

artibus

INNOVATION

Developing industry skills

Construction, Plumbing and Services

IRC Skills Forecast and Proposed Schedule of Work

Version: 1.0

Date: 12 March 2019



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 and Proposed Schedule of Work	2
Administrative Information	2
Sector Overview	3
CPC Construction, Plumbing and Services Industry Sub-Sectors	3
Peak Bodies and Associations	8
Construction, Plumbing and Services Qualifications	9
Challenges and Opportunities	11
Employment and Skills Outlook	13
Employment Outlook	13
Skill Shortages	14
Ranking of 13 Generic Workforce Skills	15
Key Drivers for Change	16
Social drivers for change in the construction industry	16
Technological drivers of change in the construction industry	19
Economic drivers for change in the construction industry	22
Environmental drivers for change in the construction industry	24
Educational drivers for change in the construction industry	25
Political drivers for change in the construction industry	26
Proposed Responses and Risks of Not Proceeding	27
Consultation Undertaken	29
Proposed Schedule of Work	33
2019-2020 Project Details	35
IRC Sign Off	57
References	58

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. It employs close to 1.2 million people and has the largest number of small businesses, 346,500¹, of all industries in Australia. The construction industry is projected to grow by 2.4%² 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 in the process of being substantially updated across every qualification. The industry is experiencing a range of skill shortages and workplace changes, and the training package updates will go some way to alleviating these challenges. The industry's macro challenges are an ageing workforce, new technologies and processes, regulation and compliance, and an increased demand for smart and green construction.

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, the training package must prepare both current workers and new entrants with the skills to manage these technologies efficiently and effectively.

Proposed Schedule of Work

2019-2020 will see the focus of the IRC's work shift from updating its training package to commence a new phase of development focusing on emerging needs. This skill forecast proposes work being undertaken in the following:

- areas highlighted as problematic by the Building Ministers Forum's report into compliance in the Building Industry³ e.g. Building Surveying and Building Information Modelling
- gaps in the current training package e.g. commercial waterproofing
- qualifications due for review through a four-year cycle e.g. shopfitting and signs and graphics
- qualifications requiring updating because of content updates in other parts of the training package e.g. concreting.

The proposed schedule follows consultation with the IRC, employers, industry representatives, regulators and registered training organisations across Australia.

¹ IBISWorld: Industry at a Glance: <http://clients1.ibisworld.com.au/reports/au/industry/ataglance.aspx?entid=306>.

² IBISWorld: Industry at a Glance: <http://clients1.ibisworld.com.au/reports/au/industry/ataglance.aspx?entid=306>.

³ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*.

Skills Forecast and Proposed Schedule of Work

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 buildings and non-residential buildings and structures, the installation and repairs of plumbing as well as additions, alterations, maintenance and repair, and demolition of buildings.⁴

This industry is a significant driver of economic activity in Australia. The construction sector produces around 9% of Australia's Gross Domestic Product,⁵ as it generates \$367.2 billion in revenue and is projected to grow at an annual rate of 2.4% in the next five years (2019-2024).⁶ At the end of the financial year 2016-2017, the construction sector had the highest number of businesses operating in Australia, with a count of 346,500.⁷

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.⁸ The top four companies in the construction sector make up less than 10% of the available market share⁹, and the top four companies in the plumbing sector make up less than 5% of the market share.¹⁰ Approximately 99% of the workforce in the industry is employed in the private sector¹¹ and most businesses are Australian owned with their sales occurring predominately in the domestic market.¹²

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.¹³

In residential construction, the four largest home building companies (Metricon, ABN Group, BGC and Simonds Homes) contribute to less than 10% of annual industry revenue¹⁴ and in apartment and townhouse construction, the four largest companies are expected to account for less than 20% of industry revenue in 2018-19 (Probuild, Multiplex (BHCA), Meriton Apartments, Dylam).¹⁵ Businesses

⁴ Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

⁵ Australian Industry Group, Economics Research, July 2015, *Australia's Construction Industry: Profile and Outlook*

⁶ IBISWorld: Industry at a Glance: <http://clients1.ibisworld.com.au/reports/au/industry/ataglance.aspx?entid=306>.

⁷ Ibid (p4).

⁸ Ibid.

⁹ Ibid (p6).

¹⁰ IBIS World: Australia Industry Reports, Plumbing Services:

<http://clients1.ibisworld.com.au/reports/au/industry/competitivelandscape.aspx?entid=324#BTE> (p20)

¹¹ Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly, November 2018, Table 27. Employed Persons by Sector (public/private) and Industry Division of Main Job.

¹² 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>

¹³ Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

¹⁴ IBISWorld, 2017, Industry Report E3011 House Construction in Australia, p.20.

¹⁵ IBISWorld, 2018, Industry Report E3019 on Multi-Unit Apartment and Townhouse Construction in Australia, p.21.

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.¹⁶ Typically, businesses in the industry operate in narrow regional markets.¹⁷

The non-residential building construction industry operates in areas such as industrial, commercial and institutional building construction. The four largest companies generate less than 20% of annual revenue for commercial and industrial building (LendLease, Multiplex, CIMIC Group and Probuild Contractors) and the four largest companies in commercial building generate less than 10% of industry revenue (CIMIC Group, Lendlease, CCCI and BHCA Pty Limited).¹⁸ The industry is characterised by small-scale businesses, though it also contains some of the country's largest building firms.¹⁹ While the industry sector has a significant amount of foreign ownership, the industry is still mostly Australian owned.²⁰

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.²¹

Land Development and Site Preparation

Businesses in Land Development primarily subdivide and amalgamate land into lots as well as prepare and service land for sale.²² 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.²³ This sector also includes businesses that hire out earthmoving equipment.²⁴

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.²⁵ 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.²⁶

In contrast to other sectors of 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.²⁷

¹⁶ Ibid

¹⁷ Ibid

¹⁸ IBISWorld, 2018, Industry Report E3022 Institutional Building Construction in Australia, p.21.

IBISWorld, 2018, Industry Report E3021 Commercial and Industrial Building Construction in Australia, p.19.

¹⁹ IBISWorld, 2018, Industry Report E3021 Commercial and Industrial Building Construction in Australia, p.19.

²⁰ IBISWorld, 2018, Industry Report E3022 Institutional Building Construction in Australia, p.25.

²¹ IBISWorld, 2018, Industry Report E3011 House Construction in Australia.

IBISWorld, 2018, Industry Reports E3019 Multi-Unit Apartment and Townhouse Construction in Australia.

²² IBISWorld, 2018, Industry Report E3211 Land Development and Subdivision in Australia, p.4.

²³ IBISWorld, 2018, Industry Report E3212 Site Preparation Services in Australia, p.2.

²⁴ Ibid

²⁵ IBISWorld, 2018, Industry Report E321 Land Development and Subdivision in Australia, p.19.

²⁶ IBISWorld, 2018, Industry Report E3212 Site Preparation Services in Australia, p.26.

²⁷ Ibid, p.26.

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.²⁸ 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.²⁹ In terms of worker 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.³⁰ For demolition work, different licences, permits and notifications are also required in different states and territories.³¹

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.³²

The Building Structure Services industry is also characterised by small-scale businesses, often with less than 20 employees.³³ 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.³⁴

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.³⁵ 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.³⁶

²⁸ IBISWorld, 2018, Industry Report E3211 Land Development and Subdivision in Australia, p.28.

²⁹ Ibid, p.28.

³⁰ IBISWorld, 2018, Industry Report E3212 Site Preparation Services in Australia, p.31.

³¹ Australian Business Licence and Information Service, 2017, custom search 'demolition,' accessed on 16/01/2017 at <https://ablis.business.gov.au/search/customsearch#>

³² Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006, and IBISWorld, 2018, Industry Reports E3221 Concreting in Australia, E3222 Bricklaying in Australia, E3223 Roofing in Australia, and E3224 Structural Steel Erection Services in Australia, p.2.

³³ IBISWorld, 2018, Industry Reports E3221 Concreting in Australia, p.18, E3222 Bricklaying in Australia, p. 17, E3223 Roofing in Australia, p.17, and E3224 Structural Steel Erection Services in Australia, p.19.

³⁴ Ibid

³⁵ IBISWorld, 2018, Industry Reports E3221 Concreting in Australia, p.27, E3222 Bricklaying in Australia, p. 24, E3223 Roofing in Australia, p.26, and E3224 Structural Steel Erection Services in Australia, p.28.

³⁶ IBISWorld, 2017, Industry Reports E3222 Bricklaying in Australia, p. 24, and E3223 Roofing in Australia, p.26.

Building Installation Services

This sector involves construction work such as plumbing and drainage installation, and repair, air conditioning and heating installation and fire and security alarm testing.³⁷ 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.³⁸ The plumbing sector alone generates approximately \$14.7 billion in revenue and is expected to have an annual growth rate of 2.2% in the next five years.³⁹
2. The Fire and Security Alarm industry installs and repairs security systems and fire protection, detection and control systems.⁴⁰ 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 repairing and maintaining existing electrical equipment and fixtures.⁴¹ 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.⁴² This industry is also covered by the Electrotechnology Training Package.

The Building Installation Services sector is characterised by small-scale businesses that work in local areas.⁴³ 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).⁴⁴

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.⁴⁵ 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.⁴⁶

³⁷ Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

³⁸ IBISWorld, 2018, Industry Report E3231 Plumbing Services in Australia, p.2.

³⁹ IBISWorld, 2018, Industry Report E3231 Plumbing Services in Australia, p.5.

⁴⁰ IBISWorld, 2018, Industry Report E3234 Fire and Security Alarm Services in Australia, p.2.

⁴¹ IBISWorld, 2018, Industry Report E3232 Electrical Services in Australia, p.2.

⁴² IBISWorld, 2018, Industry Report E3233 Air Conditioning and Heating Services in Australia, p.2.

⁴³ IBISWorld, 2018, Industry Reports E3231 Plumbing Services in Australia, p.4., E3232 Electrical Services in Australia, p.4., E3233 Air Conditioning and Heating Services in Australia, p.4., and E3234 Fire and Security Alarm Services in Australia, p.5.

⁴⁴ IBISWorld, 2018, Industry Report E3234 Fire and Security Alarm Services in Australia, p. 19.

⁴⁵ Australian Business Licence and Information Service, 2018, custom search 'plumbing,' accessed on 16/01/2018 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

⁴⁶ IBISWorld, 2018, Industry Report E3234 Fire and Security Alarm Services in Australia, p.30.

Building Completion Services

The Building Completion Services sector involves work that ‘finishes’ a building such as plastering, carpentry, tiling, painting and decorating and glazing.⁴⁷ Glazing however, is covered in the Furnishing Training Package.

The Building Completion Services sector is also characterised by small scale businesses, often with less than 20 employees or consisting of individual contractors.⁴⁸ Businesses generally work in local or specialised niche markets with few businesses operating in more than one state or territory.⁴⁹

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.⁵⁰

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.⁵¹ Landscape Construction Services⁵² such as planting, land forming, building retaining walls and paths, installation of garden drainage and watering systems as well as the Hire of Construction Machinery are also classified under Other Construction Services.⁵³

These sectors are typically characterised by small-scale businesses that operate at the local level.⁵⁴ 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.⁵⁵

Across this sector, licensing requirements vary depending on the type of work. In the Construction Machinery sub sector 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.⁵⁶ In the Metal Cladding, Waterproofing and Scaffolding industry, contractors are

⁴⁷ Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

⁴⁸ IBISWorld, 2018, Industry Reports E3241 Plastering and Ceiling Services in Australia, E3242 Carpentry Services in Australia, E3243 Tiling and Carpeting Services in Australia, E3244 Painting and Decorating Services in Australia, and E3245 Glazing Services in Australia.

⁴⁹ Ibid

⁵⁰ IBISWorld, 2018, Industry Reports E3241 Plastering and Ceiling Services in Australia, E3242 Carpentry Services in Australia, E3243 Tiling and Carpeting Services in Australia.

⁵¹ Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

⁵² This is covered by the Agriculture, Horticulture and Conservation and Land Management Training Package, not the Construction, Plumbing and Services Training Package

⁵³ IBISWorld, 2018, Industry Reports E3291 Landscaping Services, E3292 Construction Machinery and Operator Hire, and E3299 Metal Cladding, Waterproofing and Scaffolding Services in Australia.

⁵⁴ Ibid

⁵⁵ IBISWorld, 2018, Industry Report E3299 Metal Cladding, Waterproofing and Scaffolding Services in Australia, p. 18-22.

