, Plumbing and Services units have been identified for review, however, evidence shows that automation is likely to affect many occupations

---

<sup>59</sup> Australian Department of Employment, Labour Market Information Portal, *Construction*  
<http://lmip.gov.au/default.aspx?LMIP/GainInsights/IndustryInformation/Construction>

<sup>60</sup> PWC, 2015, *A Smart Move: Future-proofing Australia's workforce by growing skills in science, technology, engineering and maths (STEM)*, accessed online 19/01/2018 at <https://www.pwc.com.au/pdf/a-smart-move-pwc-stem-report-april-2015.pdf>

<sup>61</sup> Jadhav, NY, 2016, *Green and Smart Buildings*, Springer, Singapore

<sup>62</sup> World Business Council for Sustainable Development, 2009, *Energy Efficiency in Buildings: Transforming the Market*, accessed online 02/02/2018 at <http://www.wbcsd.org/Projects/Energy-Efficiency-in-Buildings/Resources/Transforming-the-Market-Energy-Efficiency-in-Buildings>

<sup>63</sup> Construction Training Fund, 2014, *Impact of New Technologies on the Construction Industry*, accessed online 18/01/2018 at [https://bcitf.org/upload/documents/research\\_reports/ImpactofNewTechnologyontheConstructionIndustry.pdf](https://bcitf.org/upload/documents/research_reports/ImpactofNewTechnologyontheConstructionIndustry.pdf)



in the construction industry (see Key Drivers for Change section). The Construction, Plumbing and Services IRC believes its involvement is critical in these cross-sector projects.

The Digital skills cross-sector project is being led by IBSA Manufacturing with the aim to review the skill needs for digital literacy, additive manufacturing (3D printing) and programming/coding skills. This project is also critical for all construction workers and professionals with the increase in new technologies, uptake of digital applications and systems and the emergence of 3D printing of buildings.

BIM and offsite construction (including prefabrication) have the potential to disrupt and challenge a major part of the construction industry's current processes, tasks and occupations. In response, the IRC proposes to two research projects – one on BIM and the other on offsite construction that aim to determine how this disruption will occur, what occupations will be affected and what qualifications this will impact in the CPC training package. The outcomes of these research projects will then lead to:

1. Updating any existing qualifications in the CPC training package identified that will be affected by BIM and offsite construction
2. Identifying gaps in the training package where new qualifications for BIM and offsite construction are needed and developing those qualifications.

The Environmental Sustainability cross-sector project, led by Skills Impact with a focus on environmentally sustainable production methods and energy management; natural resource management and waste handling; and consumer/market driven sustainability practices. There are two Construction, Plumbing and Services units that have been identified for review. Environmental sustainability is critical to the construction industry with the increasing demand for green and smart construction and will affect the tasks, processes and materials used in many occupations.

## Employment and Skills Outlook

This section explores current and projected employment levels in the Construction, Plumbing and Services sector. Current skills shortages and emerging skills needed in the industry are also discussed.

### Employment Outlook

The construction industry is Australia's largest by number of operating businesses.<sup>64</sup> At end of the 2015-2016 financial year there were 358,466 businesses operating in the industry and throughout the year, there were 47,957 exits and 59,924 entries, showing a +3.5% rate of change.<sup>65</sup>

The construction industry employs approximately 1,154,500 people in both full and part time capacities. This equates to around 9.4% of the total workforce in Australia.<sup>66</sup> Over the past five years, employment in the industry has increased by 19%, and over the next five years, employment is projected to grow 10.9%.<sup>67</sup> The below tables show the sub-sector and occupation employment projections for the next five years in the Construction, Plumbing and Services Sector.

---

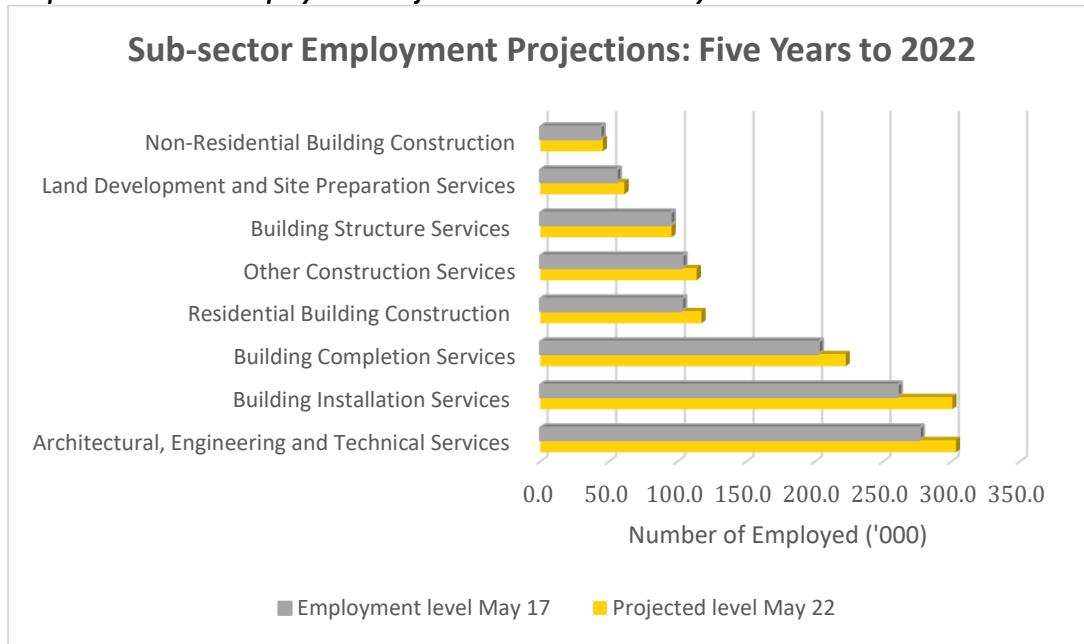
<sup>64</sup> Australian Bureau of Statistics, 8165.0 Counts of Australian Businesses, including entries and exits, Jun 2012 to Jun 2016, Summary of Findings

<sup>65</sup> Australian Bureau of Statistics, 8165.0 Counts of Australian Businesses, including entries and exits, Jun 2012 to Jun 2016, table 1: Businesses by industry division

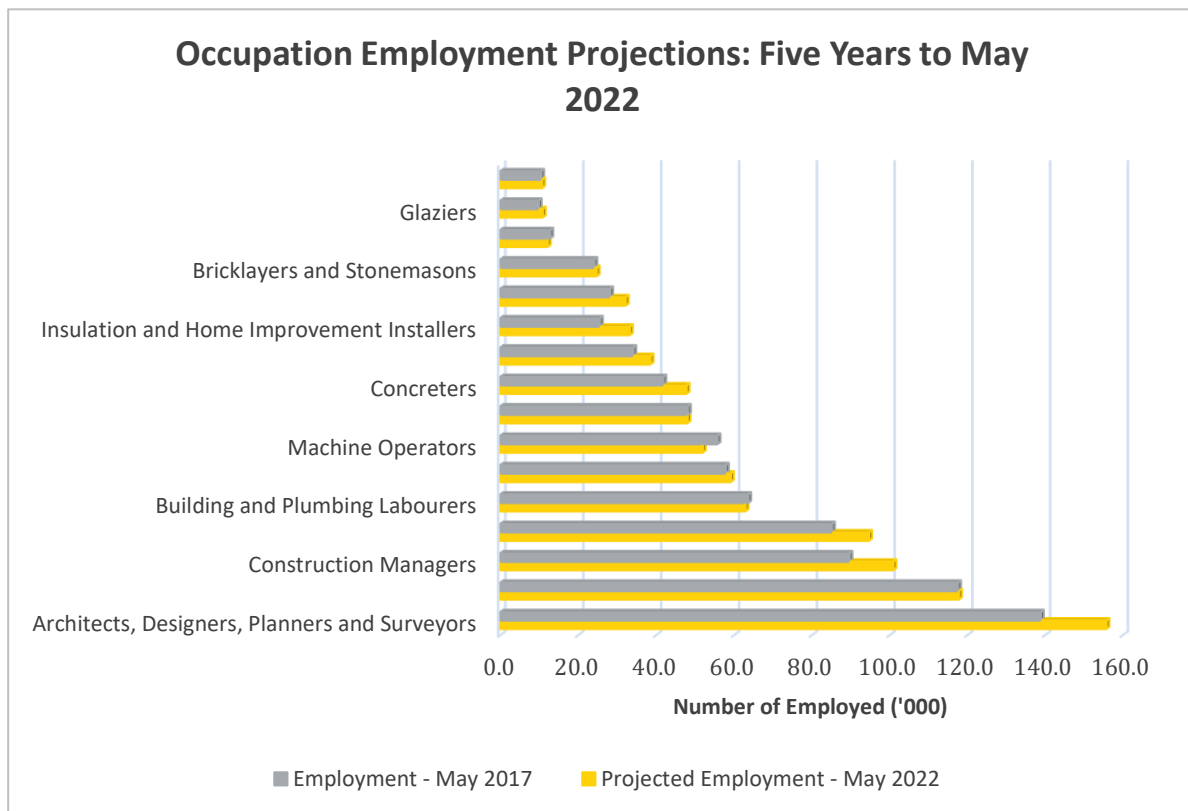
<sup>66</sup> Australian Department of Employment, Labour Market Information Portal, *Construction*  
<http://lmip.gov.au/default.aspx?LMIP/GainInsights/IndustryInformation/Construction>

<sup>67</sup> Labour Market Information Portal, 2017, *2017 Employment Projections, Industry Employment Projections – five years to May 2022 table*, accessed online 12/01/18 at <http://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>

**Graph 1: Sub-Sector Employment Projections - Five Year to May 2022.<sup>68</sup>**



**Graph 2: Occupation Employment Projections: Five Years to 2022.<sup>69</sup>**



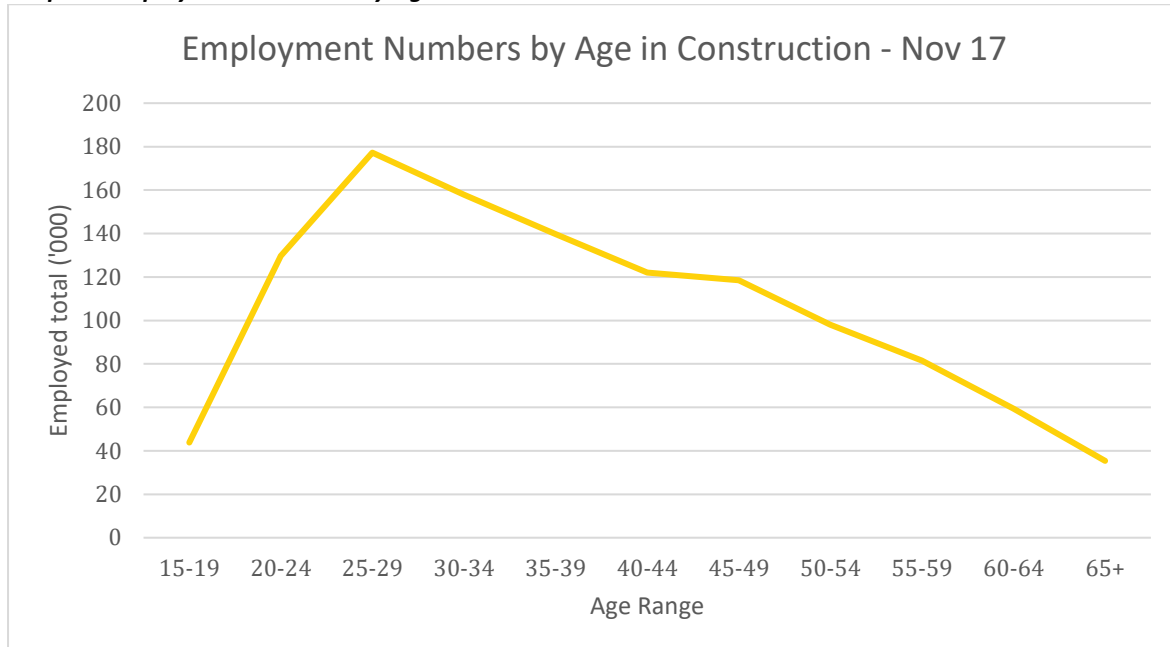
<sup>68</sup> Labour Market Information Portal, 2017, *2017 Employment Projections, Industry Employment Projections – five years to May 2022 table*, accessed online 12/01/18 at <http://lmp.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>

<sup>69</sup> Ibid

The median earnings in the construction industry are around \$1,250 gross per week for full time employees, and the industry is predominately male accounting for 88.4% of the workforce.<sup>70</sup>

The construction industry workforce is younger than the national average, with the largest age group being 25–30 years. The graph below shows the age trends of workers in the construction industry as of November 2017.<sup>71</sup>

**Graph 3: Employment Numbers by Age in Construction - Nov 17.**<sup>72</sup>



Despite the young demographic of workers, over the last 20 years there has been an increase in the workforce participation rate of workers aged 50 and over. The graph below shows the changes in the age composition of the construction industry over the last 20 years.

