

artibus
INNOVATION

DEVELOPING INDUSTRY SKILLS.

**CONSTRUCTION, PLUMBING AND SERVICES
INDUSTRY REFERENCE COMMITTEE
FOUR-YEAR WORK PLAN**

September 2016

Document Control

File Location:		https://artibusinnovation.imeetcentral.com/artibusoperations/file/46610732/		
Revision History:				
Version #	Author	Summary of Changes	Date of Issue	Cleared by
0.1	Artibus Innovation	Development of first draft for submission to IRC	July 2016	DM
0.2	Artibus Innovation	Response to feedback provided by IRC and State Training Authorities	August 2016	DM
0.3	Artibus Innovation	Final draft for approval by IRC Chairperson	September 2016	DM
1.0	Artibus Innovation	Approved version for submission to the AISC	September 2016	RW
Final Approvals:				
Name	Initials	Title	Date of Issue	Version #
Robert Wilson	RW	IRC Chairperson	29 September 2016	1.0

Executive Summary

This Four Year Work Plan identifies the key skills and training requirements for the Construction, Plumbing and Services Industry for 2016 – 2020.¹ It has been prepared for the Interim Construction Industry Reference Committee by Artibus Innovation, Skills Service Organisation. Based on a national and international evidence based research model, this report offers an overview of the challenges, technological and environmental impacts and emerging opportunities affecting the industry and its skills needs.

Industry Overview

The construction industry is a driving force in the Australian economy, employing over 1,000,000 people operating in the following industry sectors:

<i>Engineering and technical services</i>	<i>Land development and site preparation</i>
<i>Building structures</i>	<i>Building installations services</i>
<i>Building completion services</i>	<i>Architectural</i>
<i>Residential building construction and non-Residential building construction</i>	<i>Other constructions services</i>

- The sector is highly transient and businesses tend to enter and exit frequently. As a consequence, many of the workers require an adaptable broad skill base to work in the sector (and sub-sectors).
- In the housing sector in particular, 450,000 Australians directly contribute to the growth of the sector.²
- A significant amount of businesses are sole-traders and or small businesses, and most of the companies in the industry are Australian owned.

Employment

- Currently, the industry accounts for 9% of the national workforce and is expected to grow to employ 1,200,000 people by 2019.
- The workforce is on average younger than the national average. The common age cohort is between 25 – 39 years.

¹ In accordance with the AISC template guidelines and in association with the Construction, Plumbing and Services Industry Reference Committee (IRC) this analysis strategically reviewed the industry's skills needs and workforce development by considering (i) key input from industry stakeholders; (ii) nation-wide industry consultations; (iii) both a qualitative and quantitative review of international and national article publications; and (iv) data from governmental sources.

² See, for example, CPC Construction Plumbing and Services Training Package: Implementation Guide. <https://vetnet.education.gov.au/Public%20Documents/FINAL%20CPC%20Implementation%20Guide%205%20June%202015.pdf>.

Skills Outlook / Emerging Trends

Analysis has identified three macro trends that are predicted to change the industry, job design and its workplace skills.

- Advances in technology are changing the industry’s skills requirements. The ‘digitalisation’ of the industry suggests that job design is undergoing an operative transformation: concreters, carpenters and other common trades are moving towards becoming ‘construction technologists.’ The impact of Building Information Modelling (BIM) cannot be overemphasised in this regard; this was a theme that was regularly cited by the industry.
- Prefabrication is changing supply chains and skill requirements. There is an increasing move towards the use of easy-to-handle, easy and quick to install prefabricated materials.
- Green building and environmental sustainability is also significantly shaping the industry, the materials and processes it uses and the skills required of its workforce.

Four-Year Plan Overview

The IRC recommends the following schedule for training package development. The plan has been developed with regard to maintaining currency as well as timely development into the future needs of the industry.

Training Package Development Plan	
Year	Assessment and Review of Qualifications/Units
2016 – 17	<ul style="list-style-type: none"> • White Card unit of competency • Carpentry, Joinery, Carpentry & Joinery qualifications • Construction, Construction Pathways qualifications • Fire Protection Inspection and Testing • Transitioning units to 2012 standards • Units for Installation of Insulation
2017 – 18	<ul style="list-style-type: none"> • Plumbing • Fire System Design • Swimming Pool and Spa Building • Bricklaying/Blocklaying, Stonemasonry and Paving • Finishing Trades • High Risk qualifications • Building Information Modelling Project (BIM)
2018 – 19	<ul style="list-style-type: none"> • Prefabrication Project • Robotics/ Automation Project
2019 – 20	<ul style="list-style-type: none"> • Building Surveying

*For a more detailed account of the Calendar Review Plan (e.g. qualification codes, units of competency etc.) see pages 32– 41 of this Construction, Plumbing and Services Four-Year Plan.