⁵⁶ IBISWorld, 2018, Industry Report E3292 Construction Machinery and Operator Hire in Australia.

required to have high-risk work licensees for scaffolding and rigging.⁵⁷ However, many other services do not require formal qualifications or licensees.⁵⁸

Architectural, Engineering and Technical Services

This sector includes designing buildings and structures, surveying and mapping services and sign writing.⁵⁹ 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.⁶⁰ This sector is mostly within the coverage of the Property Services IRC, although the CPC training package includes qualifications 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, Maritime, 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

⁵⁷ Australian Business Licence and Information Service, 2018, custom search 'rigging,' accessed on 17/01/2018 at <https://ablis.business.gov.au/search/customsearch#>

⁵⁸ IBISWorld, 2018, Industry Report E3299 Metal Cladding, Waterproofing and Scaffolding Services in Australia

⁵⁹ Australian Bureau of Statistics: 129.0 Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006

⁶⁰ IBISWorld, 2018, Industry Reports M6921 Architectural Services and M6923 Engineering Consulting in Australia

Construction, Plumbing and Services Qualifications

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

Residential Building and Non-Residential Building Construction	No. of Enrolments 2017⁶¹	No. of Completions 2017⁶² **
CPC10111 Certificate I in Construction	42,600	5,244
CPC20112 Certificate II in Construction	2,834	1,029
CPC20211 Certificate II in Construction Pathways	23,689	3,318
CPC40110 Certificate IV in Building and Construction (Building)	22,319	5,848
CPC40208 Certificate IV in Building and Construction (Contract Administration)	367	109
CPC40308 Certificate IV in Building and Construction (Estimating)	653	180
CPC40408 Certificate IV in Building and Construction (Sales)	0	0
CPC40508 Certificate IV in Building and Construction (Site Management)	336	107
CPC40611 Certificate IV in Building and Construction (Specialist Trades)	6	0
CPC40708 Certificate IV in Building and Construction (Trade Contracting)	6	0
CPC50210 Diploma of Building and Construction (Building)	11,965	2,243
CPC50308 Diploma of Building and Construction (Management)	966	166
CPC60212 Advanced Diploma of Building and Construction (Management)	340	112
Land Development and Site Preparation		
CPC10111 Certificate I in Construction	42,600	5,244
CPC20112 Certificate II in Construction	2,834	1,029
CPC20211 Certificate II in Construction Pathways	23,689	3,318
CPC30413 Certificate III in Demolition	422	182
CPC41013 Certificate IV in Demolition	202	66
Building Structure Services		
CPC10111 Certificate I in Construction	42,600	5,244
CPC20112 Certificate II in Construction	2,834	1,029
CPC20211 Certificate II in Construction Pathways	23,689	3,318
CPC20812 Certificate II in Metal Roofing and Cladding	284	65
CPC30111 Certificate III in Bricklaying/Blocklaying	3,671	755
CPC32313 Certificate III in Stonemasonry (Monumental/Installation)	388	90

⁶¹ NCVET, 2019, VOCSTATS Portal – Total VET program enrolments, accessed online on 19/02/2019 at: <http://vocstats.ncver.edu.au/>

⁶² NCVET, 2019, VOCSTATS Portal – Total VET program completions, accessed online on 19/02/2019 at: <http://vocstats.ncver.edu.au/>

CPC30313 Certificate III in Concreting	2,034	537
CPC30812 Certificate III in Roof Tiling	753	163
CPC31111 Certificate III in Steel Fixing	87	52
CPC31611 Certificate III in Paving	0	0
Building Installation Services		
CPC20712 Certificate II in Drainage	102	26
CPC20912 Certificate II in Urban Irrigation	2	0
CPC32413 Certificate III in Plumbing	16,602	2,257
CPC32513 Certificate III in Plumbing (Mechanical Services)	66	5
CPC32612 Certificate III in Roof Plumbing	1,219	288
CPC32713 Certificate III in Gas Fitting	302	21
CPC40912 Certificate IV in Plumbing and Services	5,242	694
CPC50412 Diploma of Plumbing and Services	N/A*	N/A*
CPC50612 Diploma of Hydraulic Services Design	140	16
CPC32813 Certificate III in Fire Protection	808	113
CPC50509 Diploma of Fire Systems Design	101	6
CPC80115 Graduate Certificate in Fire Systems Design Management	N/A*	N/A*
Building Completion Services		
CPC10111 Certificate I in Construction	42,600	5,244
CPC20112 Certificate II in Construction	2,834	1,029
CPC20211 Certificate II in Construction Pathways	23,689	3,318
CPC30211 Certificate III in Carpentry	30,257	5,336
CPC30611 Certificate III in Painting and Decorating	4,390	947
CPC31011 Certificate III in Solid Plastering	473	145
CPC31211 Certificate III in Wall and Ceiling Lining	2,326	439
CPC31511 Certificate III in Formwork/Falsework	606	121
CPC31311 Certificate III in Wall and Floor Tiling	2,827	609
CPC30116 Certificate III in Shop fitting	311	2
CPC31912 Certificate III in Joinery	505	104
CPC32011 Certificate III in Carpentry and Joinery	2,555	489
CPC32211 Certificate III in Joinery (Stairs)	12	1
Other Construction Services		

CPC30511 Certificate III in Dogging	4,253	22
CPC30711 Certificate III in Rigging	1,774	115
CPC30911 Certificate III in Scaffolding	1,467	236
CPC31411 Certificate III in Construction Waterproofing	1,824	653
CPC31712 Certificate III in Post-Tensioning	0	0
CPC32912 Certificate III in Construction Crane Operations	13	0
CPC40808 Certificate IV in Swimming Pool and Spa Building	95	26
Architectural, Engineering and Technical Services		
CPC30216 Certificate III in Signs and Graphics	240	25
CPC60115 Advanced Diploma of Building Surveying	654	43
CPC80215 Graduate Diploma of Building Surveying	N/A*	N/A*

**no enrolment data found on NCVER/VOCSTATS website*

***completion numbers are not indicative of attrition, as qualification durations are typically longer than 12 months.*

Challenges and Opportunities

This section involves a brief overview of the challenges and opportunities in 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 construction industry will face some major challenges over the next few decades with an ageing workforce, introduction of new technologies, a downturn in the sector, demand for smart and green construction, and the need for better compliance and regulatory systems. These challenges have the potential to cause critical skills shortages as they impact materials, techniques and processes. They also emphasise the need for industry to be responsive in reskilling, upskilling and continuous professional development. These challenges also bring exciting growth opportunities for industry.

Ageing Workforce

The construction industry has aged in the last 20 years. Vital skills are at risk of being lost as proportionally fewer younger workers are replacing retiring workers. This then drives the need to retrain and upskill current workers. The ageing effect is particularly prevalent in the 30-50 age group.

Introduction of New Technologies

The introduction of new technologies such as automation, building information modelling (BIM), modular construction and pre-fabrication will continue to change construction processes, methods and jobs. This means the jobs of today are not necessarily the jobs of tomorrow. Most affected will be lower-skilled jobs that are routine in nature that computers or robotics will be able to perform tasks more efficiently than people.

Downturn in Sector

While demand and growth in the sector remains positive, construction is impacted by external factors such as the decline of the mining boom and changes to banking approvals of loans. Tighter lending by banks in response to the royal commission has influenced the capacity of builders, developers and investors to embrace risk and have sufficient confidence to engage apprentices and invest in training.

Demand for Smart and Green Construction

Buildings have a high carbon footprint and they account for around forty percent of global energy consumption. With increasing emphasis on climate change, sustainability and energy consumption, the smart and green construction industry is growing worldwide. Benefits of smart and green buildings include lower operating costs, increased value of buildings, higher rental and occupancy rates, and improved health and productivity of occupants. They also necessitate new knowledge and skills in occupational areas such as energy efficiency, new products and water conservation.

Compliance and Regulation

The emergence of a global building product supply chain has fuelled prosperity for the Australian construction sector. It has also raised unique challenges. The cause and effect of globalisation, procurement via the internet, reduced barriers to trade and increased competition has led to a unique set of problems regarding non-conforming building products that do not meet Australian Standards. The performance-based building and plumbing code for Australia known as the National Construction Code (NCC) references applicable Australian Standards. Recent publicised threats to public safety in the form of the Lacrosse (2014) and Neo200 (2019) fires and Opal Tower structural problems (2018) have raised the need for better conformity to the NCC in terms of compliance and regulatory systems.

The Opportunities

Digitalisation is rapidly changing the future of work. The implication of this for construction is two-fold:

1. The digital management of buildings, known as Building Information Modelling (BIM). BIM encapsulates the digital lifecycle of a building from the design, build, operational, and demolition stages. Its mandatory adoption in projects over \$50 million by the Queensland Government announced in 2018 signals its wider receptivity in Australia. Tier One companies have already been implementing BIM in high-rise buildings and have required sub-contractors to connect and interact with this technology.
2. Increased use of mobile devices for accessing construction information and business services.

Routine updating, review and maintenance of the training package means that Building Surveying qualifications are scheduled for review. This is very timely given the Building Minister's Forum and 'Shergold and Weir' report,⁶³ which outlined many limitations of the compliance systems that building surveyors are part of in Australia. Further related projects presented in this skills forecast relate to changes in the NCC, including concreting and commercial waterproofing.

⁶³ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*.

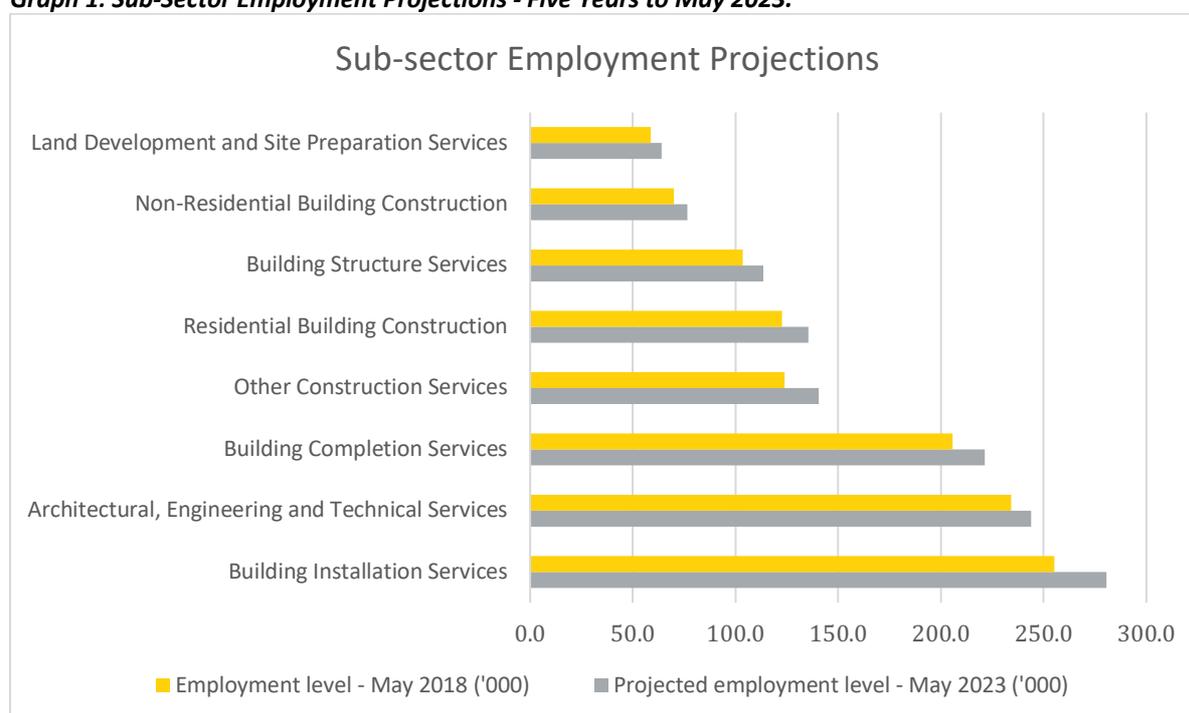
Employment and Skills Outlook

This section documents current and projected employment levels in the Construction, Plumbing and Services sector as well as current skills shortages.

Employment Outlook

The construction industry employs approximately 1,195,200 people in both full and part time capacities. This equates to around 9.4% of the total workforce in Australia and over the past five years, employment in the industry has increased by 19.6%.⁶⁴ The below graphs show the sub-sector and occupation employment projections for the next five years in the Construction, Plumbing and Services Sector.

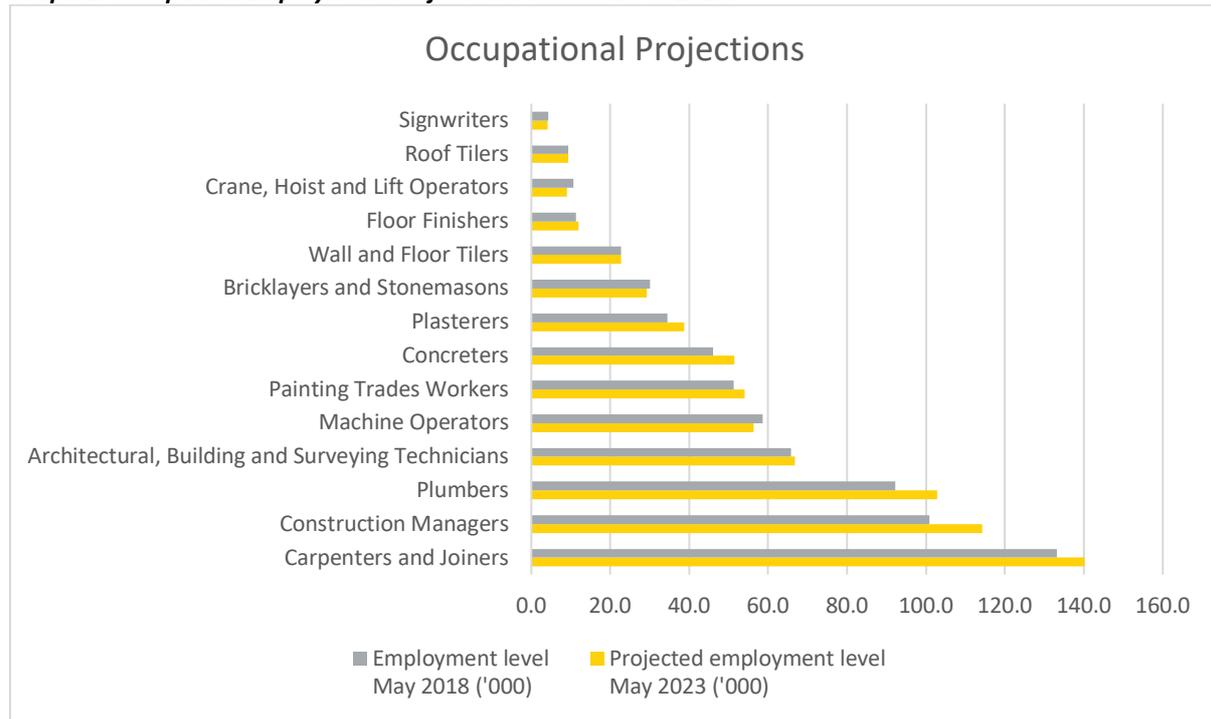
Graph 1: Sub-Sector Employment Projections - Five Years to May 2023.⁶⁵



⁶⁴ Australian Department of Employment, Labour Market Information Portal, *Construction* <http://lmip.gov.au/default.aspx?LMIP/GainInsights/IndustryInformation/Construction>

⁶⁵ Labour Market Information Portal, 2018, *2018 Employment Projections, Industry Employment Projections – five years to May 2023 table*, accessed online 12/02/19 at <http://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>

Graph 2: Occupation Employment Projections: Five Years to 2023.⁶⁶



Despite the projected growth in occupation and industry employment levels as shown in graphs 1 and 2, a downturn in the construction industry is predicted for 2019. This is as a result of a number of factors, such as the decline in mining, construction firm insolvencies, a decline in building approvals and tightening of lending by banks and other financial institutions.

This could lead to there being less work available for construction trades workers and labourers⁶⁷ and since the construction industry directly employs nearly 10 per cent of the nation's workforce and has supply chains in other sectors like retail, manufacturing and engineering, the economic impacts could be far reaching.⁶⁸ This issue is further explored in the key drivers for change section of this report.