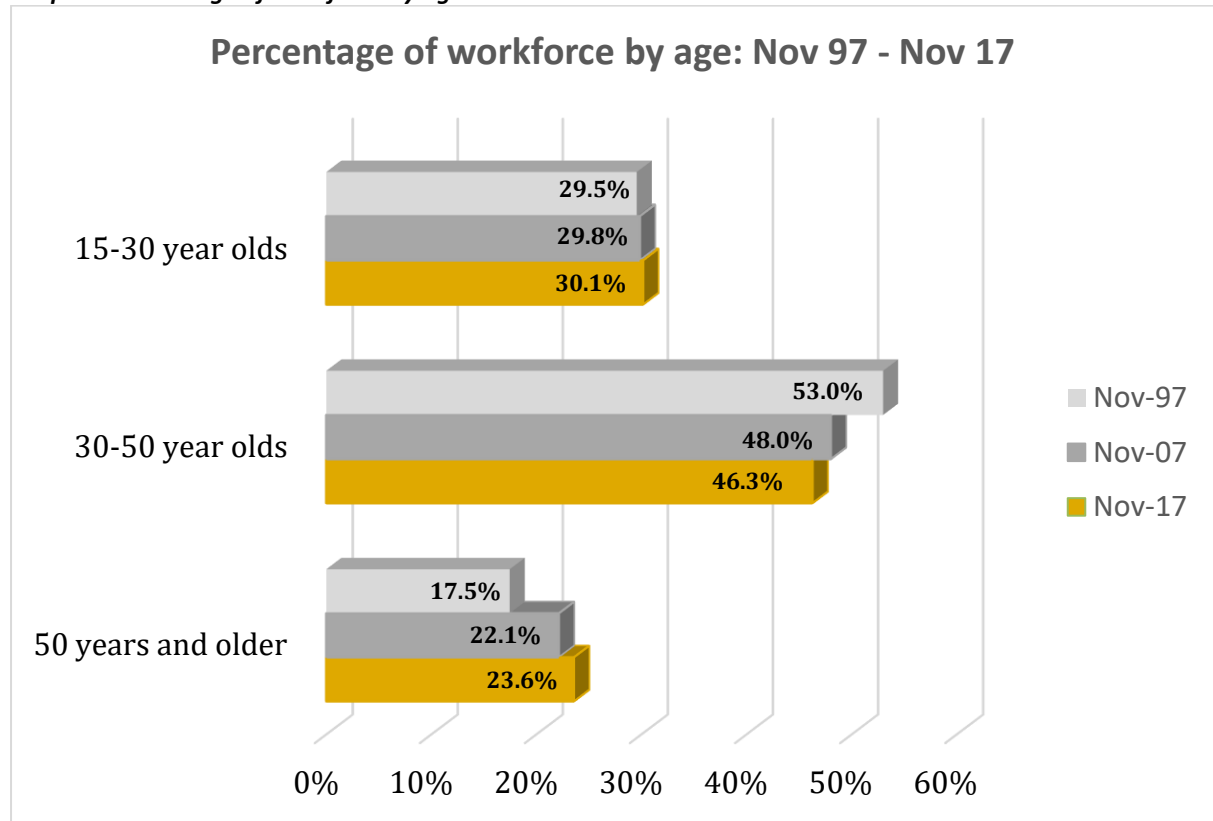
---

<sup>70</sup> Australian Department of Employment, Labour Market Information Portal, *Construction*  
<http://lmip.gov.au/default.aspx?LMIP/GainInsights/IndustryInformation/Construction>

<sup>71</sup> Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly, Data Cube EQ12 - *Employed persons by Age and Industry division of main job (ANZSIC), November 1984 onwards*  
<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003Nov%202017?OpenDocument>

<sup>72</sup> Ibid

**Graph 4: Percentage of workforce by age - Nov 97 - Nov 17.<sup>73</sup>**



## Skill Shortages

The Australian Government Department of Jobs and Small Business researches and compiles a list of skills shortages in the labour market. This list captures shortages in skilled occupations using the Survey of Employers who have Recently Advertised (SERA).<sup>74</sup> Table 4 shows the occupations in the Construction, Plumbing and Services Industry identified in this survey as having shortages in 2016-2017.

This data was validated by the Artibus Innovation CPC Skills Forecast Survey 2018. The top five occupational shortages identified through our survey are also captured in table 4. These five skill shortages were also identified in the Department of Jobs and Small Business’s survey.

<sup>73</sup> Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly, Data Cube EQ12 - *Employed persons by Age and Industry division of main job (ANZSIC), November 1984 onwards*  
<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003Nov%202017?OpenDocument>

<sup>74</sup> Australian Government Department of Jobs and Small Business, 2017, *Skill Shortages List - Australia*, accessed online 17/01/2018 at <https://docs.jobs.gov.au/documents/skill-shortage-list-australia>

**Table 4 Skills Shortages for Construction, Plumbing and Services Industry<sup>75</sup>**

Skill	Area of Shortage	Description of Shortage
<b>Top Five Skills Shortages Identified in the CPC Skills Forecast Survey 2018</b>		
<b>Bricklayer</b>	National Shortage	Shortages were reported in all states and territories except NT and WA. Employers find it hard to attract qualified and experienced applicants and fill vacancies.
<b>Carpenter and Joiner</b>	Shortage in some states	The 2016 survey found that there was a shortage of skilled and experienced carpenters and joiners across Victoria and New South Wales with over two thirds of vacancies remaining unfilled in VIC and employers attracting on average less than one suitable applicant per vacancy in NSW.
<b>Solid Plasterer</b>	National Shortage	Employers are facing difficulty in filling vacancies. Shortages can be seen in most states and in metropolitan and regional areas. There are few applicants, and most are considered to be insufficiently skilled or lack the required level of experience.
<b>Plumber</b>	Recruitment difficulties in some states	Employers in most states have trouble recruiting for multi-skilled plumbers, roof plumbers and gas or sprinkler fitters, while there is no shortage in South Australia.
<b>Wall and Floor Tiler</b>	National Shortage	Shortages have persisted after re-emerging in 2014 – though there are differences in recruitment experiences between locations. For example, shortages tend to be in Victoria and New South Wales, where construction activity is strong, while in other locations there is a surplus of tilers, with multiple applications vying for jobs.
<b>Other Skill Shortages Identified in Occupational Skills Shortages Lists by Department of Jobs and Small Business</b>		
<b>Painting Trades Worker*</b>	National Shortage	Shortages were reported in QLD, SA, TAS and VIC, while there are recruitment difficulties in NT but no shortages in WA.
<b>Surveyor*</b>	National Shortage	Shortages are mainly for cadastral surveyors in Victoria, New South Wales and Queensland.
<b>Stonemason</b>	National Shortage	Shortages of stonemasons have persisted since 2005. Employers report difficulty hiring stonemasons that have specialist skill sets and, in most states and territories, there are also shortages of those with more generalist stonemasonry skills. However, across Queensland and Western Australia, employers report recruitment is easier.

<sup>75</sup> Australian Government Department of Jobs and Small Business, 2017, *Occupational Skills Shortages Information*, accessed online 17/01/2018 at <https://www.jobs.gov.au/occupational-skill-shortages-information>, and Artibus Innovation CPC Skills Forecast Survey 2018.

<b>Fibrous Plasterer</b>	National Shortage	Shortages can be seen in all states and territories except WA and SA. Employers are finding low applicant numbers and very few applicants have the skill level required, vacancies are therefore unfilled.
<b>Roof Tiler</b>	National Shortage	Shortages have been persistent over the past decade, getting worse over the last three years. Employers have a very small number of applicants and few are considered suitable.

\*Skill shortage also identified in the Artibus Innovation CPC Skills Forecast Survey 2018, but not part of top 5.

## Ranking of 13 Generic Workforce Skills

The Department of Education and Training has developed a list of 13 generic workforce skills. Each year, Artibus asks stakeholders to rank these skills in order of importance through the *CPC Skills Forecast Survey 2018*. This question received 57 responses, and the results are presented in table 5.

**Table 5 List of 13 Generic Workforce Skills in Order of Importance<sup>76</sup>**

13 GENERIC WORKFORCE SKILLS				
2018		Skill	2017	2016
↑ 1	<b>1</b>	Managerial/Leadership	2	4
↓ 1	<b>2</b>	Language, Literacy and Numeracy (LLN)	1	6
↑ 3	<b>3</b>	Customer service/Marketing	6	7
↓ 1	<b>4</b>	Design mindset/Thinking critically/System thinking/Solving problems	3	5
↓ 1	<b>5</b>	Technology use and application	4	3
↑ 3	<b>6</b>	Financial	9	1
↓ 2	<b>7</b>	Learning agility/Information literacy/Intellectual autonomy and self-management	5	12
↑ 2	<b>8</b>	Entrepreneurial	10	2
↓ 2	<b>9</b>	Communication/Virtual collaboration/Social intelligence	7	11
↑ 2	<b>10</b>	Science, Technology, Engineering & Maths (STEM)	12	8
↓ 3	<b>11</b>	Environmental and Sustainability	8	10
↓ 1	<b>12</b>	Data analysis	11	9
N/A	<b>13</b>	Other (please specify)	N/A	N/A

The top responses to the category of 'other' included:

- Life Skills (including money and time management, organisation and planning)
- Adaptability
- Good work ethic (attitude, reliability, desire to work hard)
- Work Health and safety
- Resilience

<sup>76</sup> Artibus Innovation CPC Skills Forecast Survey 2018.

## Key Drivers for Change and Proposed Responses

This section further explores the challenges and opportunities for the construction, plumbing and services sector. The *CPC Skills Forecast Survey 2018* asked participants to ‘indicate what Social, Technological, Environment, Educational, Economic and Political (STEEEP) trends will have an impact on their industry in the next 3-5 years’ and the answer choices were derived using AISC’s *Future Skills and Training Resource*.<sup>77</sup> There were 66 responses for this question and the top 3 trends per category as identified by participants are in table 6.

**Table 6 STEEEP Trend Responses from the CPC Skills Forecast Survey 2018<sup>78</sup>**

Trend	Rating per category	
<b>Social Trends</b>		
Changing work and career values	1	26%
Ageing population*	2	25%
Global mobility	3	23%
<b>Technological Trends</b>		
Digitisation*	1	33%
Artificial intelligence and machine learning*	2	37%
Augmented reality and virtual reality	3	20%
<b>Economic Trends</b>		
Workforce vulnerability	1	22%
Changing workplace dynamics	2	22%
Empowered customers*	3	15%
<b>Education Trends</b>		
VET uptake and completion rates	1	42%
Skills mismatch*	2	33%
Knowledge-based economy	3	25%
<b>Environmental Trends</b>		
Financial viability	1	34%
Climatic weather shifts	2	22%
International sustainability action	3	22%
<b>Political Trends</b>		
Innovation ahead of regulation	1	37%

<sup>77</sup> Australian Industry and Skills Committee 2016, *Future Skills and Training: A practical resource to help identify future skills and training*, accessed online on 11/01/2018 at: <https://www.aisc.net.au/sites/aisc/files/documents/Future%20Priority%20Skills%20Resource.pdf>

<sup>78</sup> Artibus Innovation CPC Skills Forecast Survey 2018



Political appetite for reform	2	33%
Political instability & polarisation	3	30%

*\*Trend also identified by the IRC and discussed in the key drivers section*

The AISC's *Future Skills and Training Resource* was also used by the IRC to identify the following key drivers for change in the industry and on the CPC Construction, Plumbing and Services Training Package:

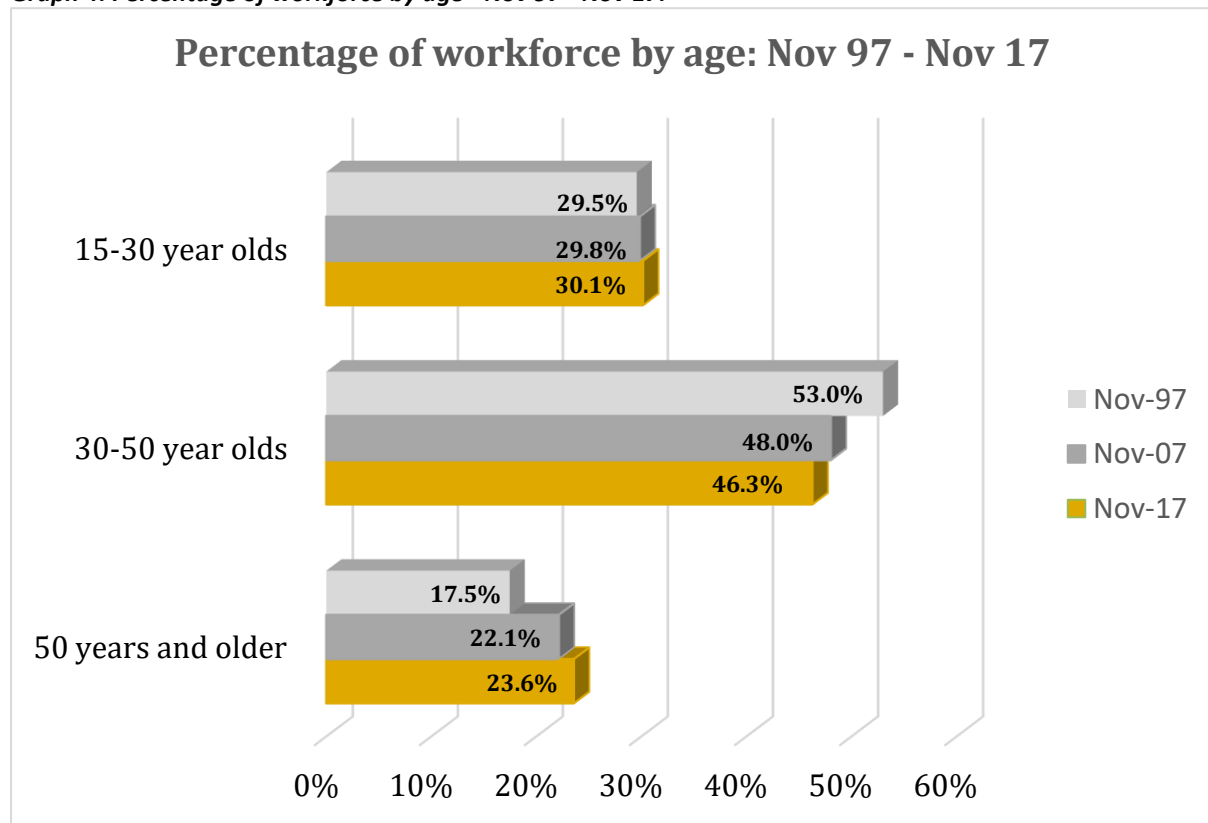
- Ageing population, specifically the increase in older workers in the industry
- Digitisation, artificial intelligence and automation
- Empowered customers, specifically demanding smart and green construction
- Skills mismatch

These trends were also validated in the *CPC Skills Forecast Survey 2018*.

### *An Increase in Older Workers*

While the evidence in the employment outlook section shows that the construction industry is typically young, the age profile of the industry has actually become older in the last 20 years.

**Graph 4: Percentage of workforce by age - Nov 97 - Nov 17.<sup>79</sup>**



<sup>79</sup> Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly, Data Cube EQ12 - *Employed persons by Age and Industry division of main job (ANZSIC), November 1984 onwards*  
<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003Nov%202017?OpenDocument>

The graph above shows that, while the percentage of younger workers in the industry has remained relatively constant over the last 20 years – only increasing 0.6%, there has actually been a decrease in the percentage of the workforce aged 30-49 by 6.7% and an increase in the workforce aged 50 and over by 6.1%.

Graph 4 shows that the skill replacement gap is increasing. Vital skills to the industry are at risk of being lost as increasing amounts of workers retire yet there are proportionally fewer younger workers in the industry to replace their skills.<sup>80</sup> This skill loss is especially relevant to senior level skills such as management and leadership. These skills are projected to be more in demand in the future construction industry, as lower skilled jobs are at risk of being automated, while business and management jobs that require high levels of social intelligence, technical ability and creative intelligence are predicted to increase.<sup>81</sup> Typically, these skills are held by older workers who have worked their way up to these positions, so with a large portion of people with these skills reaching retirement and a fewer portion of people available to take their place, the industry is at risk of critical workforce shortages. This suggests that the training package must be reviewed and updated to provide support for higher-level skills and qualifications to upskill workers to replace the skills of retiring workers as well as efforts to attract new talent to construction VET courses and careers.<sup>82</sup>

This need to replace high skilled workers in larger numbers in the future raises the issue of the future supply of the skilled workforce and whether the current apprentice system will be able to deliver the numbers needed.<sup>83</sup> The industry is likely to face increased competition from other industries for the potential apprentice workforce and needs to ensure that the career training pathways are understood and well established in school settings.

Furthermore, an increase in older people in the workforce is likely to create a demand for less physically demanding jobs. Automation and new technology may provide a solution but with this comes the need to upskill and re-skill the older population of construction workers to use new technologies and automated processes.<sup>84</sup>

In addition, the construction industry needs to improve career pathways for women into, and the recruitment of women for, the roles that are facing a skill replacement gap. The industry has traditionally been male dominated, this is increasing. In 2006, women accounted for 17% of the construction industry workforce,<sup>85</sup> however in 2018, women only account for 11.6% of the workforce.<sup>86</sup> A 2016 study by UNSW into gender disparity in the construction industry noted that men dominate senior roles, while women are more likely to be in junior, support roles and non-fee-earning

---

<sup>80</sup> Watson, M. (2012), Concerns for skills shortages in the 21st century: A review into the construction industry, Australia, The Australian Journal of Construction Economics and Building, Vol. 7(1), pp. 45–54.

<sup>81</sup> PWC, 2015, *A Smart Move: Future-proofing Australia's workforce by growing skills in science, technology, engineering and maths (STEM)*, accessed online 19/01/2018 at <https://www.pwc.com.au/pdf/a-smart-move-pwc-stem-report-april-2015.pdf>

<sup>82</sup> Watson, M. (2012), Concerns for skills shortages in the 21st century: A review into the construction industry, Australia, The Australian Journal of Construction Economics and Building, Vol. 7(1), pp. 45–54.

<sup>83</sup> Quezada G, Bratanova A, Boughen N, and Hajkowicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.

<sup>84</sup> Quezada G, Bratanova A, Boughen N, and Hajkowicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.

<sup>85</sup> UNSW, 2016, *Demonishing gender structures*, accessed online 18/04/2018 at [http://www.csi.edu.au/media/Construction\\_Booklet\\_FINAL2.pdf](http://www.csi.edu.au/media/Construction_Booklet_FINAL2.pdf)

<sup>86</sup> Australian Department of Employment, Labour Market Information Portal, *Construction* <http://lmip.gov.au/default.aspx?LMIP/GainInsights/IndustryInformation/Construction>

professions such as human resources and marketing.<sup>87</sup> Additionally, women experience relative disadvantage in regards to development and promotional opportunities, as well as inequality in pay. These experiences result in women leaving the construction industry almost 39% faster than men.<sup>88</sup>

In order to increase recruitment and retention of women, the report by UNSW recommends that:

- construction companies review the cultures of their workplaces to determine if they are gendered and exclusionary,
- even out how men and women are recruited – through both formal and informal channels,
- provide pathways and training for women to further their construction careers, and
- introduce more flexibility in the workplace so parental leave does not hinder women’s careers.<sup>89</sup>

### *The Introduction of New Technology*

The construction industry is yet to feel the effects of significant digital disruption and is one of the least ‘digitally engaged’ industry sectors.<sup>90</sup> The major technological advances that will affect the CPC training package are business applications, automation, BIM and pre-fabrication.

### **Business Applications**

The *Telstra Loop Self Employed Tradies Summary Report* highlights the low uptake of everyday digital technology among the construction workforce and the imperative for tradespeople to rapidly upskill to survive and compete in a service-based economy.<sup>91</sup> The report notes that equipment used for business, including everything from tablets to cranes, has the potential to improve training and workplace performance. For example, the rapid development of handheld devices and computer numerical control (CNC) routers has the potential to greatly improve the safety, precision and operation of many construction tasks, particularly those that are manual or high risk.<sup>92</sup>

### **Automation**

In the Australian labour market, about 40% of current jobs are deemed to be at high risk of automation over the next 10-15 years, yet we are still training people for these jobs. The Foundation for Young Australians suggest that this is particularly critical for young people, as more than half of young Australians are be trained for jobs that will no longer exist in the same capacity in the future.<sup>93</sup> In the construction industry, PwC projections show that lower skilled jobs such as plasterers and tilers have an 81.4% probability of being automated, while higher skilled jobs such as construction managers and engineers only have an 8.2% and 4.2% chance of being automated the next 20 years respectively.<sup>94</sup>

---

<sup>87</sup> UNSW, 2016, Demonishing gender structures, accessed online 18/04/2018 at [http://www.csi.edu.au/media/Construction\\_Booklet\\_FINAL2.pdf](http://www.csi.edu.au/media/Construction_Booklet_FINAL2.pdf)

<sup>88</sup> Ibid

<sup>89</sup> Ibid

<sup>90</sup> Vision Critical, Telstra Loop; Self Employed Tradies Summary Report, June 2016

<sup>91</sup> Ibid

<sup>92</sup> Vision Critical, Telstra Loop; Self Employed Tradies Summary Report, June 2016

<sup>93</sup> Foundation for Young Australians, 2015, *The New Work Order: Ensuring young Australians have skills and experience for the jobs of the future, not the past*, accessed online 06/02/2018 at: <https://www.fya.org.au/wp-content/uploads/2015/08/fya-future-of-work-report-final-lr.pdf>

<sup>94</sup> PwC, 2015, *A Smart Move: Future-proofing Australia’s workforce by growing skills in science, technology, engineering and maths (STEM)*, accessed online 19/01/2018 at <https://www.pwc.com.au/pdf/a-smart-move-pwc-stem-report-april-2015.pdf>

### ***Building Information Modelling (BIM)***

BIM is the digital version of a building, which includes all information on the building through its whole lifecycle – from design, to build, to operations and even demolition. BIM allows construction professionals, as well as owners and operators to access construction and operation information about the building.<sup>95</sup> The Australian construction industry has had a gradual and varied adoption of BIM, depending on how complex the project is.<sup>96</sup>

BIM has shown to have major benefits for the construction industry, such as reliable cost estimates, 3D walk-through animations for marketing, reliable predictions of the building's sustainability rating, early assessment of potential issues and design errors, tracking of construction activities and site safety planning. It also allows for better communication between project owners, designers, subcontractors and workers on site.<sup>97</sup> BIM is projected to completely replace current computer-aided design (CAD) systems. This is helped by smartphone and tablet technologies, which allow project workers and stakeholders to quickly access building information from BIM virtually everywhere.<sup>98</sup> Governments in Australia have been slow to mandate BIM for public works, but Tier One companies are already well advanced in this area and are starting to require sub-contractors to be able to connect with this technology.