Contents

Part One – Industry Analysis	1
Administrative Information	1
Methodology	1
Industry Overview and Analysis	2
Employment	12
Skills Outlook	23
Other Relevant Skills – related insights for this sector	32
Part Two- Proposed Plan	36
Training Product Review Plan and Rationale	36
IRC Signoff	43
IRC Training Product Review Plan 2016-17 to 2019-2020	44
Construction, Plumbing and Services Industry Training Council	44
List of References	52

Part One – Industry Analysis

Administrative Information

IRC: Construction, Plumbing and Services (CPC and CPC08)

SSO: Artibus Innovation

Methodology

In preparing this work plan, Artibus Innovation has relied on a range of quantitative and qualitative data sources, which have provided a detailed insight into the skills and development issues facing the construction industry in Australia. The methodology for gathering this industry intelligence has included:

- An online survey of 321 construction industry members undertaken in June 2016, gathering both quantitative and qualitative data from employers, Registered Training Organisations (RTO's), industry regulators, and employees/students in relation to the relevance and operation of the training packages, broader industry skills needs, industry trends and technologies on the horizon;
- A review of published quantitative data from official sources such as the Australian Bureau of Statistics, federal government agencies and industry reports;
- A review of published qualitative data and articles from recognised industry publications such as Ibis World;
- Feedback from key industry players and representative bodies on the Construction, Plumbing and Services Industry Reference Committee;
- Feedback received through industry consultation on current training package review projects and general industry correspondence; and
- Use of Research Officers and Executive Officers to obtain on-the-ground feedback from industry representatives through targeted interviewing.

As a result of these methods, Artibus Innovation has obtained information from industry members in each state and territory, and from across the different user groups of the construction training packages.

Industry Overview and Analysis

The construction, plumbing and services industry is composed of a number of industry sectors, which focus on the different stages of planning, design, construction and finishing. The table below contains a breakdown of (i) each industry sector; (ii) the relevant CPC and CPC08 qualifications; (iii) an analysis of the businesses environment; (iv) the industry key stakeholders; and (v) applicable licences; and industry challenges and opportunities.

Key stakeholders at an industry level include:

- Department of Education and Training;
- Australian Industry and Skills Committee (AISC);
- Other IRCs or SSOs;
- Industry (including employers, employees, industry associations, peak bodies, and unions);
- Students;
- Ministers with portfolio responsibility for training packages;
- State Training Authorities;
- State and Territory governments;
- Registered Training Organizations (RTOs), RTO staff and RTO representative organisations;
- Relevant industry regulators and their representative cross jurisdictional organisations or committees;
- Law enforcement bodies; and
- Lobby groups.

As of June 2015, there were 309,068 businesses operating in the construction industry as a whole.³ A snapshot of the industry reveals the following:

- The great majority of industry businesses are sole-traders and small businesses that employ up to 20 people.⁴
- The great majority (>90%) of people working in the construction industry are employed by the private sector.⁵

³ Australian Bureau of Statistics: 81650 Counts of Australian Businesses, including Entries and Exits, June 2011- June 2015.

⁴ Ibid.

⁵ Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly (Table 11. Employed Persons by Industry Division of Main Job (2015).

- The industry is heavily regulated, with licensing and regulatory requirements at national, state and local level.
- The majority of businesses are Australian owned and their sales occur principally in the domestic market. There is, however, an increasing level of importation of foreign materials and labour.⁶
- The average age of the industry, though varying somewhat by sector is young - the workforce is younger than the national average, with the largest age group being 25-39 years.⁷
- For many of the industry sectors listed below, the most common qualification is a Certificate II/IV, followed by year 10 and 11 schooling, and then a Bachelor degree, reflecting the continuing importance of vocational qualifications, particularly through the channel of apprenticeships, as an industry entry point.⁸

Table 1: Sector Descriptions

Sector Descriptions	
Residential Building Construction and Non-Residential Building Construction	
Description	<p>The Residential Building Construction sector primarily involves the construction of houses or other residential buildings, or carrying out alterations, additions or renovations to these buildings, or in organising or managing these tasks.</p> <p>The Non-Residential Building Construction sector involves the construction of non-residential buildings such as hotels, motels, hostels, hospitals, prisons or other buildings, in carrying out alterations, additions or renovation to such buildings, or in organising or managing these activities.</p>
Qualifications	<p>CPC10111 Certificate I in Construction</p> <p>CPC20112 Certificate II in Construction</p> <p>CPC20211 Certificate II in Construction Pathways</p> <p>CPC40110 Certificate IV in Building and Construction (Building)</p> <p>CPC40208 Certificate IV in Building and Construction (Contract Administration)</p> <p>CPC40308 Certificate IV in Building and Construction (Estimating)</p> <p>CPC40408 Certificate IV in Building and Construction (Sales)</p>

⁶ IBISWorld: Industry Reports on Institutional Building Construction in Australia (2016) and Commercial and Industrial Building Construction in Australia (2016), Land Division and Subdivision and Site Preparation in Australia (2015-16), Concreting, Bricklaying, Roofing and Structural Steel Erection Services in Australia (2015-16), Plastering and Ceiling, Carpentry, Tiling and Carpeting, Painting and Decorating, and Glazing Services in Australia (2015-16), Construction Machinery and Operator Hire, and Metal Cladding, Waterproofing and Scaffolding Services in Australia (2015-16), Architectural, Surveying and Mapping and Specialised Design Services in Australia (2015-16).