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).⁶⁹ The following occupations have been listed as experiencing either a national or state-based skills shortage in 2017-2018:

- Building Associate (site supervisor)
- Construction Project Manager
- Bricklayer and Stonemason

⁶⁶ Ibid

⁶⁷ Ross, D, 29 September 2018, *Six months until construction bust*, News.com.au, accessed online 19/02/2019 at: <https://www.news.com.au/finance/economy/australian-economy/six-months-until-construction-bust/news-story/7d006500e9d76aaa33f4301223ae1743>

⁶⁸ Diss, K, 23 Dec 2018, *Subcontractors are the human face of a construction industry in crisis*, ABC News, accessed online 19/02/2019 at: <https://www.abc.net.au/news/2018-12-23/the-buck-stops-here-a-construction-industry-in-crisis/10638228>

⁶⁹ Australian Government Department of Jobs and Small Business, 2017, *Skill Shortages List - Australia*, accessed online 15/02/2019 at <https://www.jobs.gov.au/occupational-skill-shortages-information>

- Carpenter and Joiner
- Fibrous Plasterer
- Plumber
- Wall and Floor Tiler
- Painting Trades Worker
- Fibrous Plasterer
- Roof Tiler.

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 2019*. This question received 42 responses, and the results are presented in table 5.

Table 5 List of 13 Generic Workforce Skills in Order of Importance⁷⁰

13 GENERIC WORKFORCE SKILLS					
2019		Skill	2018	2017	2016
↑ 1	1	Language, Literacy and Numeracy (LLN)	2	1	6
↑ 5	2	Learning agility/Information literacy/Intellectual autonomy and self-management	7	5	12
↑ 1	3	Design mindset/Thinking critically/System thinking/Solving problems	4	3	5
↑ 5	4	Communication/Virtual collaboration/Social intelligence	9	7	11
-	5	Technology use and application	5	4	3
↑ 4	6	Science, Technology, Engineering & Maths (STEM)	10	12	8
↑ 4	7	Environmental and Sustainability	11	8	10
↓ 5	8	Customer service/Marketing	3	6	7
↓ 3	9	Financial	6	9	1
↑ 2	10	Data analysis	12	11	9
↓ 10	11	Managerial/Leadership	1	2	4
↓ 4	12	Entrepreneurial	8	10	2
N/A	13	Other (please specify)	13	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

⁷⁰ Artibus Innovation CPC Skills Forecast Survey 2019.

Key Drivers for Change

This section further explores the challenges and opportunities for the construction, plumbing and services sector. The key drivers for change are categorised according to the STEEP analysis model, which analyses emerging trends in relation to six key domains:

- Social
- Technological
- Environmental
- Economic
- Educational
- Political.

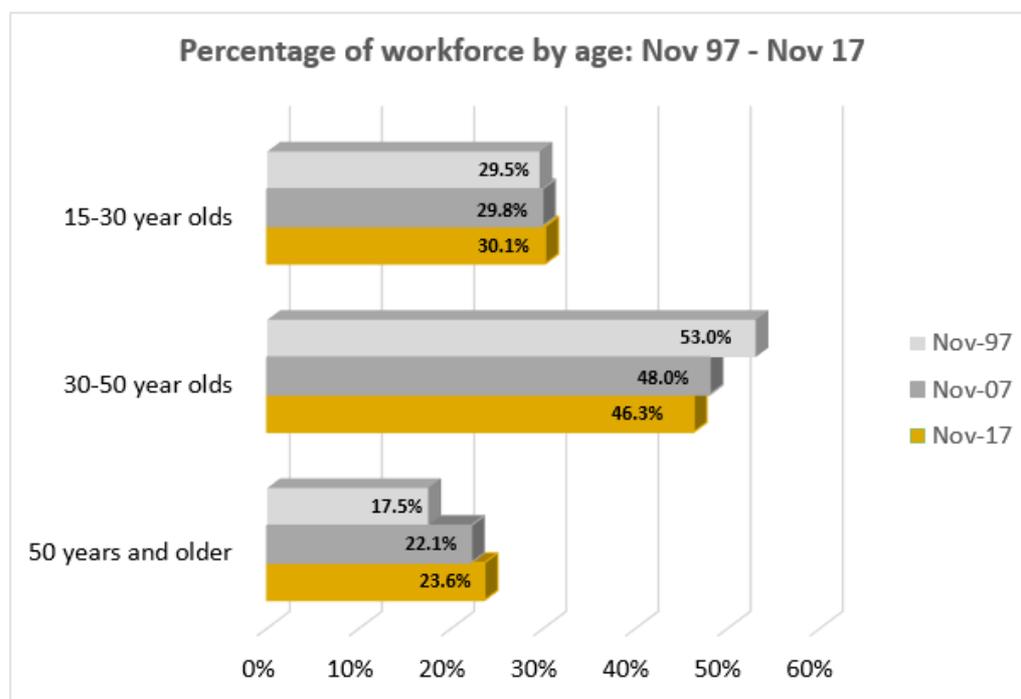
While some of the issues discussed below could be categorised in more than one STEEP domain, they are discussed in the domain that is most relevant to their impact on the construction industry.

Social drivers for change in the construction industry

An increase in older workers

The construction industry has become older in the last 20 years. The graph below 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 3: Percentage of workforce by age - Nov 97 - Nov 17.⁷¹



⁷¹ 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>

Graph 3 shows that the skill replacement gap is increasing. Skills that are vital to the industry are at risk of being lost as increasing amounts of workers retire with proportionally fewer younger workers in the industry to replace their skills.⁷² 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.⁷³ 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.⁷⁴

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.⁷⁵ The industry is likely to face increased competition from other industries for the potential apprentice workforce and needs to ensure that information about careers and training pathways are available for school aged people.

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.⁷⁶

Lack of gender diversity

The industry has traditionally been male dominated, and this is increasing. In 2006, women accounted for 17% of the construction industry workforce,⁷⁷ however in 2018, women only account for 11.6% of the workforce.⁷⁸ 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 professions such as human resources and marketing.⁷⁹ 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

⁷² 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.

⁷³ 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>

⁷⁴ 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.

⁷⁵ Quezada G, Bratanova A, Boughen N, and Hajkowicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.

⁷⁶ Quezada G, Bratanova A, Boughen N, and Hajkowicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.

⁷⁷ UNSW, 2016, *Demonishing gender structures*, accessed online 18/04/2018 at http://www.csi.edu.au/media/Construction_Booklet_FINAL2.pdf

⁷⁸ Australian Department of Employment, Labour Market Information Portal, *Construction* <http://lmip.gov.au/default.aspx?LMIP/GainInsights/IndustryInformation/Construction>

⁷⁹ UNSW, 2016, *Demonishing gender structures*, accessed online 18/04/2018 at http://www.csi.edu.au/media/Construction_Booklet_FINAL2.pdf

men.⁸⁰

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.⁸¹

Mental health in the construction industry

Suicide is elevated in construction workers compared to other workers in Australia. While the rates of suicide among construction workers have been dropping in the last decade, the rates are still higher than other industries in Australia. For example, between 2011 and 2013 the suicide rate in the construction industry was 1.7 times that of other male workers.⁸² The high rates of suicide in the construction industry is a strong indication that poor mental health exists amongst workers within the industry.⁸³

A 2015 study showed that in 2012, 169 male construction industry workers lost their lives to suicide and another 2,535 workers suffered non-fatal suicide attempts, of which 431 resulted in full incapacity and 2104 resulted in short absences from work.⁸⁴ The factors influencing the mental health of construction workers include a range of socio-economic factors such as education level and incomes, factors in workers' personal lives, individual lifestyle and behaviour as well as factors in the work environment,⁸⁵ such as:

- the pressure of large deadlines often means working long days without adequate rest,
- tenure in the construction industry is associated with poor health and fatigue, as many suffer from an extended lifestyle of physically demanding work combined with lack of sleep and/or poor dietary choices,
- prominent use of drugs and alcohol among workers recreationally and to cope with stress, and
- fly-in-fly-out work (FIFO), which can be isolating and create a lack of routine for workers.⁸⁶

⁸⁰ Ibid

⁸¹ Ibid

⁸² Milner, A. and Law, P., 2017, Mental health in the construction industry, MATES in Construction, accessed 23/01/2019 at:

<http://matesinconstruction.org.au/commitment-to-evidence-base-practice/evidence/>

⁸³ Milner, A. and Law, P., 2017, *Mental health in the construction industry*, MATES in Construction, accessed 23/01/2019 at:

<http://matesinconstruction.org.au/commitment-to-evidence-base-practice/evidence/>

⁸⁴ Doran, M., Ling R., and Milner, A., 2015, *The economic cost of suicide and non-fatal suicidal behaviour in the Australian construction industry by state and territory*, Report conducted for MATES in Construction, accessed 23/01/2019 at:

<http://matesinconstruction.org.au/wp-content/uploads/2016/03/Cost-of-suicide-in-construction-industry-final-report.pdf>

⁸⁵ Milner, A. and Law, P., 2017, *Mental health in the construction industry*, MATES in Construction, accessed 23/01/2019 at:

<http://matesinconstruction.org.au/commitment-to-evidence-base-practice/evidence/>

⁸⁶ Milner, A. and Law, P., 2017, *Mental health in the construction industry*, MATES in Construction, accessed 23/01/2019 at:

<http://matesinconstruction.org.au/commitment-to-evidence-base-practice/evidence/>

The total cost of suicide and non-fatal suicide behaviour in the Australian construction industry is estimated at \$1.57 billion. The majority of this cost is attributed to the cost associated with non-fatal suicide behaviour resulting in full incapacity (76.5% of total costs) followed by the cost of suicide (23.3% of total costs).⁸⁷

Technological drivers of change in the construction industry

The construction industry is yet to feel the effects of significant digital disruption and is one of the least 'digitally engaged' industry sectors.⁸⁸ 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.⁸⁹ 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.⁹⁰

Automation

About 40% of current jobs are deemed to be at high risk of automation in Australia over the next 10-15 years. 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.⁹¹ 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.⁹²

Building Information Modelling (BIM)

BIM is the virtual representation of a building, which includes all information on the building through its whole lifecycle – from design, to build, to operations and demolition. BIM allows construction professionals, as well as owners and operators to access construction and operation information

⁸⁷ Doran, M., Ling R., and Milner, A., 2015, *The economic cost of suicide and non-fatal suicidal behaviour in the Australian construction industry by state and territory*, Report conducted for MATES in Construction, accessed 23/01/2019 at: <http://matesinconstruction.org.au/wp-content/uploads/2016/03/Cost-of-suicide-in-construction-industry-final-report.pdf>

⁸⁸ Vision Critical, Telstra Loop; *Self Employed Tradies Summary Report*, June 2016

⁸⁹ Ibid

⁹⁰ Vision Critical, Telstra Loop; *Self Employed Tradies Summary Report*, June 2016

⁹¹ 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>

⁹² 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>

about the building.⁹³ The Australian construction industry has had a gradual and varied adoption of BIM, depending on how complex the project is.⁹⁴

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.⁹⁵ 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 through BIM, virtually everywhere.⁹⁶ Governments in Australia have been slow to mandate BIM for public works, however, in late 2018 the Queensland government mandated that all major government construction projects with an estimated capital cost of \$50 million or more will be required to use BIM.⁹⁷ Additionally, Tier One companies are already well advanced in BIM usage and are starting to require sub-contractors to be able to connect with this technology. The adoption of BIM by the chains of subcontractors involved in the construction process is likely to be slow but nevertheless those without awareness of this technology and the ability to interact with it will, in time, be locked out of a role in larger supply chains with head contractors.

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.⁹⁸ This means that more of the construction process can take place offsite in a manufacturing plant instead of at the building site.⁹⁹ 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.¹⁰⁰ 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.¹⁰¹

Prefabrication is not a new construction process, rather it has been used for decades, but had developed a reputation as being cheap and of poor quality compared to onsite site construction.¹⁰² However, with the rise of new technologies in the construction industry, particularly BIM, it is easier

⁹³ Construction and Property Services Industry Skills Council, 2014, *Environmental Scan 2014-15*

⁹⁴ StartupAUS, 2017, *Digital Foundations: How technology is transforming Australia's construction sector*, accessed online 01/02/2018 at <https://startupaus.org/document/constructiontech/>

⁹⁵ Azhar, S et al. (2012) 'Building information modeling (BIM): now and beyond', *Australasian Journal of Construction Economics and Building*, 12 (4) 15-28

⁹⁶ Ibid

⁹⁷ Queensland Government, 29 Nov 2018, *Building Information Modelling (BIM)*, accessed online 21/02/2019 at: <https://www.statedevelopment.qld.gov.au/infrastructure/building-information-modelling-bim.html>

⁹⁸ PrefabAUS, 2018, *What is Prefab*, accessed online 06/02/2018 at: <http://www.prefabaus.org.au/what-is-prefab/>

⁹⁹ 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>

¹⁰⁰ Ibid

¹⁰¹ 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>

¹⁰² Ibid

to implement lean design and modularisation into construction, making the fabrication of complex building parts more economical.¹⁰³

How will these emerging technologies impact the Construction, Plumbing and Services Training Package?

These emerging technologies are likely to have a major impact across the 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.¹⁰⁴

History tells us that automation will not affect all jobs equally. For example, lower skilled jobs such as 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.¹⁰⁵ 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.¹⁰⁶ 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.¹⁰⁷

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 fields¹⁰⁸, but also because BIM will bring about new and more efficient ways of working,¹⁰⁹ 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 important that competencies are incorporated into the training package progressively as adoption increases and application becomes better understood.¹¹⁰

Additionally, an increase in prefabrication in Australia will require construction workers with different skillsets and therefore different training than what is currently available.¹¹¹ Prefabrication will require workers to have a mix of skills from both construction and manufacturing. This means that workers

¹⁰³ Azhar, S et al. (2012) 'Building information modeling (BIM): now and beyond', *Australasian Journal of Construction Economics and Building*, 12 (4) 15-28

¹⁰⁴ 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

¹⁰⁵ 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>

¹⁰⁶ Quezada G, Bratanova A, Boughen N, and Hajkovicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.

¹⁰⁷ Ibid

¹⁰⁸ Ibid

¹⁰⁹ 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>

¹¹⁰ Ibid

¹¹¹ 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

entering the industry will need training that comes from both the manufacturing and construction training packages.¹¹²

Economic drivers for change in the construction industry

Downturn in construction industry

Despite the projected growth in occupation and industry employment levels as shown in graphs 1 and 2 in the employment outlook section, throughout 2018 and predicted for 2019, there has been a downturn in the construction industry. This has been brought on by a number of factors such as the downturn in mining, construction firm insolvencies and a drop in building approvals and tighter access to finance.