### ***Pre-fabrication, offsite and modular building***

Pre-fabrication refers to any part of a building that has been created at a different location to the building being constructed.<sup>99</sup> This means that more of the construction process takes place offsite in a manufacturing plant instead of at the building site.<sup>100</sup> The Australian construction industry has been slow to adopt pre-fabrication in comparison to global markets. For example, in Scandinavian countries approximately 50% of residential housing is constructed with pre-fabrication, while in Australia, pre-fabrication only accounts for 3% of residential buildings, though this number is growing.<sup>101</sup> There are major benefits to pre-fabrication such as a significant reduction in construction waste, increase in safe work practices and injury prevention, and time savings due to construction taking place at same time as site preparation.<sup>102</sup>

Prefabrication is not a new construction process, rather it has been used for decades, but developed a reputation as being cheap and of poor quality compared to onsite site construction.<sup>103</sup> However, with the rise of new technologies in the construction industry, particularly BIM, it is easier to

---

<sup>95</sup> Construction and Property Services Industry Skills Council, 2014, *Environmental Scan 2014-15*

<sup>96</sup> StartupAUS, 2017, *Digital Foundations: How technology is transforming Australia's construction sector*, accessed online 01/02/2018 at <https://startupaus.org/document/constructiontech/>

<sup>97</sup> Azhar, S et al. (2012) 'Building information modeling (BIM): now and beyond', *Australasian Journal of Construction Economics and Building*, 12 (4) 15-28

<sup>98</sup> Ibid

<sup>99</sup> PrefabAUS, 2018, *What is Prefab*, accessed online 06/02/2018 at: <http://www.prefabaus.org.au/what-is-prefab/>

<sup>100</sup> Alviano, P., 2014, *Job Skills in Prefabricated Construction*, ISS Institute Inc, accessed online 01/02/2018 at: <http://www.issinstitute.org.au/wp-content/media/2015/11/Report-Alviano-Final-LowRes.pdf>

<sup>101</sup> Ibid

<sup>102</sup> McGraw Hill Construction, 2014, *Pre-fabrication and Modularization: increasing productivity in the construction industry*, accessed online 06/02/2018 at: <https://www.nist.gov/sites/default/files/documents/el/economics/Prefabrication-Modularization-in-the-Construction-Industry-SMR-2011R.pdf>

<sup>103</sup> Ibid

implement lean design and modularisation into construction, making the fabrication of complex building parts more economical.<sup>104</sup>

#### *How will this impact the Construction, Plumbing and Services Training Package?*

These emerging technologies are likely to have a major impact across the construction industry. For the construction industry to capitalise on these opportunities, the workforce will need to be trained, re-trained and upskilled with the skills and knowledge to not only use these new technologies, but also for the new jobs and tasks that arise.<sup>105</sup>

History tells us that automation will not affect all jobs equally. For example, lower skilled jobs such as secretary or administrative roles have been partially replaced by computers while higher skilled jobs such as managers have reaped the benefits of this automation as it results in more efficient and cost-effective projects.<sup>106</sup> This trend is set to continue in the construction industry, as automation is predicted to complement and assist jobs of higher skill levels but substitute those of routine and lower skill levels.<sup>107</sup> This means that a significant portion of the industry will need to be up-skilled and new workers trained for higher skilled jobs. However, this does not mean that higher skilled jobs will not be affected by automation. With increased automation comes a need to learn how to use new machines, computers, software and applications and therefore all workers in the construction industry will need to be trained appropriately.<sup>108</sup>

In regard to BIM, construction workers will need to be upskilled and retrained, not only so they have the knowledge and skills to use BIM in their fields<sup>109</sup>, but also because BIM will bring about new and more efficient ways of working,<sup>110</sup> which may result in new processes, tasks, policies and regulations for particular jobs. BIM usage will span across many occupations in the construction industry, so it is vital that competencies are incorporated into the training package.<sup>111</sup>

Additionally, an increase in prefabrication in Australia will require construction workers with different skillsets and therefore different training than what is currently available.<sup>112</sup> Prefabrication will require workers to have a mix of skills from both construction and manufacturing. This means that workers entering the industry will need training that comes from both the manufacturing and construction training packages.<sup>113</sup>

---

<sup>104</sup> Azhar, S et al. (2012) 'Building information modeling (BIM): now and beyond', *Australasian Journal of Construction Economics and Building*, 12 (4) 15-28

<sup>105</sup> Construction Training Fund, 2014, *Impact of New Technologies on the Construction Industry*, accessed online 18/01/2018 at [https://bcitf.org/upload/documents/research\\_reports/ImpactofNewTechnologyontheConstructionIndustry.pdf](https://bcitf.org/upload/documents/research_reports/ImpactofNewTechnologyontheConstructionIndustry.pdf)

<sup>106</sup> Foundation for Young Australians, 2015, *The New Work Order: Ensuring young Australians have skills and experience for the jobs of the future, not the past*, accessed online 06/02/2018 at: <https://www.fya.org.au/wp-content/uploads/2015/08/fya-future-of-work-report-final-lr.pdf>

<sup>107</sup> Quezada G, Bratanova A, Boughen N, and Hajkovic S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.

<sup>108</sup> Ibid

<sup>109</sup> Ibid

<sup>110</sup> Bryne, C., 2015, *Building Information Modelling in Australia: Lesson from the UK*, ISS Institute Inc, accessed online 01/02/2018 at: <http://www.issinstitute.org.au/wp-content/media/2015/05/Report-Byrne-FINAL-LowRes.pdf>

<sup>111</sup> Ibid

<sup>112</sup> Construction Training Fund, 2014, *Impact of New Technologies on the Construction Industry*, accessed online 18/01/2018 at [https://bcitf.org/upload/documents/research\\_reports/ImpactofNewTechnologyontheConstructionIndustry.pdf](https://bcitf.org/upload/documents/research_reports/ImpactofNewTechnologyontheConstructionIndustry.pdf)

<sup>113</sup> Alviano, P., 2014, *Job Skills in Prefabricated Construction*, ISS Institute Inc, accessed online 01/02/2018 at: <http://www.issinstitute.org.au/wp-content/media/2015/11/Report-Alviano-Final-LowRes.pdf>

## *The Demand for Smart and Green Construction*

With the need for action on climate change and sustainability becoming a focal point globally, so too comes a demand for green and smart buildings. Green buildings significantly reduce the negative impact buildings have on the environment by incorporating sustainable design, construction and operational elements. This also translates to healthier buildings for occupants.<sup>114</sup> Similarly, smart buildings are those that incorporate technology and materials that capture data on how the building is performing. This allows for a greater level of control over energy usage, monitoring tenant usage and maintenance and repair needs while also improving safety features.<sup>115</sup> Often, buildings that incorporate green elements also incorporate smart elements and vice versa.

The green and smart construction industry is growing worldwide, and while adoption has been slow in Australia, it is on the rise. A 2016 study conducted by Dodge Data and Analytics suggests that of the Australian companies surveyed, 48% expect that more than 30% of their projects will be green by 2018. This is an increase of 14 percentage points on green construction projects at the time of the survey.<sup>116</sup> Sectors with highest expected green construction growth rate in Australia are new low-rise residential building construction, retrofits of existing buildings and institutional building construction.<sup>117</sup>

The benefits of smart and green construction are becoming increasingly clearer, which is helping drive market awareness and consumer demand as the world moves towards more sustainable practices and ways of living.<sup>118</sup> These benefits include; lower carbon footprint from building operation, lower operating costs, increased value of building, higher rental and occupancy rates and improved health and productivity benefits for occupants.<sup>119</sup>

According to a study conducted by Dodge Data and Analytics in 2016, client demand and environmental regulations were the top two drivers for green building in 2015 globally. This trend can also be seen for Australia, as respondents ranked environmental regulations, the desire for healthier neighbourhoods and client demands as the top three drivers in 2015.<sup>120</sup>

---

<sup>114</sup> Green Building Council of Australia, 2018, *What is Green Building?* <https://www.gbca.org.au/about/what-is-green-building/>

<sup>115</sup> StartupAUS, 2017, *Digital Foundations: How technology is transforming Australia's construction sector*, accessed online 01/02/2018 at <https://startupaus.org/document/constructiontech/>

<sup>116</sup> Dodge Data & Analytics, 2016, *World Green Building Trends 2016: Developing Markets Accelerate Global Green Growth*, accessed online 19/01/2018 at:

<http://www.worldgbc.org/sites/default/files/World%20Green%20Building%20Trends%202016%20SmartMarket%20Report%20FINAL-2.pdf>

<sup>117</sup> Ibid

<sup>118</sup> Jadhav, NY, 2016, *Green and Smart Buildings*, Springer, Singapore

<sup>119</sup> Ibid

<sup>120</sup> Dodge Data & Analytics, 2016, *World Green Building Trends 2016: Developing Markets Accelerate Global Green Growth*, accessed online 19/01/2018 at:

<http://www.worldgbc.org/sites/default/files/World%20Green%20Building%20Trends%202016%20SmartMarket%20Report%20FINAL-2.pdf>

### *How will this impact the Construction, Plumbing and Services Industry?*

Buildings have a high carbon footprint, as they account for about 40% of global energy consumption.<sup>121</sup> This opens large opportunities for the construction industry to provide innovative solutions to reduce this – one way to achieve this is through green and smart construction.

However, with demand for green and smart construction, comes the need for governments and the industry to prioritise vocational education and training for new and current construction workers in energy-efficiency building and retrofitting, as many construction jobs will see a change in practices and tasks.<sup>122</sup> Construction workers will need to keep their skills and knowledge up to date in advances in water conservation, wastewater recycling and treatment and the renewable energies sector.<sup>123</sup> Some jobs may be more affected than others, as the Construction Skills Queensland (CSQ) and CSIRO *Farsight for Construction* report predicts those that will see a more significant change in practices and tasks are carpenters, plumbers, heating engineers, painters and plasterers, roofers, and electricians.<sup>124</sup>

### *Skills Shortages in a Specialised & Growing Industry*

Employment numbers in the construction, plumbing and services industry are growing. Typically, businesses in the industry are characterised by sub-contractors with trade specialisations employed in small-scale businesses of less than 20 employees or as sole operators.<sup>125</sup> This means that often a construction worker will specialise in a narrow aspect of their trade after being trained in a wide base of skills. The CSQ and CSIRO *Farsight for Construction* report notes that these specialised contractors can find it difficult to give their apprentices the full range of skilling opportunities that are needed to fulfil the requirements of a traditional apprenticeship.<sup>126</sup>

With an increased reliance on technology, more automated processes and tasks, and construction that is both green and smart, there will likely be a shift in skills, with much of the research indicating the growing need for science, technology, engineering and maths (STEM) skills. A 2015 report on STEM skills in Australia's workforce by PwC reports that 75% of the fastest growing occupations require STEM skills.<sup>127</sup> It is interesting to note that respondents to the Artibus Innovation CPC Skills Forecast Survey 2018 placed STEM skills 10<sup>th</sup> in the ranking of key generic workforce skills. There will need to be a shift in the understanding of the applicability of STEM skills to the construction industry to keep up with the skill needs of the industry into the future.

In addition to STEM skills, critical thinking, problem solving, analytical capabilities, curiosity and imagination have all been identified as skills that help foster STEM skills and are critical to the future workplace.<sup>128</sup> The Foundation for Young Australians (FYA) calls these skills 'enterprise skills,' and in

---

<sup>121</sup> World Business Council for Sustainable Development, 2009, *Energy Efficiency in Buildings: Transforming the Market*, accessed online 02/02/2018 at <http://www.wbcsd.org/Projects/Energy-Efficiency-in-Buildings/Resources/Transforming-the-Market-Energy-Efficiency-in-Buildings>

<sup>122</sup> Ibid

<sup>123</sup> Quezada G, Bratanova A, Boughen N, and Hajkowicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.

<sup>124</sup> Ibid

<sup>125</sup> IBISWorld, October 2017, *Australia Industry Reports - Construction: Competitive Landscapes*

<sup>126</sup> Quezada G, Bratanova A, Boughen N, and Hajkowicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.

<sup>127</sup> PWC, 2015, *A Smart Move: Future-proofing Australia's workforce by growing skills in science, technology, engineering and maths (STEM)*, accessed online 19/01/2018 at <https://www.pwc.com.au/pdf/a-smart-move-pwc-stem-report-april-2015.pdf>

<sup>128</sup> Ibid

their 2017 report *The New Work Smarts* millions of online job advertisements were analysed and results show that employers are already demanding these enterprise skills and paying higher wages for them. For example, they found that the demand for critical thinking has increased by 158% in the past three years while problem solving skills attract an additional \$7,745 compared with jobs of the same level that don't list problem solving in selection criteria.<sup>129</sup>

For the construction industry, these skills will be particularly important as more automated processes are introduced and there is a shift towards higher-skilled jobs. As skill needs change in the industry, employers will need to be able to give employees and apprentices opportunities to upskill and reskill. It is vital that the workforce is updated with relevant skills and knowledge as the industry grows and changes otherwise there is a risk of severe skills shortages and experience, leading to reduced quality and quantity of work and increased project costs, time frames and risks for the industry.<sup>130</sup>

## Proposed Responses and Risks of Not Proceeding

### *Proposed Responses*

#### ***Finalising the transition of the CPC training package to the 2012 standards***

The IRC's priority is to finalise all current and proposed transitions of the Construction, Plumbing and Services Training Package to the 2012 standards for training packages as set out by the (former) National Skills Standards Council. This will ensure that the CPC training package keeps in line with the standards of other national training packages, allowing for the easy alignment of imported units relevant to specific qualifications, as well as facilitating the collaboration on projects across sectors and training packages. It will also ensure that the CPC training package remains of a high quality and meets the workforce development needs of the construction, plumbing and services industry.

#### ***Continuing to update the current training package to respond to skill shortages***

The IRC will also continue to update the CPC training package to ensure current and emerging skills needs are met. There is a threat of looming skills shortages in the industry with the increase in older workers and lack of younger workers available to replace their skills. In addition, new technologies and the automation of many routine jobs will see a shift towards the need for STEM and enterprise skills. Continually updating the CPC training package to include these higher-level skills is vital to the industry.