Downturns in mining

The construction industry is highly vulnerable to economic cycles in other related industries, particularly the mining industry.¹¹³ A booming housing market coupled with large infrastructure projects in New South Wales (NSW) and Victoria (Vic) have so far helped keep the construction industry buoyant while the mining sector declined in Western Australia. However, with housing prices and mortgage approvals declining, the construction industry now faces a downturn.¹¹⁴

Construction firm insolvencies

The ABC reports that almost 1,700 construction businesses went broke last financial year, with most in NSW and VIC. According to corporate watchdog the Australian Securities and Investments Commission (ASIC), the main causes of these insolvencies were a lack of cash flow and poor management.¹¹⁵ The construction industry has a competitive culture where underbidding is often used to win jobs. This then places a large financial burden on the subcontractor when the project cannot be delivered on budget.¹¹⁶

Drop in building approvals and lending

Australian Bureau of Statistics figures show Australia's July 2018 building approvals figures are down -5.6 per cent in seasonally adjusted figures, with apartments the worst hit, down -6.2 per cent.¹¹⁷ As figure 1 shows, building approvals are also forecast to fall around 30% over the next two years, which would be the sharpest percentage downturn since 2000-01.¹¹⁸

¹¹² 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>

¹¹³ Roberts, JH., 18 March 2018, *Construction outlook: mining construction slowdown ripples across industry*, The Conversation, accessed online 20/02/2019 at: <https://theconversation.com/construction-outlook-mining-construction-slowdown-ripples-across-industry-55621>

¹¹⁴ Diss, K, 23 Dec 2018, *Subcontractors are the human face of a construction industry in crisis*, ABC News, accessed online 19/02/2019 at: <https://www.abc.net.au/news/2018-12-23/the-buck-stops-here-a-construction-industry-in-crisis/10638228>

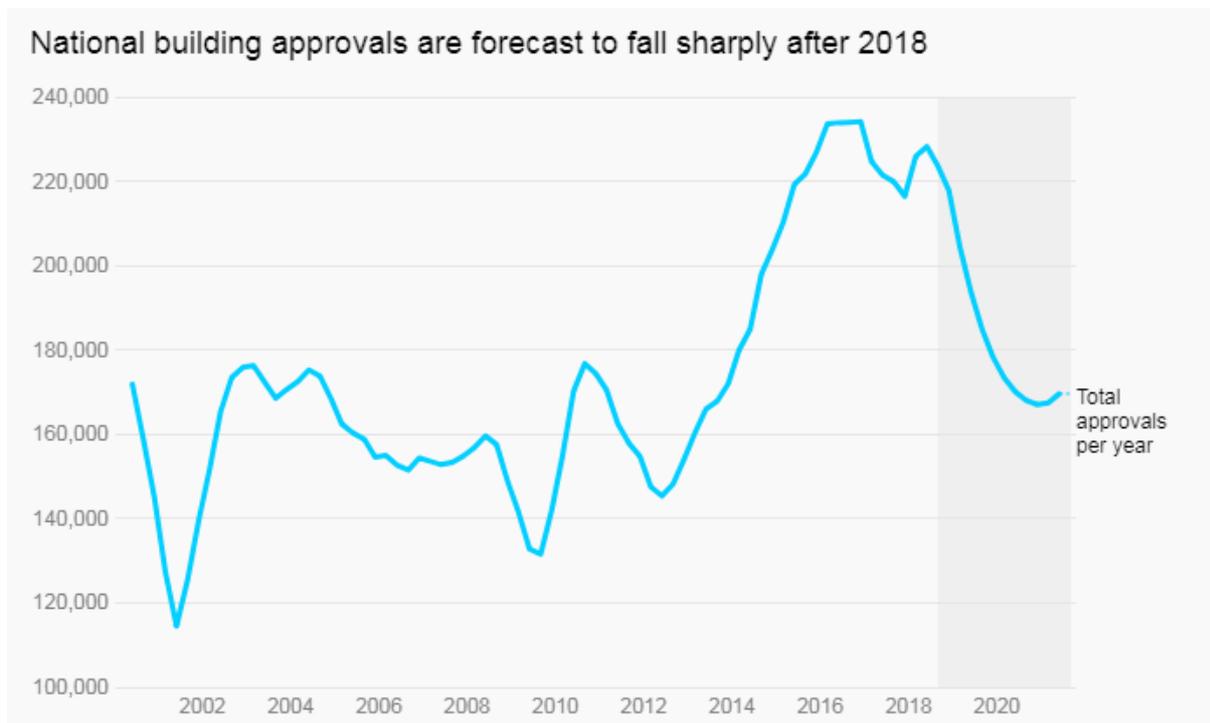
¹¹⁵ Diss, K, 23 Dec 2018, *Subcontractors are the human face of a construction industry in crisis*, ABC News, accessed online 19/02/2019 at: <https://www.abc.net.au/news/2018-12-23/the-buck-stops-here-a-construction-industry-in-crisis/10638228>

¹¹⁶ Diss, K, 23 Dec 2018, *Subcontractors are the human face of a construction industry in crisis*, ABC News, accessed online 19/02/2019 at: <https://www.abc.net.au/news/2018-12-23/the-buck-stops-here-a-construction-industry-in-crisis/10638228>

¹¹⁷ Ross, D., 29 Sept 2018, *Six months until construction bust*, news.com.au, accessed online 20/02/2019 at: <https://www.news.com.au/finance/economy/australian-economy/six-months-until-construction-bust/news-story/7d006500e9d76aaa33f4301223ae1743>

¹¹⁸ Diss, K, 23 Dec 2018, *Subcontractors are the human face of a construction industry in crisis*, ABC News, accessed online 19/02/2019 at: <https://www.abc.net.au/news/2018-12-23/the-buck-stops-here-a-construction-industry-in-crisis/10638228>

Figure 1: National building approvals 2000-2020¹¹⁹



The royal commission into the banking industry has put banks under pressure for poor lending practices. Tighter lending is noted as worsening the downturn in residential construction.¹²⁰ It is affecting builders, developers and investors, and is leading to a decrease in building starts and fewer house sales.¹²¹ This has added to other factors already affecting the construction industry such as foreign buyers withdrawing due to higher taxes and charges, an oversupply of new apartments in certain states and housing prices falling.¹²²

Impact on construction industry

This downturn could lead to there being less work available for construction trades workers and labourers¹²³ and since the construction industry directly employs nearly 10 per cent of the nation's workforce and provides work for other sectors like retail, manufacturing and engineering, the economic impacts could be far reaching.¹²⁴

¹¹⁹ Diss, K, 23 Dec 2018, *Subcontractors are the human face of a construction industry in crisis*, ABC News, accessed online 19/02/2019 at: <https://www.abc.net.au/news/2018-12-23/the-buck-stops-here-a-construction-industry-in-crisis/10638228>

¹²⁰ Scutt, D., 19 Nov 2018, *The HIA warns Australia's housing construction downturn could get nasty unless credit continues to flow*, Business Insider, accessed online 20/02/2019 at: <https://www.businessinsider.com.au/australia-property-market-credit-squeeze-housing-construction-downturn-2018-11>

¹²¹ 4 Aug 2018, *Credit crunch hits developers, builders, would be homeowners*, The Australian, accessed online 20/02/2019 at: <https://www.theaustralian.com.au/news/nation/credit-crunch-hits-developers-builders-would-be-homeowners/news-story/a6476d1838c1f57e60594875c76fcfc7>

¹²² 4 Aug 2018, *Credit crunch hits developers, builders, would be homeowners*, The Australian, accessed online 20/02/2019 at: <https://www.theaustralian.com.au/news/nation/credit-crunch-hits-developers-builders-would-be-homeowners/news-story/a6476d1838c1f57e60594875c76fcfc7>

¹²³ Ross, D, 29 September 2018, *Six months until construction bust*, News.com.au, accessed online 19/02/2019 at: <https://www.news.com.au/finance/economy/australian-economy/six-months-until-construction-bust/news-story/7d006500e9d76aa33f4301223ae1743>

¹²⁴ Diss, K, 23 Dec 2018, *Subcontractors are the human face of a construction industry in crisis*, ABC News, accessed online 19/02/2019 at: <https://www.abc.net.au/news/2018-12-23/the-buck-stops-here-a-construction-industry-in-crisis/10638228>

Environmental drivers for change in the construction industry

The Growth of 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.¹²⁵ 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.¹²⁶ 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.¹²⁷ 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.¹²⁸

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.¹²⁹ 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.¹³⁰

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 2015.¹³¹

¹²⁵ Green Building Council of Australia, 2018, *What is Green Building?* <https://www.gbca.org.au/about/what-is-green-building/>

¹²⁶ StartupAUS, 2017, *Digital Foundations: How technology is transforming Australia's construction sector*, accessed online 01/02/2018 at <https://startupaus.org/document/constructiontech/>

¹²⁷ 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>

¹²⁸ Ibid

¹²⁹ Jadhav, NY, 2016, *Green and Smart Buildings*, Springer, Singapore

¹³⁰ Ibid

¹³¹ 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.¹³² 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-efficient building and retrofitting, as many construction jobs will see a change in practices and tasks.¹³³ 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.¹³⁴ 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.¹³⁵

Educational drivers for change in the construction industry

Skills shortages in a specialised and 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.¹³⁶ 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.¹³⁷

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.¹³⁸

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

¹³² 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>

¹³³ Ibid

¹³⁴ Quezada G, Bratanova A, Boughen N, and Hajkowicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.

¹³⁵ Ibid

¹³⁶ IBISWorld, October 2017, *Australia Industry Reports - Construction: Competitive Landscapes*

¹³⁷ Quezada G, Bratanova A, Boughen N, and Hajkowicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036*, CSIRO, Australia.

¹³⁸ 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>

workplace.¹³⁹ The Foundation for Young Australians (FYA) calls these skills ‘enterprise skills,’ and in 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.¹⁴⁰

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.¹⁴¹

Micro-credentialing and life-long learning

One way to achieve the re-skilling and up-skilling of the construction workforce is through micro-credentialing, which are short courses aimed at building competency in a particular skill. They are industry specific, which ensures that they meet industry-specific needs, and are relevant to employers.¹⁴²

In vocational education and training, micro-credentialing can be achieved through completing a skill set, which are one or more units of competency that are linked to a defined industry skill or need. Skill sets could be used in the construction industry as professional development for the workforce to keep their skills and knowledge fresh, learn about new technologies, materials or tools relevant to the job, or used to move into another related occupation.

Political drivers for change in the construction industry

Compliance and regulation

The National Construction Code (NCC) is Australia’s performance-based building and plumbing code. The key objectives of the NCC are to address issues of safety and health, amenity and accessibility, and sustainability for the built environment in Australia. The NCC also provides the *minimum necessary* requirements for the design, construction, performance and liveability of buildings in Australia. It is managed by the Australian Building Codes Board (ABCB) and was developed to incorporate all on-site construction requirements into a single code.¹⁴³ It is revised according to a three-year cycle and its next release is scheduled for early 2019.

¹³⁹ Ibid

¹⁴⁰ 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

¹⁴¹ Quezada G, Bratanova A, Boughen N, and Hajkowicz S, 2016, *Farsight for construction: Exploratory scenarios for Queensland’s construction industry to 2036*, CSIRO, Australia.

¹⁴² Blazevic, O., 8 Aug 2018, *What are micro credential and can they benefit you?*, training.com.au, accessed online 20/02/2019 at: <https://www.training.com.au/ed/how-micro-credentials-can-benefit-you/>

¹⁴³ National Construction Code, 2018, accessed online 14/01/19 at: <https://www.business.gov.au/planning/templates-and-tools/industry-factsheets/national-construction-code>

Under the Australian Constitution, governance of the built environment is the responsibility of state and territory governments. Recent failures in the performance of certain buildings in Australia (e.g., Lacrosse Tower in 2014, Opal Tower in late 2018 and Neo200 in early 2019) has highlighted the problems of buildings not conforming to standards outlined in the NCC.

Issues of non-conforming materials, non-compliant building products and responsibility in the supply chain have recently been considered by the Building Ministers' Forum through a report by independent experts, Professor Peter Shergold and Ms Bronwyn Weir, on *Assessment of the Effectiveness of Compliance and Enforcement Systems for Building and Construction Industry across Australia*. The report investigates the shortcomings in the implementation of the National Construction Code (NCC) across the compliance and enforcement systems in place in Australia.¹⁴⁴ Shergold and Weir make 24 recommendations that relate to various aspects of the compliance and enforcement systems such as documentation and (digital) recording keeping, integrity of private building surveyors, the roles of fire authorities and regulators and the training of the workforce.¹⁴⁵ Together, these recommendations are intended to operate as a framework of solutions to the weaknesses in the compliance and regulation systems, which will require legislative reform and changes to regulatory practice in each state and territory.¹⁴⁶

Throughout the skills forecast consultation with CPC IRC members, this report was noted frequently as a key driver for change, not only for the industry, but also for training. A number of its recommendations focus on continuous professional development of the workforce around the NCC, career pathways, and the tasks and roles of certain occupations (building surveying and fire protection) covered in the CPC training package.¹⁴⁷

Proposed Responses and Risks of Not Proceeding

Proposed Responses

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

The IRC will 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.

¹⁴⁴ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*. Retrieved from <https://aibs.com.au/Public/News/2018/ShergoldWeir.aspx>

¹⁴⁵ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*. Retrieved from <https://aibs.com.au/Public/News/2018/ShergoldWeir.aspx>

¹⁴⁶ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*. Retrieved from <https://aibs.com.au/Public/News/2018/ShergoldWeir.aspx>

¹⁴⁷ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*. Retrieved from <https://aibs.com.au/Public/News/2018/ShergoldWeir.aspx>

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 and upskilled with the skills and knowledge to not only use new technologies, but for the new jobs and tasks that arise. It is important that the skills and knowledge needed are embedded in the CPC 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. In order for these impacts to become opportunities, it is vital that the workforce be trained and upskilled accordingly. If this does not occur the CPC training package risks becoming out-dated with obsolete skills and knowledge, which could lead to severe shortages of skills, knowledge and experience among the workforce in the industry.

Consultation Undertaken

The Artibus Innovation consultation strategy for the development of the skills forecast included consultation with IRC, an industry stakeholder survey, and specific industry stakeholder consultation where additional information was needed.

Though time constraints limited the scope of this year's consultation, through targeted interviews with IRC members we obtained key insights in four crucial industry priorities for the skills forecast: training package gaps, emerging trends and challenges, drivers of change, and future skills needs. Issues identified by IRC members were explored through further research and developed in our skills forecast.

Consultation will continue to be a major priority throughout the proposed projects.