#### ***Having an eye on the future***

The future of the construction industry is more streamlined, environmentally friendly and cost effective as a result of the key drivers mentioned above. The workforce will need to be trained, re-trained and upskilled with the skills and knowledge to not only use these new technologies, but for the new jobs and tasks that arise. It is therefore important that the skills and knowledge needed for this future are embedded in the CPC training package. The IRC aims to continue researching these

---

<sup>129</sup> Foundation for Young Australians, 2017, *The New Work Smarts: Thriving in the New Work Order*, accessed online 08/02/2018 at: [https://www.fya.org.au/wp-content/uploads/2017/07/FYA\\_TheNewWorkSmarts\\_July2017.pdf](https://www.fya.org.au/wp-content/uploads/2017/07/FYA_TheNewWorkSmarts_July2017.pdf)

<sup>130</sup> Quezada G, Bratanova A, Boughen N, and Hajkovicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.



drivers for change as part of the cross-sector projects on automation, digitisation and environmental sustainability, and developing these into cases for change for the training package.

### *Risks of not proceeding*

Not updating the CPC training package as proposed risks a loss of currency and erosion of the knowledge and skills in the training package, and therefore in the construction, plumbing and services industry. Emerging technologies and the automation of many routine jobs and processes are likely to have a major impact across the construction industry and in order for these impacts to become opportunities, it is vital that the workforce be trained, re-trained and upskilled with the skills and knowledge to not only use these new technologies, but also for the new jobs and tasks that arise. If this does not occur the CPC training package risks becoming out-dated with obsolete skills and knowledge, which could lead to severe skills shortages knowledge and experience among the workforce in the industry.

# Proposed Schedule of Work

Proposed Schedule of Work	
<p>2018 - 19</p>	<p><b>Proposed Cases for Endorsement</b></p> <p><b>Project 1 - Building and Construction</b> Update a suite of Building and Construction qualifications to align with current vocational outcomes.</p> <ul style="list-style-type: none"> <li>• CPC40110 Certificate IV in Building and Construction (Building)</li> <li>• CPC40208 Certificate IV in Building and Construction (Contract Administrator)</li> <li>• CPC40308 Certificate IV in Building and Construction (Estimating)</li> <li>• CPC40408 Certificate IV in Building and Construction (Sales)</li> <li>• CPC40508 Certificate IV in Building and Construction (Site Management)</li> <li>• CPC40611 Certificate IV in Building and Construction (Specialist Trades)</li> <li>• CPC40708 Certificate IV in Building and Construction (Trade Contracting)</li> <li>• CPC50210 Diploma of Building and Construction (Building)</li> <li>• CPC50308 Diploma of Building and Construction (Management)</li> <li>• CPC60212 Advanced Diploma of Building and Construction (Management)</li> </ul> <p><b>Project 2 – Qualification Streamlining</b> Update the listed Construction, Plumbing and Services Training Package qualifications to align with current vocational outcomes and streamline into the <i>Standards for Training Packages 2012</i>.</p> <ul style="list-style-type: none"> <li>• CPC30812 Certificate III in Roof Tiling</li> <li>• CPC31211 Certificate III in Wall and Ceiling Lining</li> <li>• CPC31311 Certificate III in Wall and Floor Tiling</li> <li>• CPC31011 Certificate III in Solid Plastering</li> <li>• CPC41312 Certificate IV in Swimming Pool and Spa Building</li> <li>• CPC31411 Certificate III in Construction Waterproofing</li> </ul> <p><b>Project 3 – Remote Area Building Repairs and Maintenance</b> Review Accredited Course 10391NAT Certificate III in Remote Area Building Repairs and Maintenance and evaluate its potential for transition into a qualification and integration into the CPC Construction, Plumbing and Services Training Package.</p> <ul style="list-style-type: none"> <li>• 1039NAT Certificate III in Remote Area Building Repairs and Maintenance</li> </ul> <p><b>Proposed Research Projects</b></p> <p><b>Projects 4 and 5 – Building Information Modelling (BIM) and Offsite Construction</b> The IRC is proposing two research projects that will examine how these technologies will affect construction occupations.</p> <ul style="list-style-type: none"> <li>• Building Information Modelling (BIM)</li> <li>• Offsite Construction and Pre-fabrication</li> </ul>
<p>2019 – 20</p>	<p><b>Project 6 – Building Surveying</b></p> <ul style="list-style-type: none"> <li>• CPC60115 Advanced Diploma of Building Surveying</li> <li>• CPC80215 Graduate Diploma of Building Surveying</li> </ul>

	<p><b>Project 7 – Plumbing</b></p> <ul style="list-style-type: none"> <li>• CPC2XXXX Certificate II in Plumbing (new qualification)</li> </ul> <p><b>Proposed Research Project</b></p> <p><b>Project 8 – Robotics and Automation</b></p> <ul style="list-style-type: none"> <li>• Robotics and Automation</li> </ul>
<b>2020 – 21</b>	<p><b>Project 9 – Qualification Maintenance</b></p> <p>A general review, update and maintenance of a suite of qualifications will be undertaken.</p> <ul style="list-style-type: none"> <li>• CPC30116 Certificate III in Shopfitting</li> <li>• CPC30216 Certificate III in Signs and Graphics</li> </ul>
<b>2021 – 22</b>	<p>A general review, update and maintenance of a suite of qualifications will be undertaken.</p>

# 2018-2019 Project Details

## PROJECT 1 – BUILDING AND CONSTRUCTION

<b>Description</b>	Update a suite of Building and Construction qualifications to align with current vocational outcomes.				
<b>Qualifications and Units of Competency</b>	<b>Qualification</b>	<b>Occupational Outcome</b>	<b>2014 enrolment</b>	<b>2015 enrolment</b>	<b>2016 enrolment</b>
	CPC40110 Certificate IV in Building and Construction (Building)	Building Associate	17,604	22,550	22,590
	CPC40208 Certificate IV in Building and Construction (Contract Administrator)	Contract Administrator	141	403	445
	CPC40308 Certificate IV in Building and Construction (Estimating)	Construction Estimator	365	739	709
	CPC40408 Certificate IV in Building and Construction (Sales)	Property Manager	18	6	0
	CPC40508 Certificate IV in Building and Construction (Site Management)	Building Associate	394	519	510
	CPC40611 Certificate IV in Building and Construction (Specialist Trades)	Building Associate	348	106	49
	CPC40708 Certificate IV in Building and Construction (Trade Contracting)	Building Associate	19	23	23
	CPC50210 Diploma of Building and Construction (Building)	Project Builder	10,933	13,802	13,686
	CPC50308 Diploma of Building and Construction (Management)	Project Builder	905	1182	1,466
	CPC60212 Advanced Diploma of Building and Construction (Management)	Project Manager	250	307	289
	<p><b>Units of competency</b></p> <ul style="list-style-type: none"> <li>Total of 61 CPCBC units of competency to be updated – please see Appendix A for unit details</li> </ul> <p><b>Skill sets</b></p> <ul style="list-style-type: none"> <li>To be determined (TBD)</li> </ul>				
	<b>Rationale</b>	The suite of Building and Construction qualifications need to be updated to keep in line with current and future industry best practice as a result of the key drivers for change, policy and regulation.			

## PROJECT 1 – BUILDING AND CONSTRUCTION

### **Enrolment Numbers and Occupation Analysis**

Two qualifications, the Certificate IV in Building and Construction (Building) and the Diploma of Building and Construction (Building), lead to the occupational outcomes of builder and are linked to licensing requirements in some States and Territories. This accounts for the proportionally high enrolment numbers and the IRC is proposing to review and update these two qualifications.

The three qualifications with lowest enrolment numbers - Certificate IV in Building and Construction (Sales), Certificate IV in Building and Construction (Specialist Trades) and Certificate IV in Building and Construction (Trade Contracting) – will be examined to determine if they should be deleted. The heritage units from the Specialist Trades qualification will also be considered for integration into the Certificate IV in Building and Construction (Building) and as a specialist skill set.

The statuses of the remaining five qualifications will be considered throughout the project, based on enrolment numbers, occupational outcomes and need.

### **Key Drivers for Change**

#### ***Increase in Older Workers***

As evidenced in the Key Drivers for Change section, the construction industry is at risk of losing vital skills as increasing amounts of workers retire and there are proportionally fewer younger workers in the industry to replace their skills. This is especially relevant to senior level skills such as management and leadership, which are projected to be more in demand in the future construction industry. The training package must be reviewed and updated to provide support for higher-level skills and qualifications to upskill workers to replace the skills of retiring workers. The IRC is proposing to review and update Certificate IV and above in the Building and Construction qualifications to meet this need.

#### ***Digitisation***

The major technological advances that will affect the CPC training package are in business applications, automation, BIM and pre-fabrication. These emerging technologies are likely to have a major impact across the construction industry.

Technology is transforming the way businesses operate, and in the construction industry everything from tablets to cranes has the potential to improve training and workplace performance. Automation is predicted to complement and assist jobs of higher skill levels but substitute those of routine and lower skill levels. This means that a significant portion of the industry will need to be up-skilled and new workers trained for higher skilled jobs, as there will be a need to learn how to use new machines, computers, software and applications. The IRC is proposing to review and update Certificate IV and above in the Building and Construction qualifications to meet this need.

## PROJECT 1 – BUILDING AND CONSTRUCTION

In regard to BIM and offsite construction, the IRC is proposing two research projects (projects 4 and 5 below) that will examine how these emerging technologies will affect construction occupations. The findings from this research will be applied to the update of the Building and Construction qualifications.

### ***Demand for Smart and Green Construction***

Consumer driven demand for green and smart construction will result in changes in construction practices and principles. As a result, there is a need for current and new construction industry workers to be trained and upskilled in energy-efficient building and retrofitting, water conservation, wastewater recycling and treatment and the renewable energies sector. The IRC is proposing to review and update the suite of Building and Construction qualifications to meet this need.

### **Policy**

Update the suite of Building and Construction qualifications to align with the:

- *Standards for Training Packages 2012*
  - All qualifications minus those proposed for deletion
- COAG Industry and Skill Council directives
  - As detailed in the ministers' priorities addressed section below

### **Regulation**

Update the suite of Building and Construction qualifications to reflect current requirements of the National Construction Code and Workplace Health and Safety (WHS) standards, practice, protocols and procedures.

	<b>Reform</b>	<b>Action to address reform</b>
<b>Minister's priorities addressed</b>	Remove obsolete and superfluous qualifications from the system	Preliminary analysis of the enrolment patterns identified potential to delete two qualifications with negligible uptake. A mapping of the unit composition of the qualifications identified that four of the Certificate IV's have significant overlap that suggests the potential for further deletions. Consultation with industry stakeholders is required to determine if the vocational outcomes of these individual qualifications are still relevant or if an integrated qualification could be designed.
	Make more information about industry's expectations of training delivery available	Gathering information on industry expectations of the training delivery will be a focus of consultation. The training package components will be written to reflect industry expectations and the Companion Volume Implementation Guide will be updated with additional information targeted at training providers and consumers.