Name	Organisation	Consultation Type	Topics covered during consultation
Paul Baxter	Australian Manufacturing Workers Union	Interview with CPC IRC member	<ul style="list-style-type: none"> • Pre-fabrication • Drones • AQF levels and concern in losing the hierarchy
Adam Cox	Fernbrooke Homes	Interview with CPC IRC member	<ul style="list-style-type: none"> • Tech changes in the industry • Tech changes good for WHS • BIM • Mental health
Alan Davis	Western Australian Construction Training Council	Interview with CPC IRC member	<ul style="list-style-type: none"> • Skills shortages • Downturn in construction • Aging population effects on industry • New technology • Industry will demand specific training based on skill sets in future (micro-credentialing)
Lynda Douglas	Department of Defence	Interview with CPC IRC member	<ul style="list-style-type: none"> • Technology • Artificial Intelligence • Safety in the workplace • Mental health • Micro-credentialing • Big data

Name	Organisation	Consultation Type	Topics covered during consultation
Ken Gardner	Master Plumbers	Interview with CPC IRC member	<ul style="list-style-type: none"> • Downturn in construction industry • Ageing workforce • Technology • Skill specialisation • Keeping training package up to date
Lindsay Le Compte	Australian Industry Group	Interview with CPC IRC member	<ul style="list-style-type: none"> • Skill specialisation • Higher education-based careers • BIM • Drones
Andrew Marshall	Marshall & Brougham Construction Pty Ltd	Interview with CPC IRC member	<ul style="list-style-type: none"> • BIM • Mental health • Continuous professional development • Shergold and Weir report and Opal tower • Skills shortage
Jocelyn Martin	Housing Industry Association Ltd	Interview with CPC IRC member	<ul style="list-style-type: none"> • Technology • Hiring an apprentice v someone already skilled • BIM • Mental health
Stuart Maxwell	Construction, Forestry, Maritime, Mining and Energy Union	Interview with CPC IRC member	<ul style="list-style-type: none"> • Mental health • Pre-fabrication • Technology • Skill impacts from regulations
Marie Paterson	SA Building & Construction Industry Training Board	Interview with CPC IRC member	<ul style="list-style-type: none"> • Commercial waterproofing • BIM • Continuous learning and micro-credentialing • Steel framing • Technology
Greg Smith	National Fire Industry Association	Interview with CPC IRC member	<ul style="list-style-type: none"> • Mental health • BIM • Shergold and Weir report

Name	Organisation	Consultation Type	Topics covered during consultation
Yvonne Webb	Industry Skills Advisory Council, NT	Interview with CPC IRC member	<ul style="list-style-type: none"> • Compliance and regulatory issues • Migration • Apprentices • Technology
Michael Jez	Construction Skills Training Centre	Skills Forecast 2019 Survey	<p>All respondents answered questions regarding:</p> <ul style="list-style-type: none"> • skills shortages in their industry in the past 12 months • If they have noted any gaps in the CPC training package • What trends, challenges or issues are emerging in their industries • If these trends, challenges or issues will give rise to any new jobs or skills that will require training • Rank the 13 generic skills
Trisch Baff	FCTA - Building Careers	Skills Forecast 2019 Survey	
Anthony Brighton	Novaskill	Skills Forecast 2019 Survey	
Michael Wilson	Central Queensland University	Skills Forecast 2019 Survey	
Vincent Digges	TAFE NSW	Skills Forecast 2019 Survey	
Tim Ryall	TAFE QLD	Skills Forecast 2019 Survey	
Rob Staley	Wodonga Tafe	Skills Forecast 2019 Survey	
Susan Pardel	TAFE NSW	Skills Forecast 2019 Survey	
Corrie Williams	Master Builders Association of Victoria	Skills Forecast 2019 Survey	
Peter Whelan	RMIT City Campus	Skills Forecast 2019 Survey	
Bronwyn Blencowe	VETiS Consulting Services Pty Ltd	Skills Forecast 2019 Survey	
Shaun Turnbull	TAFE SA	Skills Forecast 2019 Survey	
Mick Kelly	MBA ACT	Skills Forecast 2019 Survey	
Russell Mackay	Max Build	Skills Forecast 2019 Survey	
Michael Wardle	Drouin Painting Services	Skills Forecast 2019 Survey	
Ian Lyons	Holmesglen Tafe	Skills Forecast 2019 Survey	
Rob Gilman	The Tap Doctor	Skills Forecast 2019 Survey	
Brendan	Construction Industry Training	Skills Forecast 2019 Survey	
Stephen Lee	Homesglen Institute	Skills Forecast 2019 Survey	
Brendan Gould	MPMSAA	Skills Forecast 2019 Survey	
Aidan McGuinness	Housing Industry Association	Skills Forecast 2019 Survey	
Nathan Szkoruda	Gold Coast Trades College	Skills Forecast 2019 Survey	
Rob Beckett	ATEC	Skills Forecast 2019 Survey	

Name	Organisation	Consultation Type	Topics covered during consultation
Mark Ansbro	MPA Skills	Skills Forecast 2019 Survey	
Vanessa Lastrina	Parker Brent	Skills Forecast 2019 Survey	
Jeff Nobbs	DGT Toowoomba	Skills Forecast 2019 Survey	
Pat Lazarus	Federation Training	Skills Forecast 2019 Survey	
Chris Kettle	Bundaberg Regional Council	Skills Forecast 2019 Survey	
Rai Malisauskas	Hutchinson Builders	Skills Forecast 2019 Survey	
David Harris	TAFE NSW	Skills Forecast 2019 Survey	
Mark Baker	South Regional TAFE (Bunbury Campus)	Skills Forecast 2019 Survey	
Gary Smith	Gs Plumbing	Skills Forecast 2019 Survey	
Grant Jones	Streamline Plumbing and Roofing	Skills Forecast 2019 Survey	
Sebastian La Rocca	SPA Plumbing & Gasfitting	Skills Forecast 2019 Survey	
Llewellyn Biggar	TAFE NSW	Skills Forecast 2019 Survey	
Ross Barber	Ross Barber Plumbing Pty Ltd	Skills Forecast 2019 Survey	
David Taylor	NM Tafe	Skills Forecast 2019 Survey	
Darrel Vecchio	BIZMATRIX GROUP	Skills Forecast 2019 Survey	
Graeme Lynch	Construction Training Institute	Skills Forecast 2019 Survey	
Jo Davey	Westplan Design	Skills Forecast 2019 Survey	
Steve Potter	Federation Training	Skills Forecast 2019 Survey	
Trevor Williams	Everthought College of Construction	Skills Forecast 2019 Survey	
Viviana Hood	Master Builders Association of Victoria	Skills Forecast 2019 Survey	
Rhonda Picton	Dubbo Traffic Control	Skills Forecast 2019 Survey	
James MacGuire	Trade Academy WA	Skills Forecast 2019 Survey	
Eric Parnis	CITB South Australia	Skills Forecast 2019 Survey	

Proposed Schedule of Work

Proposed Schedule of Work	
2019 - 20	<p>Project 1 – Shopfitting To review and update CPC30116 Certificate III in Shopfitting to:</p> <ul style="list-style-type: none"> • adhere to the four-year review cycle of the national review schedule as per the training package development and endorsement process policy Nov 2016 • ensure the qualification includes the most up-to-date technologies, processes and materials in shopfitting • ensure core units that are updated as part of another project are still fit for this qualification and industry needs. <p>Project 2 – Sign and Graphics To review and update CPC30216 Certificate III in Signs and Graphics to:</p> <ul style="list-style-type: none"> • adhere to the four-year review cycle of the national review schedule as per the training package development and endorsement process policy Nov 2016 • ensure the qualification includes the most up-to-date technologies, processes and materials in signs and graphics • attend to problematic performance evidence in core units. <p>Project 3 – Building Surveying To update the suite of building surveying qualifications to:</p> <ul style="list-style-type: none"> • incorporate improvements in building surveying training noted in the 2018 Building Ministers Forum report into improving the effectiveness of compliance for the building and construction industry¹⁴⁸ • better align the qualifications with current occupational outcomes • respond to skill shortages • adhere to the four-year review cycle of the national review schedule as per the training package development and endorsement process policy Nov 2016. <p>Projects 4 – Concreting To review and update the CPC30318 Certificate III in Concreting to:</p> <ul style="list-style-type: none"> • ensure core units that are updated as part of another project are still fit for this qualification and industry needs • incorporate recently released National Construction Code (NCC) updates. <p>Projects 5 – Commercial Waterproofing</p> <ul style="list-style-type: none"> • To develop a post trade qualification specific to the occupational outcome of a commercial water proofer. This addresses feedback provided by industry, IRC members and Technical Advisory Group (TAG) members on a current gap in the Construction, Plumbing and Services Training Package.

¹⁴⁸ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*. Retrieved from <https://aibs.com.au/Public/News/2018/ShergoldWeir.aspx>

	<p>Projects 6 – Building Information Modelling (BIM)</p> <p>This project will develop a micro credential/skill set in BIM awareness for the Construction, Plumbing and Services (CPC) Training Package. BIM is an emerging technology with the construction industry and will be a requirement across many occupations, making a micro-credential in BIM awareness an essential component of the CPC training package. Other training packages that cover occupations across the built environment will also be able to import this skill set to use as upskilling or continuous professional development.</p>
2020 – 21	<p>Project 7 – Composite Roofing</p> <ul style="list-style-type: none"> Feedback during skills forecast consultations noted composite roofing as a gap in the training package. <p>Project 8 – Smart and Green Construction</p> <ul style="list-style-type: none"> A project on emerging technologies and green construction materials and techniques such as using new materials and techniques, understanding energy efficiencies, internet of things, big data, and applications of BIM. <p>Project 9 – Rope work</p> <ul style="list-style-type: none"> Feedback from IRC members and TAG members noted a gap in the training package. This will be investigated for possible inclusion in 2020-21. <p>Other Projects</p> <ul style="list-style-type: none"> IRC to advise on further industry skilling needs and required projects for 2020-2021.
2021 – 22	IRC to advise on industry skilling needs and required projects for 2021-2022.
2022 – 23	A general review, update and maintenance of a suite of qualifications will be undertaken.

2019-2020 Project Details

PROJECT 1 – Shopfitting	
Description	<p>To review and update CPC30116 Certificate III in Shopfitting to:</p> <ul style="list-style-type: none"> • adhere to the four-year review cycle of the national review schedule as per the training package development and endorsement process policy Nov 2016 • ensure the qualification includes the most up-to-date technologies, processes and materials in shopfitting • ensure core units that are updated as part of another project are still fit for this qualification and industry needs.
Rationale	<p>The following drivers for change are evident for this project.</p> <p>National Review Schedule Policy</p> <p>The CPC30116 Certificate III in Shopfitting will be reviewed and updated under the four-year review cycle of the national schedule as per the training package development and endorsement process policy Nov 2016.</p> <p>Additionally, three units that are packaged in the core of CPC30116 Certificate III in Shopfitting are being reviewed in other CPC projects currently and, as per policy, once those projects are endorsed, will trigger a full review of this qualification to make sure it is still fit of this qualification and industry needs. The units are:</p> <ol style="list-style-type: none"> 1. CPCCCM3004 Identify and apply information in construction plans, drawings and specifications 2. CPCCCM3006 Carry out levelling operations 3. CPCCJN3001 Process materials to produce components using static machines. <p>Technologies, processes, and materials update</p> <p>Shopfitters design, produce, assemble and install retail and commercial shop-fittings including counters, showcases, display units, shop fronts, floor coverings, fixtures, doors and architectural joinery.¹⁴⁹ Shopfitting is a highly specialised, niche occupation in the construction industry, that has skills in common with carpentry, interior design, signs and graphics, and furniture building and manufacturing.</p> <p>Shopfitters use a variety of technologies, processes and materials, which will be updated as part of the review of CPC30116 Certificate III in Shopfitting to make sure the qualification is capturing the current trends in the industry. This includes:</p> <ul style="list-style-type: none"> • updating the qualification’s Workplace Health and Safety (WHS) references • ensuring all unit content is fit for industry needs through stakeholder consultation • ensuring the packaging of the qualification includes all relevant skills and knowledge for a shopfitter, paying specific attention to core units revised in other projects. <p>Consultation will be undertaken during the unit drafting phases of this project to make sure all relevant technologies, processes and materials are accounted for in the qualification.</p>

¹⁴⁹ Adform, 2012, *Australian shopfitters and what they do for you*, accessed online 04/02/2019 at: <http://adform.com.au/window-displays-revitalise-retail-life/>

PROJECT 1 – Shopfitting

Qualification enrolments increasing, RTO with qualification on scope and jurisdictional funding

Qualification	ANZSCO Code	2015 enrolment	2016 enrolment	2017 enrolment
CPC30116 Certificate III in Shopfitting	331211	0	0	311
CPC31812 Certificate III in Shopfitting (superseded qualification)	Carpenter and Joiner	781	835	613
Total		781	835	924

Shopfitting specific employment data cannot be analysed, as the Australian Bureau of Statistics (ABS) codes shopfitting within the carpentry industry. However, enrolments in this qualification are strong, indicating good uptake and need for the qualification within the industry. There are currently 8 RTOs with this qualification on scope.

Additionally, the tuition fees for this qualification are partially, and in some cases, fully funded by the following state governments; NSW, SA, VIC and QLD.¹⁵⁰

These factors are incentives to make sure the qualification is up-to-date and fit for industry needs through the review process.

The minister's priorities addressed in this project are detailed in the table below.

Reform	Action to address reform
Make more information about industry's expectations of training delivery available.	The units, assessment requirements and qualification 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.
Ensure the training system better supports individuals to move easily from one related occupation to another.	This update will make sure that the design of qualification strengthens pathways to related sectors including carpentry and joinery.
Improve the efficiency of the training system at a unit level so that units can be owned and used by multiple industry sectors.	In updating the qualification, where appropriate import relevant cross industry and cross sector units to minimise the duplication of units in the system.

Ministers' Priorities Addressed

¹⁵⁰ Myskills.gov.au, *Certificate III in Shopfitting*, accessed online 04/02/2019 at: <https://www.myskills.gov.au/courses/details?Code=CPC30116>

PROJECT 1 – Shopfitting

Consultation undertaken and Consultation Plan

Consultation Undertaken

The consultation undertaken for this project included one-on-one interviews with members of the Construction, Plumbing and Services IRC and an ISF survey widely promoted to industry through our website and newsletter. The interviews with IRC members provided key insights in three crucial industry priorities for the skills forecast: training package gaps, emerging trends and challenges, drivers of change and future skills needs. As time constraints limited the scope of this year’s consultation process, stakeholder engagement will be an ongoing priority throughout the proposed project.