## PROJECT 1 – BUILDING AND CONSTRUCTION

	Ensure the training system better supports individuals to move easily from one related occupation to another	The design of qualifications will be adjusted to strengthen pathways to related sectors including building design, home sustainability and access consulting.																		
	Improve the efficiency of the training system at a unit level	22 out of a total of 83, building and construction units have been identified as having negligible enrolments. These will be confirmed for deletion in consultation with industry. Where appropriate, relevant cross industry and cross sector units will be imported to minimise the duplication of units in the system.																		
	Foster greater recognition of skill sets	Skill sets will be investigated especially for upskilling the existing workforce in new materials and technologies.																		
<b>Consultation plan</b>	<p>The key engagement methods will be as follows:</p> <ul style="list-style-type: none"> <li>• technical Advisory Groups (TAGs) will be established in accordance with internal policy and procedures to guide the subject matter expertise components of the work</li> <li>• direct correspondence with regulators</li> <li>• direct correspondence with State Training Authorities</li> <li>• direct correspondence with IRC and key stakeholders</li> <li>• industry associations and other stakeholders will be invited to capital city forums in all state/territories. A copy of forums material will be published on the web and an online forum will also be facilitated</li> <li>• RTOs will be engaged through online survey and trainer networks</li> <li>• public web project page updated fortnightly</li> <li>• newsletter survey distribution to 4,200 stakeholders, including all RTOs, regulators, industry associations. Minimum of three newsletter profiles</li> <li>• industry survey on early and late draft material</li> <li>• distribution of survey through TAG networks and Artibus digital channels</li> <li>• social media – twitter and linkedin.</li> </ul>																			
<b>Project timeline</b>	<table border="1"> <thead> <tr> <th data-bbox="344 1505 1027 1532"><b>Details</b></th> <th data-bbox="1034 1505 1474 1532"><b>Date</b></th> </tr> </thead> <tbody> <tr> <td data-bbox="344 1541 1027 1568">Proposed work approved by AISC</td> <td data-bbox="1034 1541 1474 1568">June 2018</td> </tr> <tr> <td data-bbox="344 1576 1027 1603">Project kick-off</td> <td data-bbox="1034 1576 1474 1603">June 2018</td> </tr> <tr> <td data-bbox="344 1612 1027 1639">Establish Technical Advisory Group (TAG)</td> <td data-bbox="1034 1612 1474 1639">July – August 2018</td> </tr> <tr> <td data-bbox="344 1648 1027 1720">Training package components put forward for consultation</td> <td data-bbox="1034 1648 1474 1720">September 2018</td> </tr> <tr> <td data-bbox="344 1729 1027 1756">Review feedback and update Draft Pack 1</td> <td data-bbox="1034 1729 1474 1756">November 2018</td> </tr> <tr> <td data-bbox="344 1765 1027 1836">Training package components put forward for validation</td> <td data-bbox="1034 1765 1474 1836">January 2019</td> </tr> <tr> <td data-bbox="344 1845 1027 1872">Finalisation and Quality Assurance</td> <td data-bbox="1034 1845 1474 1872">March 2019</td> </tr> <tr> <td data-bbox="344 1881 1027 1908">Training package components sent to STAs for sign-off</td> <td data-bbox="1034 1881 1474 1908">April 2019</td> </tr> </tbody> </table>		<b>Details</b>	<b>Date</b>	Proposed work approved by AISC	June 2018	Project kick-off	June 2018	Establish Technical Advisory Group (TAG)	July – August 2018	Training package components put forward for consultation	September 2018	Review feedback and update Draft Pack 1	November 2018	Training package components put forward for validation	January 2019	Finalisation and Quality Assurance	March 2019	Training package components sent to STAs for sign-off	April 2019
<b>Details</b>	<b>Date</b>																			
Proposed work approved by AISC	June 2018																			
Project kick-off	June 2018																			
Establish Technical Advisory Group (TAG)	July – August 2018																			
Training package components put forward for consultation	September 2018																			
Review feedback and update Draft Pack 1	November 2018																			
Training package components put forward for validation	January 2019																			
Finalisation and Quality Assurance	March 2019																			
Training package components sent to STAs for sign-off	April 2019																			

## PROJECT 1 – BUILDING AND CONSTRUCTION

	Submitted for endorsement training package components to Commonwealth Department of Education and Training	June 2019
--	--	-----------

## PROJECT 2 – QUALIFICATION STREAMLINING

<b>Description</b>	Update the listed Construction, Plumbing and Services Training Package qualifications to align with current vocational outcomes and streamline into the <i>Standards for Training Packages 2012</i> .
--------------------	---

<b>Qualifications and Units of Competency</b>	<table border="1"> <thead> <tr> <th>Qualification</th> <th>Occupational Outcome</th> <th>2014 enrolment</th> <th>2015 enrolment</th> <th>2016 enrolment</th> </tr> </thead> <tbody> <tr> <td>CPC30812 Certificate III in Roof Tiling</td> <td>Roof Tiler</td> <td>356</td> <td>550</td> <td>725</td> </tr> <tr> <td>CPC31211 Certificate III Wall and Ceiling Lining</td> <td>Fibrous Plasterer</td> <td>1820</td> <td>2468</td> <td>2508</td> </tr> <tr> <td>CPC31311 Certificate III in Wall and Floor Tiling</td> <td>Wall and Floor Tiler</td> <td>1804</td> <td>2130</td> <td>2390</td> </tr> <tr> <td>CPC31411 Certificate III in Construction Waterproofing</td> <td>Construction Trades Worker</td> <td>887</td> <td>1425</td> <td>1677</td> </tr> <tr> <td>CPC40808 Certificate IV in Swimming Pool and Spa Building</td> <td>Building Associate</td> <td>14</td> <td>3</td> <td>6</td> </tr> <tr> <td>CPC31011 Certificate III in Solid Plastering</td> <td>Solid Plasterer</td> <td>623</td> <td>789</td> <td>755</td> </tr> </tbody> </table>	Qualification	Occupational Outcome	2014 enrolment	2015 enrolment	2016 enrolment	CPC30812 Certificate III in Roof Tiling	Roof Tiler	356	550	725	CPC31211 Certificate III Wall and Ceiling Lining	Fibrous Plasterer	1820	2468	2508	CPC31311 Certificate III in Wall and Floor Tiling	Wall and Floor Tiler	1804	2130	2390	CPC31411 Certificate III in Construction Waterproofing	Construction Trades Worker	887	1425	1677	CPC40808 Certificate IV in Swimming Pool and Spa Building	Building Associate	14	3	6	CPC31011 Certificate III in Solid Plastering	Solid Plasterer	623	789	755
	Qualification	Occupational Outcome	2014 enrolment	2015 enrolment	2016 enrolment																															
	CPC30812 Certificate III in Roof Tiling	Roof Tiler	356	550	725																															
	CPC31211 Certificate III Wall and Ceiling Lining	Fibrous Plasterer	1820	2468	2508																															
	CPC31311 Certificate III in Wall and Floor Tiling	Wall and Floor Tiler	1804	2130	2390																															
	CPC31411 Certificate III in Construction Waterproofing	Construction Trades Worker	887	1425	1677																															
	CPC40808 Certificate IV in Swimming Pool and Spa Building	Building Associate	14	3	6																															
	CPC31011 Certificate III in Solid Plastering	Solid Plasterer	623	789	755																															

### Units of competency

- Total of 41 units to be updated - please see Appendix A for unit details
- Through review and update, consideration will be given to the development of new units of competency, particularly for the Certificate IV in Swimming Pool and Spa Building.

### Skill sets

Through review and update, the development of skill sets will be considered. Number not known at this stage.

<b>Rationale</b>	<p>The qualifications in this project need to be updated to keep in line with current and future industry best practice as a result of the key drivers for change and policy guidelines.</p> <p><b>Enrolment Numbers and Occupation Analysis</b></p> <p>All qualifications lead to occupational outcomes that are projected to grow in the next five years (see graph 2 in the Employment Outlook section), all, except the Certificate IV in Swimming Pool and Spa Building, have had increasing enrolments since 2014.</p> <p>Swimming Pool and Spa Building is a niche industry. The qualification, as it is now, is made up of generic building units which are not seen as relevant to the specialist area of swimming</p>
------------------	---



## PROJECT 2 – QUALIFICATION STREAMLINING

pool and spa building. There is strong industry support to amend the qualification and develop specific units to address the niche requirements of swimming pool and spa builders.

### **Key Drivers for Change**

#### ***Digitisation***

The major technological advances that will affect the qualifications in this project are in business applications, automation, BIM and pre-fabrication.

Technology is transforming the way businesses operate, and in the construction industry everything from tablets to cranes has the potential to improve training and workplace performance. Technology's influence on the occupational outcomes of the qualifications listed therefore needs to be examined. For example, in the swimming pool and spa building industry technological integration for controlling and maintaining pools through smartphone devices is growing, so this will be examined and incorporated into CPC40808 Certificate IV in Swimming Pool and Spa Building.

Automation is predicted to have wide spread effects on the construction industry, substituting many lower skilled jobs, processes and tasks. The IRC is proposing to research the effects of automation on the construction industry as part of the cross-sector project led by Skills Impact. This research will inform updates to the qualifications listed in this project.

In regard to BIM and offsite construction, the IRC is proposing two research projects (projects 4 and 5 below) that will examine how these emerging technologies will affect construction occupations. The findings from this research will be applied to update of the qualifications listed.

#### ***Consumer Demand for Smart and Green Construction***

Consumer driven demand for green and smart construction will result in changes in construction practices and principles. As a result, there is a need for current and new construction industry workers to be trained and upskilled. Some jobs may be more affected than others, as the CSQ and CSIRO *Farsight for Construction* report predicts those that will see a more significant change in practices and tasks are painters, plasterers and roofers. The IRC is proposing to review and update the qualifications listed to meet this need.

#### ***Skill Shortages and Mismatches***

According to the Australian Government Department of Jobs and Small Business' list of skills shortages, wall and floor tilers are considered to be in national shortage. Updating the CPC31311 Certificate III in Wall and Floor Tiling to comply with the 2012 standards and current and emerging industry best practice may increase enrolments and completions and address this skill shortage.

In addition, it is vital that the workforce has relevant, valued, and up-to-date skills. The current CPC40808 Certificate IV in Swimming Pool and Spa Building is comprised largely of generic business and building units that do not address the occupational requirements of

## PROJECT 2 – QUALIFICATION STREAMLINING

specialist swimming pool and spa builders. Therefore, it is necessary to update the qualification accordingly.

### Policy

Update the qualifications listed to align with the:

- *Standards for Training Packages 2012*
  - All qualifications
- COAG Industry and Skill Council directives
  - As detailed in the ministers' priorities addressed section below

<b>Minister's priorities addressed</b>	<b>Reform</b>	<b>Action to address reform</b>
	Remove obsolete and superfluous qualifications from the system	The qualifications in the scope of this project are meeting the needs of the skill shortage areas including: roof, wall and floor tilers, and solid and fibrous plasterers. The Swimming Pool and Spa qualification is a niche area for which the industry is seeking a relevant qualification. None of these qualifications are obsolete.
	Make more information about industry's expectations of training delivery available	Gathering information on industry expectations of the training delivery will be a focus of consultation undertaken as part of the review. The training package components will be written to reflect industry expectations and the Companion Volume Implementation Guide will be updated with additional information useful for training providers and consumers.
	Ensure the training system better supports individuals to move easily from one related occupation to another	The design of qualifications will support articulation and strengthen cross sector pathways to support occupational mobility.
	Improve the efficiency of the training system at a unit level	Appropriate relevant cross industry and cross sectors units will be used to minimise the duplication of units in the system.
	Foster greater recognition of skill sets	Skills sets will be considered to support individuals move from one related occupation to another.
<b>Consultation plan</b>	<p>The IRC approved consultation process will be undertaken that will ensure all key stakeholders are consulted throughout this project.</p> <p><i>Detailed description of the process is outlined in Project 1.</i></p>	
<b>Project timeline</b>	<b>Details</b>	<b>Date</b>
	Proposed work approved by AISC	June 2018

## PROJECT 2 – QUALIFICATION STREAMLINING

	Project kick-off	June 2018
	Establish Technical Advisory Group (TAG)	July 2018
	Training package components put forward for consultation	September 2018
	Review feedback and update Draft Pack 1	October 2018
	Training package components put forward for validation	November 2018
	Finalisation and Quality Assurance	November 2018
	Training package components sent to STAs for sign-off	December 2018
	Submitted for endorsement training package components to Commonwealth Department of Education and Training	January 2019

## PROJECT 3 – REMOTE AREA BUILDING REPAIRS AND MAINTENANCE

<b>Description</b>	Review Accredited Course 10391NAT Certificate III in Remote Area Building Repairs and Maintenance and evaluate its potential for transition into a qualification and integration into the CPC Construction, Plumbing and Services Training Package.				
<b>Qualification and Units of Competency</b>	<p><b>Qualification</b></p> <table border="1"> <thead> <tr> <th>Code</th> <th>Title</th> </tr> </thead> <tbody> <tr> <td>10391NAT</td> <td>Certificate III in Remote Area Building Repairs and Maintenance</td> </tr> </tbody> </table> <p><b>Units of competency</b></p> <ul style="list-style-type: none"> <li>TBD</li> </ul> <p><b>Skill sets</b></p> <ul style="list-style-type: none"> <li>TBD</li> </ul>	Code	Title	10391NAT	Certificate III in Remote Area Building Repairs and Maintenance
Code	Title				
10391NAT	Certificate III in Remote Area Building Repairs and Maintenance				
<b>Rationale</b>	<p><b>Aim</b></p> <p>This project will use, as a foundation, an accredited course to create a national qualification available for remote areas Australia wide. The majority of residents in remote communities throughout Australia are indigenous and some of the most disadvantaged job seekers. The aim of the Certificate III in Remote Area Repairs and Maintenance is to provide:</p> <ul style="list-style-type: none"> <li>A meaningful training and a pathway from Certificate II level qualifications in building and construction</li> <li>Context specific skills and knowledge for the repair, maintenance and asset protection of residential and commercial buildings in remote communities</li> <li>And to build local workforce capacity and Indigenous participation in economic and employment opportunities.</li> </ul> <p><b>Policy</b></p> <p>Transition the accredited course to a qualification and align with the:</p> <ul style="list-style-type: none"> <li>2012 <i>Standards for Training Packages</i></li> <li>COAG Industry and Skill Council directives.</li> </ul> <p><b>Regulations</b></p> <p>Review accredited course and transition into qualification that reflects current Workplace Health and Safety (WHS) standards, practice, protocols and procedures.</p>				