Consultation Plan

The key engagement methods will be as follows:

- Technical Advisory Groups (TAGs) will be established in accordance with internal policy and procedures to guide the subject matter expertise components of the work
- direct correspondence with regulators
- direct correspondence with State Training Authorities
- direct correspondence with IRC and key stakeholders
- 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
- RTOs will be engaged through online survey and trainer networks
- public web project page updated fortnightly
- newsletter survey distribution to 4,200 stakeholders, including all RTOs, regulators, industry associations. Minimum of three newsletter profiles
- industry survey on early and late draft material
- distribution of survey through TAG networks and Artibus digital channels
- social media – twitter and linkedin.

Timeline and Key Dates

Details	Date
Expected approval by AISC of proposed work	April 2019
Project kick-off	May 2019
Consultation on draft components	May – June 2019
Establish Technical Advisory Group (TAG)	June 2019
Review feedback and update Draft Pack 1 accordingly, as per TAG advice	July 2019
Training package components put forward for consultation (Draft pack 2)	August 2019
Review feedback and update Draft Pack 2 accordingly, as per TAG advice	October 2019
Training package components put forward for validation	November 2019
Finalisation and Quality Assurance	February 2020
Training package components sent to STAs for sign-off	April 2020

PROJECT 1 – Shopfitting

	Submitted for endorsement training package components to Commonwealth Department of Education and Training	May 2020
Summary of Project Components	<ul style="list-style-type: none">• 1 qualification to be reviewed and updated - CPC30116 Certificate III in Shopfitting:<ul style="list-style-type: none">○ 10 Units of Competency to be reviewed and updated (please see Attachment A: CPC Training Components Proposed for Work for 2019-2020 for list of units).	

PROJECT 2 – Signs and Graphics

<p>Description</p>	<p>To review and update CPC30216 Certificate III in Signs and Graphics to:</p> <ul style="list-style-type: none"> • adhere to the four-year review cycle of the national review schedule as per the training package development and endorsement process policy Nov 2016 • ensure the qualification includes the most up-to-date technologies, processes and materials in signs and graphics. 																			
<p>Rationale</p>	<p>The following drivers for change are evident for this project.</p> <p>National Review Schedule Policy</p> <p>The CPC30216 Certificate III in Signs and Graphics will be reviewed and updated in adherence to the four-year review cycle of the national review schedule as per the training package development and endorsement process policy Nov 2016.</p> <p>Technologies, processes, and materials update</p> <p>Signwriters design, manufacture and paint signs for displays, buildings, boats, and other infrastructure. Signwriters frequently work at heights, both indoors and outdoors, as well as in confined spaces and with toxic substances. Technology changes within the industry have seen a move towards the computerised manufacture of signs, which means that digital literacy is becoming more important.¹⁵¹</p> <p>Signwriters therefore use a variety of technologies, processes and materials, which will be updated as part of the review of CPC30216 Certificate III in Signs and Graphics to make sure the qualification is capturing the current trends in the industry. This includes:</p> <ul style="list-style-type: none"> • ensuring all unit content is fit for industry needs through stakeholder consultation • ensuring the packaging of the qualification includes all relevant skills and knowledge for a signwriter. <p>Employment outlook, qualification enrolments, RTO scope and jurisdictional funding</p> <table border="1" data-bbox="379 1361 1422 1653"> <thead> <tr> <th>Qualification</th> <th>ANZSCO Code</th> <th>2015 enrolment</th> <th>2016 enrolment</th> <th>2017 enrolment</th> </tr> </thead> <tbody> <tr> <td>CPC30216 Certificate III in Signs and Graphics</td> <td rowspan="2">399611 Signwriter</td> <td>0</td> <td>0</td> <td>240</td> </tr> <tr> <td>CPC32111 Certificate III in Signage (superseded qualification)</td> <td>467</td> <td>521</td> <td>301</td> </tr> <tr> <td>Total</td> <td></td> <td>467</td> <td>521</td> <td>541</td> </tr> </tbody> </table> <p>Signwriters are forecast to decrease in employment over the next 5 years by 3.9%.¹⁵² Despite this, over the past three years, enrolments in this qualification are strong, supporting the need for the qualification within the training package. There are currently 7 RTOs with this qualification on scope.</p>	Qualification	ANZSCO Code	2015 enrolment	2016 enrolment	2017 enrolment	CPC30216 Certificate III in Signs and Graphics	399611 Signwriter	0	0	240	CPC32111 Certificate III in Signage (superseded qualification)	467	521	301	Total		467	521	541
Qualification	ANZSCO Code	2015 enrolment	2016 enrolment	2017 enrolment																
CPC30216 Certificate III in Signs and Graphics	399611 Signwriter	0	0	240																
CPC32111 Certificate III in Signage (superseded qualification)		467	521	301																
Total		467	521	541																

¹⁵¹ Construct My Career, 2013, *Sign Writer*, accessed online 04/02/2019 at: <http://www.constructmycareer.com.au/resources/file/Sign%20Writer.pdf>

¹⁵² Labour Market Information Portal, 2019, Data file: Occupation Projections – five years to May 2023, accessed on 22/01/2019 at: <http://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>

PROJECT 2 – Signs and Graphics

	<p>Additionally, the tuition fees for this qualification are partially, and in some cases, fully funded by the following state governments; NSW, SA, VIC and QLD.¹⁵³</p> <p>These factors are incentives to make sure the qualification is up-to-date and fit for industry needs.</p>									
<p>Ministers’ Priorities Addressed</p>	<p>The minister’s priorities addressed in this project are detailed in the table below.</p> <table border="1" data-bbox="328 555 1430 1178"> <thead> <tr> <th data-bbox="328 555 783 600">Reform</th> <th data-bbox="783 555 1430 600">Action to address reform</th> </tr> </thead> <tbody> <tr> <td data-bbox="328 600 783 846"> <p>Make more information about industry’s expectations of training delivery available.</p> </td> <td data-bbox="783 600 1430 846"> <p>The units, assessment requirements and qualification 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.</p> </td> </tr> <tr> <td data-bbox="328 846 783 1010"> <p>Ensure the training system better supports individuals to move easily from one related occupation to another.</p> </td> <td data-bbox="783 846 1430 1010"> <p>This update will make sure that the design of qualification strengthens pathways to related sectors including building and construction.</p> </td> </tr> <tr> <td data-bbox="328 1010 783 1178"> <p>Improve the efficiency of the training system at a unit level so that units can be owned and used by multiple industry sectors.</p> </td> <td data-bbox="783 1010 1430 1178"> <p>In updating the qualification, where appropriate import relevant cross industry and cross sector units to minimise the duplication of units in the system.</p> </td> </tr> </tbody> </table>		Reform	Action to address reform	<p>Make more information about industry’s expectations of training delivery available.</p>	<p>The units, assessment requirements and qualification 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.</p>	<p>Ensure the training system better supports individuals to move easily from one related occupation to another.</p>	<p>This update will make sure that the design of qualification strengthens pathways to related sectors including building and construction.</p>	<p>Improve the efficiency of the training system at a unit level so that units can be owned and used by multiple industry sectors.</p>	<p>In updating the qualification, where appropriate import relevant cross industry and cross sector units to minimise the duplication of units in the system.</p>
Reform	Action to address reform									
<p>Make more information about industry’s expectations of training delivery available.</p>	<p>The units, assessment requirements and qualification 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.</p>									
<p>Ensure the training system better supports individuals to move easily from one related occupation to another.</p>	<p>This update will make sure that the design of qualification strengthens pathways to related sectors including building and construction.</p>									
<p>Improve the efficiency of the training system at a unit level so that units can be owned and used by multiple industry sectors.</p>	<p>In updating the qualification, where appropriate import relevant cross industry and cross sector units to minimise the duplication of units in the system.</p>									
<p>Consultation Undertaken and Consultation Plan</p>	<p>Consultation Undertaken</p> <p>The consultation undertaken for this project included one-on-one interviews with members of the Construction, Plumbing and Services IRC and an ISF survey widely promoted to industry through our website and newsletter. The interviews with IRC members provided key insights in three crucial industry priorities for the skills forecast: training package gaps, emerging trends and challenges, drivers of change and future skills needs. As time constraints limited the scope of this year’s consultation process, stakeholder engagement will be an ongoing priority throughout the proposed project.</p> <p>Consultation Plan</p> <p>The IRC approved consultation process will be undertaken that will ensure all key stakeholders are consulted in the Signs and Graphics Project.</p> <p><i>Detailed description of the process is outlined in Project 1.</i></p>									
<p>Timeline and Key Dates</p>	<table border="1" data-bbox="328 1854 1453 1897"> <thead> <tr> <th data-bbox="328 1854 1015 1897">Details</th> <th data-bbox="1015 1854 1453 1897">Date</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table>		Details	Date						
Details	Date									

¹⁵³ Myskills.gov.au, *Certificate III in Signs and Graphics*, accessed online 04/02/2019 at: <https://www.myskills.gov.au/courses/details?Code=CPC30216>

PROJECT 2 – Signs and Graphics

	Expected approval by AISC of proposed work	April 2019
	Project kick-off	May 2019
	Consultation on draft components	May – June 2019
	Establish Technical Advisory Group (TAG)	June 2019
	Review feedback and update Draft Pack 1 accordingly, as per TAG advice	July 2019
	Training package components put forward for consultation (Draft pack 2)	August 2019
	Review feedback and update Draft Pack 2 accordingly, as per TAG advice	October 2019
	Training package components put forward for validation	November 2019
	Finalisation and Quality Assurance	February 2020
	Training package components sent to STAs for sign-off	April 2020
	Submitted for endorsement training package components to Commonwealth Department of Education and Training	May 2020
Summary of Project Components	<ul style="list-style-type: none"> • 1 qualification to be reviewed and updated - CPC30216 Certificate III in Signs and Graphics: <ul style="list-style-type: none"> ○ 17 Units of Competency to be reviewed and updated (please see Attachment A: CPC Training Components Proposed for Work for 2019-2020 for list of units). 	

PROJECT 3 – Building Surveying

<p>Description</p>	<p>To update the building surveying qualifications to:</p> <ul style="list-style-type: none"> incorporate improvements in building surveying training noted in the 2018 Building Ministers Forum report into improving the effectiveness of compliance for the building and construction industry¹⁵⁴ better align the qualifications with current occupational outcomes adhere to the four-year review cycle of the national review schedule as per the training package development and endorsement process policy Nov 2016.
<p>Rationale</p>	<p>The following drivers for change are evident for this project.</p> <p>National Construction Code (NCC) and Shergold and Weir Report</p> <p>A building surveyor assesses building plans to ensure that they comply with the National Construction Code (NCC), the relevant Australian Standards, and any other relevant Building Acts or legislation of the jurisdiction the building is in.¹⁵⁵ The building surveyor’s role in the compliance and enforcement systems for the building and construction industry in Australia has recently been reviewed as a result of the Grenfell Tower fire in London in 2017 and the Lacrosse apartments fire in Melbourne in 2014 in a report commissioned by the Building Ministers Forum in 2017, known as the Shergold and Weir Report.¹⁵⁶</p> <p>Throughout consultation with IRC members, this report was noted frequently because it highlights weaknesses in the construction industry’s compliance systems, of which building surveying is a key component. The report makes 24 recommendations and as part of this project, the Technical Advisory Group (TAG) will investigate which recommendations can be applied to the building surveying qualifications and how the training package can best respond. Of particular interest are recommendations three and four, which recommend continuous professional development around the NCC and career paths for building surveyors respectively.¹⁵⁷</p> <p>Employment in the industry and qualification enrolments</p> <p>Employment in the Architectural, Building and Surveying Technicians sector – which includes building certifiers and surveyors – is forecast to increase by 1.6% in the next five years.¹⁵⁸</p> <p>This is consistent with enrolment numbers in the CPC60115 Advanced Diploma of Building Surveying, as they are also increasing, indicating industry need for this qualification. However, the CPC80215 Graduate Diploma of Building Surveying has not been delivered by</p>

¹⁵⁴ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*. Retrieved from <https://aibs.com.au/Public/News/2018/ShergoldWeir.aspx>

¹⁵⁵ Australian Institute of Building Surveyors, *Building Surveying in Australia*, accessed online 31/01/2019 at: https://aibs.com.au/Public/Building_Surveying_In_Australia/Public/Building_surveying_in_Australia.aspx?hkey=156e97c2-9377-4e93-8155-095cca559b28

¹⁵⁶ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*. Retrieved from <https://aibs.com.au/Public/News/2018/ShergoldWeir.aspx>

¹⁵⁷ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*. Retrieved from <https://aibs.com.au/Public/News/2018/ShergoldWeir.aspx>

¹⁵⁸ Labour Market Information Portal, 2019, Data file: Occupation Projections – five years to May 2023, accessed on 22/01/2019 at: <http://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>

PROJECT 3 – Building Surveying

any RTO in the past three years, indicating a lack of industry need. It is expected that this qualification will be deleted.

Qualification	ANZSCO Code	2015 enrolment	2016 enrolment	2017 enrolment
CPC60115 Advanced Diploma of Building Surveying	312113 Building Inspector	47	463	654
CPC60108 Advanced Diploma of Building Surveying (superseded qualification)		196	95	0
Total		239	552	654
CPC80215 Graduate Diploma of Building Surveying	312113 Building Inspector	N/A*	N/A*	N/A*
Total		N/A*	N/A*	N/A*

*no enrolment data found on NCVET/VOCSTATS website

Furthermore, the table below shows the number of RTOs with these qualifications currently on scope.

Qualification	RTOs with qualification on scope
CPC60115 Advanced Diploma of Building Surveying	9
CPC80215 Graduate Diploma of Building Surveying	0

Additionally, the tuition fees for CPC60115 Advanced Diploma of Building Surveying are partially, and in some cases, fully funded by the NSW and VIC state governments.¹⁵⁹

These factors, combined with the construction industry's focus on compliance and building surveyors through the Shergold and Weir report, means that CPC60115 Advanced Diploma of Building Surveying must be updated to ensure the latest compliance measures and industry needs are being met.

National Review Schedule Policy

Additionally, the Building Surveying qualifications will be reviewed and updated in adherence to the four-year review cycle of the national review schedule as per the training package development and endorsement process policy Nov 2016.

Ministers' Priorities Addressed

The minister's priorities addressed in this project are detailed in the table below.

Reform	Action to address reform
Remove obsolete and superfluous qualifications from the system.	We will consult with stakeholders to determine the reason for the lack of delivery of CPC80215

¹⁵⁹ Myskills.gov.au, *Advanced Diploma of Building Surveying*, accessed online 04/02/2019 at: <https://www.myskills.gov.au/courses/details?Code=CPC60115>

PROJECT 3 – Building Surveying

		Graduate Diploma of Building Surveying and confirm whether this qualification can be deleted.
	Make more information about industry's expectations of training delivery available.	The units, assessment requirements and qualifications 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.
	Ensure the training system better supports individuals to move easily from one related occupation to another.	Adjust the design of the qualifications to incorporate more knowledge of the NCC and the construction process in line with recommendations in the Shergold and Weir report.
	Improve the efficiency of the training system at a unit level so that units can be owned and used by multiple industry sectors.	Analyse qualifications for opportunities to import units and identify and confirm potential units for deletion, particularly units in the CPC80215 Graduate Diploma of Building Surveying.
	Foster greater recognition of skill sets.	Within the redevelopment the IRC will consider the development of a skill set focused on knowledge of the NCC to support the continuing professional development of building surveyors and others in line with recommendations in the Shergold and Weir report.
Consultation undertaken and Consultation Plan	<p>Consultation Undertaken The consultation undertaken for this project included one-on-one interviews with members of the Construction, Plumbing and Services IRC and an ISF survey widely promoted to industry through our website and newsletter.</p> <p>Throughout consultation with IRC members, the Shergold and Weir report was noted frequently as a driver for change within the industry because it highlights weaknesses in the construction industry's compliance systems, of which building surveying is a key component.</p> <p>As time constraints limited the scope of this year's consultation process, further stakeholder engagement will be an ongoing priority throughout the proposed project.</p> <p>Consultation Plan The IRC approved consultation process will be undertaken that will ensure all key stakeholders are consulted in the Building Surveying Project.</p> <p><i>Detailed description of the process is outlined in Project 1.</i></p>	
Timeline and Key Dates	Details	Date
	Expected approval by AISC of proposed work	April 2019

PROJECT 3 – Building Surveying

	Project kick-off	May 2019
	Consultation on draft components	May – June 2019
	Establish Technical Advisory Group (TAG)	June 2019
	Review feedback and update Draft Pack 1 accordingly, as per TAG advice	July 2019
	Training package components put forward for consultation (Draft pack 2)	August 2019
	Review feedback and update Draft Pack 2 accordingly, as per TAG advice	October 2019
	Training package components put forward for validation	November 2019
	Finalisation and Quality Assurance	February 2020
	Training package components sent to STAs for sign-off	April 2020
	Submitted for endorsement training package components to Commonwealth Department of Education and Training	May 2020
Summary of Project Components	<ul style="list-style-type: none"> • 1 qualification to be reviewed and updated - CPC60115 Advanced Diploma of Building Surveying: <ul style="list-style-type: none"> ○ 17 units to be reviewed and updated • 1 qualification to be investigated for deletion - CPC80215 Graduate Diploma of Building Surveying: <ul style="list-style-type: none"> ○ 11 units investigated for expected deletion. <p>Total of 28 units. Please see Attachment A: CPC Training Components Proposed for Work for 2019-2020 for list of units.</p>	

PROJECT 4 – Concreting

<p>Description</p>	<p>To review and update the CPC30318 Certificate III in Concreting to:</p> <ul style="list-style-type: none"> • ensure core units that are updated as part of another project are still fit for this qualification and industry needs • incorporate recently released National Construction Code (NCC) updates.
<p>Rationale</p>	<p>The following drivers for change are evident for this project.</p> <p>Policy updates</p> <p>CPC30318 Certificate III in Concreting was last updated in 2018, however there are nine units in its core that are currently being reviewed in other CPC projects, and as per policy, once endorsed, will trigger a full review of the qualification to make sure they are still fit of this qualification and industry needs. These units are:</p> <ol style="list-style-type: none"> 1. CPCCCA2003 Erect and dismantle formwork for footings and slabs on ground 2. CPCCCM1012 Work effectively and sustainably in the construction industry 3. CPCCCM1013 Plan and organise work 4. CPCCCM1014 Conduct workplace communication 5. CPCCCM1015 Carry out measurements and calculations 6. CPCCCM2001 Read and interpret plans and specifications 7. CPCCCM2006 Apply basic levelling procedures 8. CPCCSF2004 Place and fix reinforcement materials 9. CPCCWHS2001 Apply WHS requirements, policies and procedures in the construction industry. <p>National Construction Code (NCC) updates</p> <p>An updated version of the NCC will be adopted in May 2019, which includes updates regarding the building of concrete structures. A major revision includes the performance of concrete during an earthquake based on lessons-learned from the earthquake in Christchurch in 2011. Considerations such as steel fibre reinforced concrete, new formulae on shrinkage and creep, a section on diaphragms and a renewed focus on fatigue, have been included.¹⁶⁰ The newest version of the NCC must be adopted by states and territories by 1 May 2019, therefore the qualification will be reviewed to ensure it accounts for appropriate use and reference of these updates.</p> <p>Enrolment data and employment outlook</p> <p>As shown in graph 2 concreters are forecast to increase in employment by 11.4% in the next 5 years.¹⁶¹ Concreting is important for the construction of most commercial and industrial buildings. This includes constructing foundations for buildings such as offices, shopping malls, casinos, hotels, airport terminals, factories and warehouses. Concreting is also used to construct multi-level flooring, and pour-on-site panels and columns. Demand from commercial and industrial building construction is projected to increase during 2018-19, providing an opportunity for the concreting industry's larger scale players to expand.¹⁶²</p>

¹⁶⁰ Australian Building Code Board, *National Construction Code*, 2019, accessed 14/01/19 from <https://ncc.abcb.gov.au/ncc-online/NCC>

¹⁶¹ Labour Market Information Portal, 2019, Data file: Occupation Projections – five years to May 2023, accessed on 22/01/2019 at:

<http://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>

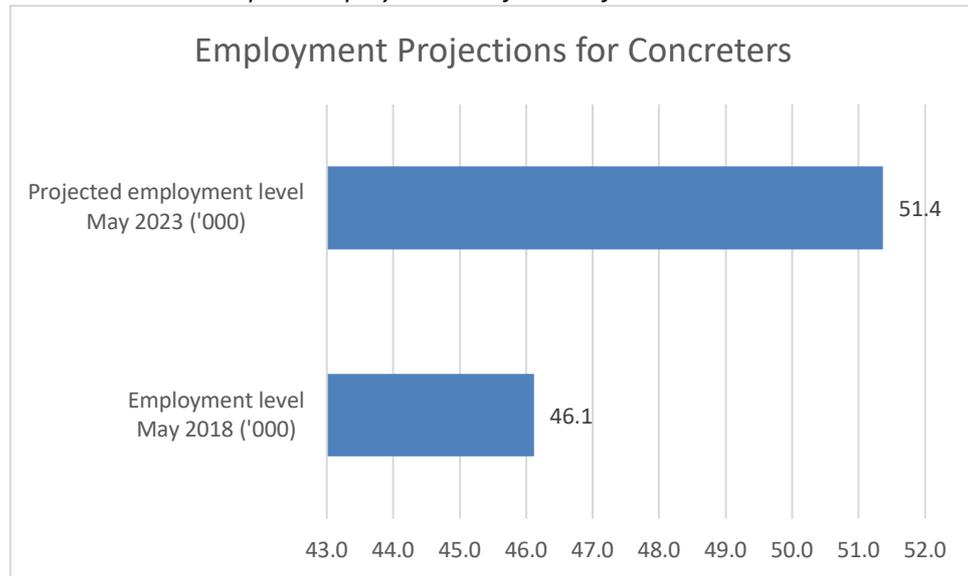
¹⁶² IBISWorld, 2018, *Concreting Services in Australia*, accessed online 08/02/2019 at:

<http://clients1.ibisworld.com.au/reports/au/industry/default.aspx?entid=319>

PROJECT 4 – Concreting

Though the trend for enrolments in the Certificate III in Concreting is an increase over the past four years, the numbers year to year are inconsistent, with a large spike in 2015. A state breakdown of the enrolment numbers shows the spike is most noticeable in VIC and QLD, which may have been a result of funding, given the low enrolment numbers in 2014. Furthermore, there are currently 53 RTOs with this qualification on scope.

Graph 2 Employment Projections for Concreters



National enrolment numbers 2014-2017

Qualification	ANZSCO Code	2014 enrolment	2015 enrolment	2016 enrolment	2017 enrolment
CPC30313 Certificate III in Concreting (superseded qualification)	821211 Concreter	920	6891	2697	2034

State enrolment numbers 2014-2015

Year	QLD	NSW	ACT	TAS	VIC	SA	WA	NT
2014	254	34	0	0	552	5	57	0
2015	3830	514	19	8	2232	21	237	0

Additionally, the tuition fees for the Certificate III in Concreting are partially, and in some cases, fully funded by all state governments except NT.¹⁶³

¹⁶³ Myskills.gov.au, *Certificate III in Concreting*, accessed online 08/02/2019 at: <https://www.myskills.gov.au/courses/details?Code=CPC30313>

PROJECT 4 – Concreting

Ministers' Priorities Addressed

The minister's priorities addressed in this project are detailed in the table below.

Reform	Action to address reform
Make more information about industry's expectations of training delivery available.	The units, assessment requirements and qualifications 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.
Ensure the training system better supports individuals to move easily from one related occupation to another.	This update will make sure that the design of the qualification strengthens pathways to related sectors including building and construction.
Improve the efficiency of the training system at a unit level so that units can be owned and used by multiple industry sectors.	This review will make sure that the nine units updated in other projects are still fit of this qualification and industry needs.

Consultation undertaken and Consultation Plan

Consultation Undertaken

The consultation undertaken for this project included one-on-one interviews with members of the Construction, Plumbing and Services IRC and an ISF survey widely promoted to industry through our website and newsletter. The interviews with IRC members provided key insights in three crucial industry priorities for the skills forecast: training package gaps, emerging trends and challenges, drivers of change and future skills needs. As time constraints limited the scope of this year's consultation process, stakeholder engagement will be an ongoing priority throughout the proposed project.

Consultation Plan

The IRC approved consultation process will be undertaken that will ensure all key stakeholders are consulted in the Concreting Project.

Detailed description of the process is outlined in Project 1.

Timeline and Key Dates

Details	Date
Expected approval by AISC of proposed work	April 2019
Project kick-off	May 2019
Consultation on draft components	May – June 2019
Establish Technical Advisory Group (TAG)	June 2019
Review feedback and update Draft Pack 1 accordingly, as per TAG advice	July 2019
Training package components put forward for consultation (Draft pack 2)	August 2019
Review feedback and update Draft Pack 2 accordingly, as per TAG advice	October 2019

PROJECT 4 – Concreting

	Training package components put forward for validation	November 2019
	Finalisation and Quality Assurance	February 2020
	Training package components sent to STAs for sign-off	April 2020
	Submitted for endorsement training package components to Commonwealth Department of Education and Training	May 2020
Summary of Project Components	<ul style="list-style-type: none"> • 1 Qualification to be reviewed and updated – CPC30318 Certificate III in Concreting: <ul style="list-style-type: none"> ○ 18 Units of Competency to be reviewed and updated (please see Attachment A: CPC Training Components Proposed for Work for 2019-2020 for list of units). 	

PROJECT 5 – Commercial Waterproofing

<p>Description</p>	<p>To develop a post-trade qualification specific to the occupational outcome of a commercial water proofer. This addresses feedback provided by industry, IRC members and Technical Advisory Group (TAG) members on a current gap in the Construction, Plumbing and Services Training Package.</p>				
<p>Rationale</p>	<p>The following drivers for change are evident for this project.</p> <p>Gap in current CPC training package</p> <p>The commercial waterproofing gap in the CPC training package was noted in a TAG meeting for the building completion services project in 2018. The building completion services project is currently reviewing and updating the CPC31411 Certificate III in Construction Waterproofing and the TAG noted that this qualification does not cover the skills and knowledge needed in the industry to design and apply complex waterproofing systems in commercial buildings, its focus is on residential waterproofing.</p> <p>Commercial waterproofing is more complex than residential waterproofing as the buildings are larger with multiple entries and exits, balconies, wet areas (kitchens and bathrooms) and levels. High rise apartment blocks are also classified as commercial buildings. The design and application of waterproofing systems for commercial buildings are therefore much more complex than residential buildings, requiring skills and knowledge not covered in CPC31411 Certificate III in Construction Waterproofing.</p> <p>Employment outlook</p> <p>Increasing demand from commercial, industrial and institutional building construction will drive the industry’s performance over the next five years.¹⁶⁴ While in the short term, the waterproofing industry is projected to decline due to deteriorating demand from the residential building sector, waterproofing in the commercial building sector is forecast to generate solid demand over the next five years, offsetting the decline in the residential sector.¹⁶⁵</p> <p>It is hard to obtain specific employment data relating to waterproofing, as it is not an occupation that is covered by the ANZSCO. The closest ANZSCO code is: 3300000 Construction Trades Workers.</p>				
<p>Ministers’ Priorities Addressed</p>	<p>The minister’s priorities addressed in this project are detailed in the table below.</p> <table border="1" data-bbox="328 1626 1428 1830"> <thead> <tr> <th data-bbox="328 1626 783 1671">Reform</th> <th data-bbox="783 1626 1428 1671">Action to address reform</th> </tr> </thead> <tbody> <tr> <td data-bbox="328 1671 783 1830"> <p>Make more information about industry’s expectations of training delivery available.</p> </td> <td data-bbox="783 1671 1428 1830"> <p>The units, assessment requirements and qualifications will be written to reflect industry expectations and the Companion Volume Implementation Guide will be updated with</p> </td> </tr> </tbody> </table>	Reform	Action to address reform	<p>Make more information about industry’s expectations of training delivery available.</p>	<p>The units, assessment requirements and qualifications will be written to reflect industry expectations and the Companion Volume Implementation Guide will be updated with</p>
Reform	Action to address reform				
<p>Make more information about industry’s expectations of training delivery available.</p>	<p>The units, assessment requirements and qualifications will be written to reflect industry expectations and the Companion Volume Implementation Guide will be updated with</p>				

¹⁶⁴ IBISWorld, 2019, *Metal Cladding, Waterproofing and Scaffolding Services in Australia*, accessed online 07/02/2019 at: <http://clients1.ibisworld.com.au/reports/au/industry/industryoutlook.aspx?entid=1870>

¹⁶⁵ IBISWorld, 2019, *Metal Cladding, Waterproofing and Scaffolding Services in Australia*, accessed online 07/02/2019 at: <http://clients1.ibisworld.com.au/reports/au/industry/industryoutlook.aspx?entid=1870>