## PROJECT 3 – REMOTE AREA BUILDING REPAIRS AND MAINTENANCE

<b>Minister's priorities addressed</b>	<b>Reform</b>	<b>Action to address reform</b>																				
	Remove obsolete and superfluous qualifications from the system	A niche qualification is proposed. At this stage, no superfluous qualifications have been identified.																				
	Make more information about industry's expectations of training delivery available	The units and assessment requirements will be written to reflect cultural protocols and practices and industry expectations and the Companion Volume Implementation Guide will be updated with additional information on this niche sector targeted at training providers and consumers.																				
	Ensure the training system better supports individuals to move easily from one related occupation to another	The Certificate III qualification offers a pathway from related Certificate II's and the higher level skills and knowledge make individuals more employable in their community in regional and remote areas of Australia.																				
<b>Consultation plan</b>	<p>The IRC approved consultation process will be undertaken that will ensure all key stakeholders are consulted in the Remote Area Building Repairs and Maintenance project.</p> <p><i>Detailed description of the process is outlined in Project 1.</i></p>																					
<b>Project timeline</b>	<table border="1"> <thead> <tr> <th>Details</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>Proposed work approved by AISC</td> <td>June 2018</td> </tr> <tr> <td>Project kick-off</td> <td>June 2018</td> </tr> <tr> <td>Establish Technical Advisory Group (TAG)</td> <td>July – August 2018</td> </tr> <tr> <td>Training package components put forward for consultation</td> <td>September 2018</td> </tr> <tr> <td>Review feedback and update Draft Pack 1</td> <td>November 2018</td> </tr> <tr> <td>Training package components put forward for validation</td> <td>January 2019</td> </tr> <tr> <td>Finalisation and Quality Assurance</td> <td>March 2019</td> </tr> <tr> <td>Training package components sent to STAs for sign-off</td> <td>April 2019</td> </tr> <tr> <td>Submitted for endorsement training package components to Commonwealth Department of Education and Training</td> <td>May 2019</td> </tr> </tbody> </table>	Details	Date	Proposed work approved by AISC	June 2018	Project kick-off	June 2018	Establish Technical Advisory Group (TAG)	July – August 2018	Training package components put forward for consultation	September 2018	Review feedback and update Draft Pack 1	November 2018	Training package components put forward for validation	January 2019	Finalisation and Quality Assurance	March 2019	Training package components sent to STAs for sign-off	April 2019	Submitted for endorsement training package components to Commonwealth Department of Education and Training	May 2019	
Details	Date																					
Proposed work approved by AISC	June 2018																					
Project kick-off	June 2018																					
Establish Technical Advisory Group (TAG)	July – August 2018																					
Training package components put forward for consultation	September 2018																					
Review feedback and update Draft Pack 1	November 2018																					
Training package components put forward for validation	January 2019																					
Finalisation and Quality Assurance	March 2019																					
Training package components sent to STAs for sign-off	April 2019																					
Submitted for endorsement training package components to Commonwealth Department of Education and Training	May 2019																					

## PROJECTS 4 and 5 – PROPOSED RESEARCH PROJECTS

<b>Description</b>	The IRC is proposing two research projects – one on Building Information modelling and one on Offsite Construction – that will examine how these technologies will affect construction occupations. The outcomes of these research projects will then lead to:
--------------------	--

## PROJECTS 4 and 5 – PROPOSED RESEARCH PROJECTS

	<ol style="list-style-type: none"> <li>1. Updating any existing qualifications in the CPC training package identified that will be affected by BIM and offsite construction</li> <li>2. Identifying gaps in the training package where new qualifications for BIM and offsite construction are needed and developing those qualifications.</li> </ol>												
<p><b>Rationale</b></p>	<p>As discussed in the Key Drivers for Change section, BIM and offsite construction (including prefabrication) have the potential to disrupt and challenge a major part of the construction industry’s current processes, tasks and occupations.</p> <p>BIM will bring about new and more efficient ways of working in the construction industry, so workers will need to be upskilled and retrained with the knowledge and skills to use BIM effectively. Additionally, an increase in prefabrication in Australia will require construction workers with different skillsets and therefore different training than what is currently available. Prefabrication will require workers to have a mix of skills from both construction and manufacturing.</p>												
<p><b>Minister’s priorities addressed</b></p>	<p>Not applicable to research projects. Minister’s priorities will be addressed as qualification amendments become evident through research outcomes.</p>												
<p><b>Consultation plan</b></p>	<p>The IRC approved consultation process will be undertaken that will ensure all key stakeholders are consulted throughout these research projects.</p> <p><i>Detailed description of the process is outlined in Project 1.</i></p>												
<p><b>Project timeline</b></p>	<table border="1"> <thead> <tr> <th>Details</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>Proposed work approved by AISC</td> <td>June 2018</td> </tr> <tr> <td>Project kick-off</td> <td>June 2018</td> </tr> <tr> <td>Develop research scope and design</td> <td>June 2018</td> </tr> <tr> <td>Research undertaken including industry consultation</td> <td>July – December 2018</td> </tr> <tr> <td>Analyse findings, report outcomes and incorporate into 2019 Skills Forecast</td> <td>February 2019</td> </tr> </tbody> </table>	Details	Date	Proposed work approved by AISC	June 2018	Project kick-off	June 2018	Develop research scope and design	June 2018	Research undertaken including industry consultation	July – December 2018	Analyse findings, report outcomes and incorporate into 2019 Skills Forecast	February 2019
Details	Date												
Proposed work approved by AISC	June 2018												
Project kick-off	June 2018												
Develop research scope and design	June 2018												
Research undertaken including industry consultation	July – December 2018												
Analyse findings, report outcomes and incorporate into 2019 Skills Forecast	February 2019												



ROBERT WILSON, IRC Chair 30 April 2018

# References

- Alviano, P., 2014, *Job Skills in Prefabricated Construction*, ISS Institute Inc, accessed online 01/02/2018 at: <http://www.issinstitute.org.au/wp-content/media/2015/11/Report-Alviano-Final-LowRes.pdf>
- Australian Government Department of Jobs and Small Business, 2017, *Skill Shortages List - Australia*, accessed online 17/01/2018 at <https://docs.jobs.gov.au/documents/skill-shortage-list-australia>
- Australian Government Department of Jobs and Small Business, 2017, *Occupational Skills Shortages Information*, accessed online 17/01/2018 at <https://www.jobs.gov.au/occupational-skill-shortages-information>
- Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006
- Australian Bureau of Statistics, 8165.0 Counts of Australian Businesses, including entries and exits, June 2012 to June 2016, *Table 1: Businesses by industry division*
- Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly, November 2017, *Table 27. Employed Persons by Sector (public/private) and Industry Division of Main Job*
- Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly, Data Cube EQ12 - *Employed persons by Age and Industry division of main job (ANZSIC), November 1984 onwards*  
<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003Nov%202017?OpenDocument>
- Australian Bureau of Statistics, 8165.0 Counts of Australian Businesses, including entries and exits, June 2012 to June 2016, *Summary of Findings*
- Australian Business Licence and Information Service, 2017, custom search 'building,' accessed on 16/01/2017 at <https://ablis.business.gov.au/search/customsearch#>
- Australian Business Licence and Information Service, 2017, custom search 'demolition,' accessed on 16/01/2017 at <https://ablis.business.gov.au/search/customsearch#>
- Australian Business Licence and Information Service, 2017, custom search 'plumbing,' accessed on 16/01/2017 at <https://ablis.business.gov.au/search/customsearch#>,
- Australian Business Licence and Information Service, 2017, custom search 'rigging,' accessed on 17/01/2017 at <https://ablis.business.gov.au/search/customsearch#>
- Australian Industry Group, Economics Research, July 2015, *Australia's Construction Industry: Profile and Outlook*

- Australian Industry and Skills Committee 2016, *Future Skills and Training: A practical resource to help identify future skills and training*, accessed online on 11/01/2018 at:  
<https://www.aisc.net.au/sites/aisc/files/documents/Future%20Priority%20Skills%20Resource.pdf>
- Azhar, S et al. (2012) 'Building information modelling (BIM): now and beyond', *Australasian Journal of Construction Economics and Building*, 12 (4) 15-28
- Bryne, C., 2015, *Building Information Modelling in Australia: Lesson from the UK*, ISS Institute Inc, accessed online 01/02/2018 at: <http://www.issinstitute.org.au/wp-content/media/2015/05/Report-Byrne-FINAL-LowRes.pdf>
- Construction and Property Services Industry Skills Council, 2014, *Environmental Scan 2014-15*
- Construction Training Fund, 2014, *Impact of New Technologies on the Construction Industry*, accessed online 18/01/2018 at:  
[https://bcitf.org/upload/documents/research\\_reports/ImpactofNewTechnologyontheConstructionIndustry.pdf](https://bcitf.org/upload/documents/research_reports/ImpactofNewTechnologyontheConstructionIndustry.pdf)
- Dodge Data & Analytics, 2016, *World Green Building Trends 2016: Developing Markets Accelerate Global Green Growth*, accessed online 19/01/2018 at:  
<http://www.worldgbc.org/sites/default/files/World%20Green%20Building%20Trends%202016%20SmartMarket%20Report%20FINAL-2.pdf>
- Electrical Regulatory Authorities Council, *Licensing*, accessed on 16/01/2017 at  
[http://www.erac.gov.au/index.php?option=com\\_content&view=category&layout=blog&id=79&Itemid=515](http://www.erac.gov.au/index.php?option=com_content&view=category&layout=blog&id=79&Itemid=515)
- Foundation for Young Australians, 2015, *The New Work Order: Ensuring young Australians have skills and experience for the jobs of the future, not the past*, accessed online 06/02/2018 at:  
<https://www.fya.org.au/wp-content/uploads/2015/08/fya-future-of-work-report-final-lr.pdf>
- Foundation for Young Australians, 2017, *The New Work Smarts: Thriving in the New Work Order*, accessed online 08/02/2018 at: [https://www.fya.org.au/wp-content/uploads/2017/07/FYA\\_TheNewWorkSmarts\\_July2017.pdf](https://www.fya.org.au/wp-content/uploads/2017/07/FYA_TheNewWorkSmarts_July2017.pdf)
- Green Building Council of Australia, 2018, *What is Green Building?*  
<https://www.gbca.org.au/about/what-is-green-building/>
- IBISWorld, October 2017, *Australia Industry Reports, Construction*, accessed online at  
<http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>
- IBISWorld, 2017, *Industry Report on House Construction in Australia*, accessed online at  
<http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>
- IBISWorld, 2017, *Industry Report on Multi-Unit Apartment and Townhouse Construction in Australia*, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Institutional Building Construction in Australia, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Commercial and Industrial Building Construction in Australia, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Australia Industry Report on Land Division and Subdivision in Australia, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Australia Industry Report on Site Preparation in Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Concreting Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Bricklaying Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Roofing Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Structural Steel Erection Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Plumbing Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Electrical Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Air Conditioning and Heating Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Fire and Security Alarm Installation Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Plastering and Ceiling Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Carpentry Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Tiling and Carpeting Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>

IBISWorld, 2017, Industry Report on Painting and Decorating Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>



- IBISWorld, 2017, Industry Report on Glazing Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>
- IBISWorld, 2017, Industry Report on Construction Machinery and Operator Hire, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>
- IBISWorld, 2017, Industry Report on Metal Cladding, Waterproofing and Scaffolding Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>
- IBISWorld, 2017, Industry Report on Landscaping Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>
- IBISWorld, 2017, Industry Report on Architectural Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>
- IBISWorld, 2017, Industry Report on Engineering Consulting, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>
- IBISWorld, 2017, Industry Report on Specialised Design Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>
- IBISWorld, 2017, Industry Report on Surveying and Mapping Services, accessed online at <http://clients1.ibisworld.com.au/reports/au/industry/home.aspx>
- Jadhav, NY, 2016, Green and Smart Buildings, Springer, Singapore
- Labour Market Information Portal, 2017, *Construction*, accessed online 12/01/18 at <http://lmip.gov.au/default.aspx?LMIP/GainInsights/IndustryInformation/Construction>
- Labour Market Information Portal, 2017, *2017 Employment Projections, Industry Employment Projections – five years to May 2022 table*, accessed online 12/01/18 at <http://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>
- Labour market Information Portal, 2017, *Employment Projections, 2017 Occupational Projections – five years to May 2022 table*, accessed online 17/01/2018 at: <http://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>
- McGraw Hill Construction, 2014, Pre-fabrication and Modularization: increasing productivity in the construction industry, accessed online 06/02/2018 at: <https://www.nist.gov/sites/default/files/documents/el/economics/Prefabrication-Modularization-in-the-Construction-Industry-SMR-2011R.pdf>
- PrefabAUS, 2018, *What is Prefab*, accessed online 06/02/2018 at: <http://www.prefabaus.org.au/what-is-prefab/>
- PWC, 2015, *A Smart Move: Future-proofing Australia's workforce by growing skills in science, technology, engineering and maths (STEM)*, accessed online 19/01/2018 at <https://www.pwc.com.au/pdf/a-smart-move-pwc-stem-report-april-2015.pdf>

Quezada G, Bratanova A, Boughen N, and Hajkowicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.