PROJECT 5 – Commercial Waterproofing

		additional information targeted at training providers and consumers.																				
	Ensure the training system better supports individuals to move easily from one related occupation to another.	The design of the qualification will allow for links with skills and knowledge of related sectors such as residential waterproofing and building and construction.																				
	Improve the efficiency of the training system at a unit level so that units can be owned and used by multiple industry sectors.	Where appropriate, units will be taken from the existing pool of CPC units and imported from other training packages.																				
Consultation Plan	<p>Consultation Undertaken The commercial waterproofing gap in the CPC training package was initially noted in a TAG meeting for the building completion services project in 2018.</p> <p>Further consultation has been undertaken for this project, which included one-on-one interviews with members of the Construction, Plumbing and Services IRC and an ISF survey widely promoted to industry through our website and newsletter.</p> <p>Through both the IRC member interviews and ISF survey, commercial waterproofing was noted as a gap in the training package. As time constraints limited the scope of this year's consultation process, stakeholder engagement will be an ongoing priority throughout the proposed project.</p> <p>Consultation Plan The IRC approved consultation process will be undertaken that will ensure all key stakeholders are consulted in the Commercial Waterproofing Project.</p> <p><i>Detailed description of the process is outlined in Project 1.</i></p>																					
Timeline and Key Dates	<table border="1"> <thead> <tr> <th>Details</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>Expected approval by AISC of proposed work</td> <td>April 2019</td> </tr> <tr> <td>Project kick-off</td> <td>May 2019</td> </tr> <tr> <td>Consultation on draft components</td> <td>May – June 2019</td> </tr> <tr> <td>Establish Technical Advisory Group (TAG)</td> <td>June 2019</td> </tr> <tr> <td>Review feedback and update Draft Pack 1 accordingly, as per TAG advice</td> <td>July 2019</td> </tr> <tr> <td>Training package components put forward for consultation (Draft pack 2)</td> <td>August 2019</td> </tr> <tr> <td>Review feedback and update Draft Pack 2 accordingly, as per TAG advice</td> <td>October 2019</td> </tr> <tr> <td>Training package components put forward for validation</td> <td>November 2019</td> </tr> <tr> <td>Finalisation and Quality Assurance</td> <td>February 2020</td> </tr> </tbody> </table>		Details	Date	Expected approval by AISC of proposed work	April 2019	Project kick-off	May 2019	Consultation on draft components	May – June 2019	Establish Technical Advisory Group (TAG)	June 2019	Review feedback and update Draft Pack 1 accordingly, as per TAG advice	July 2019	Training package components put forward for consultation (Draft pack 2)	August 2019	Review feedback and update Draft Pack 2 accordingly, as per TAG advice	October 2019	Training package components put forward for validation	November 2019	Finalisation and Quality Assurance	February 2020
Details	Date																					
Expected approval by AISC of proposed work	April 2019																					
Project kick-off	May 2019																					
Consultation on draft components	May – June 2019																					
Establish Technical Advisory Group (TAG)	June 2019																					
Review feedback and update Draft Pack 1 accordingly, as per TAG advice	July 2019																					
Training package components put forward for consultation (Draft pack 2)	August 2019																					
Review feedback and update Draft Pack 2 accordingly, as per TAG advice	October 2019																					
Training package components put forward for validation	November 2019																					
Finalisation and Quality Assurance	February 2020																					

PROJECT 5 – Commercial Waterproofing

	Training package components sent to STAs for sign-off	April 2020
	Submitted for endorsement training package components to Commonwealth Department of Education and Training	May 2020
Summary of Project Components	<ul style="list-style-type: none"> • 1 qualification to be developed – CPC4XXXX Certificate IV in Commercial Waterproofing: <ul style="list-style-type: none"> ○ 8 new units are expected to be developed (please see Attachment A: CPC Training Components Proposed for Work for 2019-2020 for list of units). 	

PROJECT 6 – Building Information Modelling (BIM) Micro-credential

<p>Description</p>	<p>This project will develop a skill set in BIM awareness for the Construction, Plumbing and Services (CPC) Training Package. BIM is an emerging technology with the construction industry and will be a requirement across many occupations, making a micro-credential in BIM awareness an essential component of the CPC training package. Other training packages that cover occupations across the built environment will also be able to import this skill set to use as upskilling or continuous professional development.</p>
<p>Rationale</p>	<p>The following drivers for change are evident for this project.</p> <p>Emerging technology in industry creating training package gap</p> <p>BIM is the digital representation 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 professionals across the built environment – from construction to property management and maintenance – to access construction and operation information about the building.¹⁶⁶</p> <p>As discussed in the key drivers for change section, BIM has been shown to have major benefits for the construction industry. It allows for better communication between project owners, designers, subcontractors and workers on site, and is projected to completely replace current computer-aided design (CAD) systems in the future.¹⁶⁷</p> <p>Through consultation with members of the Australian BIM Advisory Board and the Construction, Plumbing and Services IRC, it was noted that BIM is an emerging technology within the construction industry, but that currently there are no units in the training package to address this. This project will therefore develop a number of BIM units into a skill set that will cover BIM awareness for the occupations covered within the Construction, Plumbing and Services Training Package.</p> <p>This skill set will be developed as a micro-credential that can be used by practitioners in other related fields such as property services, civil construction, manufacturing or electrotechnology.</p> <p>It is hard to obtain specific employment projections and data relating to how BIM is going to affect occupations, as it is still an emerging technology that is predicted to impact several occupations in a variety of ways as well as create BIM specific occupations.</p>

¹⁶⁶ Construction and Property Services Industry Skills Council, 2014, *Environmental Scan 2014-15*

¹⁶⁷ Azhar, S et al. (2012) 'Building information modeling (BIM): now and beyond', *Australasian Journal of Construction Economics and Building*, 12 (4) 15-28

PROJECT 6 – Building Information Modelling (BIM) Micro-credential

International and national uptake

BIM is a globally disruptive technology rapidly being adopted across the construction and property industries. The technology offers improved productivity, reduced waste, better control and predictability over costs and capacity to deliver comprehensible lifecycle values to all involved in the built environment. Many governments including the USA, UK, Singapore, Finland, Hong Kong, UAE and Netherlands have mandated BIM on their public projects for these reasons.

International experience suggests that the adoption of BIM impacts existing jobs, particularly pre-construction, construction management and facility management as well as creating new vocations. Singapore, which is 11 years ahead of Australia in responding to this technology has 20,000 students per year in training for the new vocation of BIM manager.

In Australia, governments have been slow to mandate BIM for public works, however, in late 2018 the Queensland (QLD) government mandated that all major government construction projects with an estimated capital cost of \$50 million or more will be required to use BIM.¹⁶⁸ Additionally, Tier One construction companies are already well advanced in BIM usage and are starting to require sub-contractors to be able to connect with this technology.

Furthermore, the Australian Procurement and Construction Council (APCC) and the Australian Construction Industry Forum (ACIF) have developed a BIM knowledge and skills framework. This framework provides guidance around the required skills and knowledge relevant to BIM for a broad range of industry workers and stakeholders.¹⁶⁹ This framework will be used as part of this project to develop the units and align with current industry thinking.

Changing legislation and regulatory environment

The recent report into the weaknesses of building and construction compliance systems (Shergold and Weir) noted that there are considerable weaknesses in the collection, storage and sharing of building records, making it difficult to access all the relevant documents about a building when needed, especially when the building has been sold.¹⁷⁰ Shergold and Weir recommend the creation of a central database by each jurisdiction for record keeping and collaboration to develop a platform that has information sharing capabilities.¹⁷¹ This is a function is best delivered through BIM.

¹⁶⁸ Queensland Government, 29 Nov 2018, *Building Information Modelling (BIM)*, accessed online 21/02/2019 at: <https://www.statedevelopment.qld.gov.au/infrastructure/building-information-modelling-bim.html>

¹⁶⁹ Australian Procurement and Construction Council (APCC), 2017, *BIM skills and knowledge framework*, accessed online 24/02/2019 at: <http://www.apcc.gov.au/SitePages/BIM%20Knowledge%20and%20Skills%20Framework.aspx>

¹⁷⁰ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*. Retrieved from <https://aibs.com.au/Public/News/2018/ShergoldWeir.aspx>

¹⁷¹ Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*. Retrieved from <https://aibs.com.au/Public/News/2018/ShergoldWeir.aspx>

PROJECT 6 – Building Information Modelling (BIM) Micro-credential

Additionally, as mentioned above, in late 2018 the QLD government mandated that all major government construction projects with an estimated capital cost of \$50 million or more will be required to use BIM.¹⁷² This will greatly increase the need for BIM management skills across the built environment, particularly as other states and territories across Australia follow QLD.

Ministers' Priorities Addressed

The minister's priorities addressed in this project are detailed in the table below.

Reform	Action to address reform
Make more information about industry's expectations of training delivery available.	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.
Ensure the training system better supports individuals to move easily from one related occupation to another.	BIM is an emerging technology that will span across many occupations that design, build, maintain or service the built environment. This project will develop a BIM awareness skill set that can be used across multiple occupations.
Improve the efficiency of the training system at a unit level so that units can be owned and used by multiple industry sectors.	This project will create units in a skill set that will be applicable across a number of sectors. The skill set and units can be imported into other training packages that cover the built environment for the micro-credentialing and upskilling of related occupations.
Foster greater recognition of skill sets.	A skill set will be developed that can be used as micro-credentials by practitioners in other related fields (property services, civil construction, manufacturing, electrotechnology). Relevant IRCs will be consulted to make sure the units work for their needs.

Consultation Undertaken and Consultation Plan

Consultation Undertaken

The consultation undertaken for this project included:

- one-on-one interviews with members of the Construction, Plumbing and Services IRC,
- an ISF survey widely promoted to industry through our website and newsletter and
- meetings with Australian BIM Advisory Board.

¹⁷² Queensland Government, 29 Nov 2018, *Building Information Modelling (BIM)*, accessed online 21/02/2019 at: <https://www.statedevelopment.qld.gov.au/infrastructure/building-information-modelling-bim.html>

PROJECT 6 – Building Information Modelling (BIM) Micro-credential

The interviews with IRC members and meetings with the Australian BIM Advisory Board noted how important BIM is as a training package gap, driver of change and future skill need in the construction industry.

As time constraints limited the scope of this year’s consultation process, further stakeholder engagement will be an ongoing priority throughout the proposed project.

Consultation Plan

The IRC approved consultation process will be undertaken that will ensure all key stakeholders are consulted in the BIM Project.

Detailed description of the process is outlined in Project 1.

Timeline and Key Dates

Details	Date
Expected approval by AISC of proposed work	April 2019
Project kick-off	May 2019
Initial project consultation	May – June 2019
Establish Technical Advisory Group (TAG)	June 2019
Review feedback and update Draft Pack 1 accordingly, as per TAG advice	July 2019
Training package components put forward for consultation (Draft pack 2)	August 2019
Review feedback and update Draft Pack 2 accordingly, as per TAG advice	October 2019
Training package components put forward for validation	November 2019
Finalisation and Quality Assurance	February 2020
Training package components sent to STAs for sign-off	April 2020
Submitted for endorsement training package components to Commonwealth Department of Education and Training	May 2020

Summary of Project Components

One new skill set will be developed:

- Introduction to Building Information Modelling
- Up to 3 new units will be developed.

Total of 3 new units to be developed.

See Attachment A: CPP Training Components Proposed for Work for 2019-2020 for list of units.

IRC Sign Off



Alan Waldron
Deputy Chair
Construction, Plumbing and Services
Industry Reference Committee
12 March 2019

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, 2019, *Occupational Skills Shortages Information*, accessed online 15/02/2019 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
- Blazevic, O., 8 Aug 2018, *What are micro credential and can they benefit you?*, training.com.au, accessed online 20/02/2019 at: <https://www.training.com.au/ed/how-micro-credentials-can-benefit-you/>
- 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
- 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>
- Doran, M., Ling R., and Milner, A., 2015, *The economic cost of suicide and non-fatal suicidal behaviour in the Australian construction industry by state and territory*, Report conducted for MATES in Construction, accessed 23/01/2019 at: <http://matesinconstruction.org.au/wp-content/uploads/2016/03/Cost-of-suicide-in-construction-industry-final-report.pdf>
- Diss, K, 23 Dec 2018, *Subcontractors are the human face of a construction industry in crisis*, ABC News, accessed online 19/02/2019 at: <https://www.abc.net.au/news/2018-12-23/the-buck-stops-here-a-construction-industry-in-crisis/10638228>
- 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
- 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
- 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, 2018, *2018 Employment Projections, Industry Employment Projections – five years to May 2023 table*, accessed online 12/01/19 at <http://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>

Labour market Information Portal, 2018, *Employment Projections, 2018 Occupational Projections – five years to May 2022 table*, accessed online 17/01/2019 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>

Milner, A. and Law, P., 2017, *Mental health in the construction industry*, MATES in Construction, accessed 23/01/2019 at: <http://matesinconstruction.org.au/commitment-to-evidence-base-practice/evidence/>

National Construction Code, 2018, accessed online 14/01/19 at: <https://www.business.gov.au/planning/templates-and-tools/industry-factsheets/national-construction-code>

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.

Roberts, JH., 18 March 2018, *Construction outlook: mining construction slowdown ripples across industry*, The Conversation, accessed online 20/02/2019 at: <https://theconversation.com/construction-outlook-mining-construction-slowdown-ripples-across-industry-55621>

Ross, D., 29 Sept 2018, *Six months until construction bust*, news.com.au, accessed online 20/02/2019 at: <https://www.news.com.au/finance/economy/australian-economy/six-months-until-construction-bust/news-story/7d006500e9d76aaa33f4301223ae1743>

Scutt, D., 19 Nov 2018, *The HIA warns Australia's housing construction downturn could get nasty unless credit continues to flow*, Business Insider, accessed online 20/02/2019 at: <https://www.businessinsider.com.au/australia-property-market-credit-squeeze-housing-construction-downturn-2018-11>

Shergold, P., & Weir, B. (2018). *Building Confidence: Improving the Effectiveness of Compliance and Enforcement Systems for the Building and Compliance Industry Across Australia*. Retrieved from <https://aibs.com.au/Public/News/2018/ShergoldWeir.aspx>

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/>

The Australian, 4 Aug 2018, *Credit crunch hits developers, builders, would be homeowners*, The Australian, accessed online 20/02/2019 at: <https://www.theaustralian.com.au/news/nation/credit-crunch-hits-developers-builders-wouldbe-homeowners/news-story/a6476d1838c1f57e60594875c76fcfc7>

UNSW, 2016, Demonishing gender structures, accessed online 18/04/2018 at
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.wbcd.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.