Senate Economic References Committee (6 September 2017), *Non-conforming Building Products Inquiry: Interim Report – Aluminium composite cladding*, p.7, accessed 18/04/2018.

StartupAUS, 2017, *Digital Foundations: How technology is transforming Australia's construction sector*, accessed online 01/02/2018 at <https://startupaus.org/document/constructiontech/>

UNSW, 2016, *Demonishing gender structures*, accessed online 18/04/2018 at [http://www.csi.edu.au/media/Construction\\_Booklet\\_FINAL2.pdf](http://www.csi.edu.au/media/Construction_Booklet_FINAL2.pdf)

World Business Council for Sustainable Development, 2009, *Energy Efficiency in Buildings: Transforming the Market*, accessed online 02/02/2018 at <http://www.wbcsd.org/Projects/Energy-Efficiency-in-Buildings/Resources/Transforming-the-Market-Energy-Efficiency-in-Buildings>

Watson, M. (2012), *Concerns for skills shortages in the 21st century: A review into the construction industry, Australia*, *The Australian Journal of Construction Economics and Building*, Vol. 7(1), pp. 45–54.

# Appendix A: Units of Competency for Proposed Projects

**Project 1 Building and Construction – 61 total units**

**Project 2 Qualification Streamlining – 41 total units**

**Project 3 Remote Area Building and Repairs and Maintenance - TBD**

Project	Code	Title
Project 1 -Building and Construction	CPCBC4001A	Apply building codes and standards to the construction process for low rise building projects
Project 1 -Building and Construction	CPCBC4002A	Manage occupational health and safety in the building and construction workplace
Project 1 -Building and Construction	CPCBC4003A	Select and prepare a construction contract
Project 1 -Building and Construction	CPCBC4004A	Identify and produce estimated costs for building and construction projects
Project 1 -Building and Construction	CPCBC4005A	Produce labour and material schedules for ordering
Project 1 -Building and Construction	CPCBC4006B	Select, procure and store construction materials for low rise projects
Project 1 -Building and Construction	CPCBC4007A	Plan building or construction work
Project 1 -Building and Construction	CPCBC4008B	Conduct on-site supervision of building and construction projects
Project 1 -Building and Construction	CPCBC4009B	Apply legal requirements to building and construction projects
Project 1 -Building and Construction	CPCBC4010B	Apply structural principles to residential low rise constructions
Project 1 -Building and Construction	CPCBC4011B	Apply structural principles to commercial low rise constructions
Project 1 -Building and Construction	CPCBC4012B	Read and interpret plans and specifications
Project 1 -Building and Construction	CPCBC4013A	Prepare and evaluate tender documentation
Project 1 -Building and Construction	CPCBC4014A	Prepare simple building sketches and drawings
Project 1 -Building and Construction	CPCBC4015A	Prepare specifications for all construction works
Project 1 -Building and Construction	CPCBC4016A	Administer a construction contract
Project 1 -Building and Construction	CPCBC4017A	Arrange resources and prepare for the building or construction project
Project 1 -Building and Construction	CPCBC4018A	Apply site surveys and set-out procedures to building and construction projects
Project 1 -Building and Construction	CPCBC4019A	Apply sustainable building design principles to water management systems

<b>Project</b>	<b>Code</b>	<b>Title</b>
Project 1 -Building and Construction	CPCCB4020A	Build thermally efficient and sustainable structures
Project 1 -Building and Construction	CPCCB4021A	Minimise waste on the building and construction site
Project 1 -Building and Construction	CPCCB4022A	Supervise tilt-up work
Project 1 -Building and Construction	CPCCB4024A	Resolve business disputes
Project 1 -Building and Construction	CPCCB4025A	Manage personal work priorities and professional development
Project 1 -Building and Construction	CPCCB4026A	Arrange building applications and approvals
Project 1 -Building and Construction	CPCCB4030A	Analyse and communicate industry information
Project 1 -Building and Construction	CPCCB4031A	Process client requirements
Project 1 -Building and Construction	CPCCB4032A	Apply contract law to sales processes
Project 1 -Building and Construction	CPCCB4033A	Maintain the sales environment
Project 1 -Building and Construction	CPCCB4034A	Apply codes and standards to building trade and services contracting
Project 1 -Building and Construction	CPCCB4035A	Initiate the heritage works process
Project 1 -Building and Construction	CPCCB4036A	Prepare to undertake the heritage restoration process
Project 1 -Building and Construction	CPCCB4037A	Prepare drawings for heritage works
Project 1 -Building and Construction	CPCCB4039A	Undertake the heritage restoration process
Project 1 -Building and Construction	CPCCB4040A	Prepare report for heritage restoration work
Project 1 -Building and Construction	CPCCB4041A	Undertake preparations for refractory work
Project 1 -Building and Construction	CPCCB4042A	Construct a fire brick wall and arch using refractory materials
Project 1 -Building and Construction	CPCCB5002A	Monitor costing systems on medium rise building and construction projects
Project 1 -Building and Construction	CPCCB5003A	Supervise the planning of on-site medium rise building or construction work
Project 1 -Building and Construction	CPCCB5004A	Supervise and apply quality standards to the selection of building and construction materials
Project 1 -Building and Construction	CPCCB5005A	Select and manage building and construction contractors
Project 1 -Building and Construction	CPCCB5007B	Administer the legal obligations of a building or construction contract
Project 1 -Building and Construction	CPCCB5011A	Manage environmental management practices and processes in building and construction
Project 1 -Building and Construction	CPCCB5012A	Manage the application and monitoring of energy conservation and management practices and processes

<b>Project</b>	<b>Code</b>	<b>Title</b>
Project 1 -Building and Construction	CPCCB5013A	Develop professional technical and legal reports on building and construction projects
Project 1 -Building and Construction	CPCCB6001B	Apply building codes and standards to the construction process for large building projects
Project 1 -Building and Construction	CPCCB6002A	Generate and direct the development of new projects
Project 1 -Building and Construction	CPCCB6003A	Establish, maintain and review contract administration procedures and frameworks
Project 1 -Building and Construction	CPCCB6005A	Manage tender developments for major projects
Project 1 -Building and Construction	CPCCB6006A	Manage the procurement and acquisition of resources for building or construction projects
Project 1 -Building and Construction	CPCCB6007A	Develop, plan and implement appropriate building or construction environmental management practices and processes
Project 1 -Building and Construction	CPCCB6008A	Develop and implement an appropriate estimating and tendering system
Project 1 -Building and Construction	CPCCB6009A	Develop, plan and implement an appropriate building or construction planning process
Project 1 -Building and Construction	CPCCB6010A	Plan, develop and implement building or construction energy conservation and management practices and processes
Project 1 -Building and Construction	CPCCB6011A	Establish systems to develop and monitor building and construction costs
Project 1 -Building and Construction	CPCCB6012A	Manage and administer development of documentation for building or construction projects
Project 1 -Building and Construction	CPCCB6013A	Evaluate materials for multi-storey buildings
Project 1 -Building and Construction	CPCCB6014A	Apply structural principles to the construction of large, high rise and complex buildings
Project 1 -Building and Construction	CPCCB6016A	Assess construction faults in large building projects
Project 1 -Building and Construction	CPCCB6017A	Evaluate services layout and connection methods for the planning of large building projects
Project 1 -Building and Construction	CPCCB6018A	Manage processes for complying with legal obligations of a building or construction contractor
Project 2 - Qualification Streamline	<b>CPC30812 Certificate III in Roof Tiling</b>	
Project 2 - Qualification Streamline	CPCCR2001A	Handle roof tiling materials
Project 2 - Qualification Streamline	CPCCR2002A	Use roof tiling tools and equipment
Project 2 - Qualification Streamline	CPCCR3001A	Tile regular roofs
Project 2 - Qualification Streamline	CPCCR3002A	Tile irregular roofs
Project 2 - Qualification Streamline	CPCCR3003B	Repair and replace valleys, valley irons and flashings
Project 2 - Qualification Streamline	CPCCR3004B	Repair and renovate tile roofs

<b>Project</b>	<b>Code</b>	<b>Title</b>
Project 2 - Qualification Streamline	CPCCRT3005B	Slate a roof
Project 2 - Qualification Streamline	CPCCRT3006B	Fix shingles to roofs and facades
Project 2 - Qualification Streamline	<b>CPC31211 Certificate III in Wall and Ceiling Lining</b>	
Project 2 - Qualification Streamline	CPCCCWC3001A	Install and finish plasterboard and fibre cement sheeting to curved walls and ceilings
Project 2 - Qualification Streamline	CPCCCWC3002A	Install and finish plasterboard and fibre cement sheeting to arches
Project 2 - Qualification Streamline	CPCCCWC3003A	Install dry wall passive fire-rated systems
Project 2 - Qualification Streamline	CPCCCWC3004A	Install suspended ceilings
Project 2 - Qualification Streamline	CPCCCWC2001A	Complete penetrations and flashings
Project 2 - Qualification Streamline	<b>CPC31311 Certificate III in in Wall and Floor Tiling</b>	
Project 2 - Qualification Streamline	CPCCCWF2001A	Handle wall and floor tiling materials
Project 2 - Qualification Streamline	CPCCCWF2002A	Use wall and floor tiling tools and equipment
Project 2 - Qualification Streamline	CPCCCWF3001A	Prepare surfaces for tiling application
Project 2 - Qualification Streamline	CPCCCWF3002A	Fix floor tiles
Project 2 - Qualification Streamline	CPCCCWF3003A	Fix wall tiles
Project 2 - Qualification Streamline	CPCCCWF3004A	Repair wall and floor tiles
Project 2 - Qualification Streamline	CPCCCWF3005A	Carry out decorative tiling
Project 2 - Qualification Streamline	CPCCCWF3006A	Carry out mosaic tiling
Project 2 - Qualification Streamline	CPCCCWF3007A	Tile curved surfaces
Project 2 - Qualification Streamline	CPCCCWF3008A	Tile domestic pools and spas
Project 2 - Qualification Streamline	<b>CPC31411 Construction Waterproofing</b>	
Project 2 - Qualification Streamline	CPCCCWP2001A	Handle waterproofing materials
Project 2 - Qualification Streamline	CPCCCWP2002A	Use waterproofing tools and equipment
Project 2 - Qualification Streamline	CPCCCWP2003A	Prepare for construction waterproofing process
Project 2 - Qualification Streamline	CPCCCWP2004A	Prepare surfaces for waterproofing application
Project 2 - Qualification Streamline	CPCCCWP3001A	Apply waterproofing process to below ground level wet areas
Project 2 - Qualification Streamline	CPCCCWP3002A	Apply waterproofing process to internal wet areas

<b>Project</b>	<b>Code</b>	<b>Title</b>
Project 2 - Qualification Streamline	CPCCW3003A	Apply waterproofing process to external wet areas
Project 2 - Qualification Streamline	CPCCW3004A	Apply waterproofing remedial processes
Project 2 - Qualification Streamline	<b>CPC31011 Certificate III in Solid Plastering</b>	
Project 2 - Qualification Streamline	CPCCS2001A	Handle solid plastering materials
Project 2 - Qualification Streamline	CPCCS2002A	Use solid plastering tools and equipment
Project 2 - Qualification Streamline	CPCCS2003A	Prepare surfaces for plastering
Project 2 - Qualification Streamline	CPCCS3001A	Apply float and render to straight and curved surfaces
Project 2 - Qualification Streamline	CPCCS3002A	Apply set coats
Project 2 - Qualification Streamline	CPCCS3004A	Restore and renovate solid plasterwork
Project 2 - Qualification Streamline	CPCCS3003A	Apply trowelled texture coat finishes
Project 2 - Qualification Streamline	CPCCS3005A	Install pre-cast decorative mouldings
Project 2 - Qualification Streamline	CPCCS3006A	Install cast plaster blockwork
Project 2 - Qualification Streamline	CPCCS3007A	Apply plaster by projection machine
Project 2 - Qualification Streamline	<b>CPC40808 Certificate IV in Swimming Pool and Spa (Units applicable to this project live in the Building and Construction qualifications/project)</b>	
Project 3 - 1039NAT	<b>Remote Area Building Repairs and Maintenance (Unit count and suitability to be still determined)</b>	