⁷ Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly (Table 11. Employed Persons by Industry Division of Main Job (2015).

⁸ Commonwealth Department of Employment (Labour Market Information Portal): Educational Attainment by Industry Sector (2014).

Sector Descriptions	
	<p>CPC40508 Certificate IV in Building and Construction (Site Management) CPC40611 Certificate IV in Building and Construction (Specialist Trades) CPC40708 Certificate IV in Building and Construction (Trade Contracting) CPC50210 Diploma of Building and Construction (Building) CPC50308 Diploma of Building and Construction (Management) CPC60212 Advanced Diploma of Building and Construction (Management)</p> <p>(Note: other trade qualifications also apply to this sector, but are listed below in other sectors)</p>
Analysis of businesses	<p>As of 2015, there were 59,426 businesses operating in the residential building construction sector. Between 2014-15, 11,397 businesses entered the sector, and 7,708 businesses exited. 63% of all businesses are one-person operations, with a further 36% being micro-businesses (employing between 1-19 people).⁹</p> <p>There are no major dominant players in the industry, with a market share spread across a significant number of operators. In housing construction, the great majority of companies are domestically owned, while there is a growing level of foreign ownership in other residential building construction (e.g. the Australian multi-unit market).¹⁰</p> <p>As of 2015, there were 13,618 businesses operating the in non-residential sector. Between 2014-15, 2,054 businesses entered the sector, and 1,703 businesses exited. Businesses in this sector operate in areas such as institutional building construction and commercial and industrial building construction. 62% of all businesses in this sector are one-person operations and they are operating in the private sector (99% of all employees).¹¹ The sector has a low level of globalisation, although this is slowly changing.¹²</p>
Peak bodies	<p>Peak bodies for this sector include: CEPU, CFMEU, AWU, Air Conditioning and Mechanical Contractors Association, Association of Consultants in Access, Australian Industry Group, Australian Institute of Building, Australian Institute of Building Surveyors, Building Designers Australia, Elevating Work Platform of Australia, Housing Industry Association, Master Builders Association, Master Painters Association, Master Plumbers Association, Master Plumbers and Mechanical Services, National Fire Industry Association, Association of Consultants in Access.</p>
Licencing	<p>This sector operates in a highly regulated environment, which includes state and local government building standards, approvals and zoning regulations, pollution controls, competing land usage, disruption to existing businesses or residents and safety issues. Builders must be licenced according to state and territory requirements. In the non-residential sector, key players in this regulatory framework include the Australian Building Codes Board, Standards Australia, the Australian Procurement and Construction Council, Australian Institute of Building,</p>

⁹ Australian Bureau of Statistics: 81650 Counts of Australian Businesses, including Entries and Exits, June 2011- June 2015.

¹⁰ IBISWorld: Industry Reports on House Construction and Multi-Unit Apartment and Townhouse Construction in Australia (2015-16).

¹¹ Australian Bureau of Statistics: 81650 Counts of Australian Businesses, including Entries and Exits, June 2011- June 2015.

¹² IBISWorld: Industry Reports on Institutional Building Construction in Australia (2016) and Commercial and Industrial Building Construction in Australia (2016).

Sector Descriptions	
	builders' licensing authorities and industry associations. In addition to this, those undertaking government contracts must hold international quality management accreditation (ISO 9001).
Challenges and opportunities	<ul style="list-style-type: none"> • The sector is dominated by non-employing businesses and micro businesses, which has implications on the capacity to employ staff (particularly apprentices and trainees) and also for training expenditure. • Technological change is having an increasing impact on the operations of this sector, particularly in areas such as automation, use of new products and processes (e.g. prefabrication) and the use of software to manage the construction lifecycle.¹³ • Energy efficiency is also now a key consideration for the industry, supported by tightening minimum energy efficiency standards and the establishment of ratings schemes in this area. • The requirement to qualify for state or territory registration or licensing can present a real barrier for new entrants. • Businesses in this sector rely heavily on established reputations and existing relationships with networks of business contacts, which also represent a challenge for new entrants.¹⁴
Land Development and Site Preparation	
Description	This sector primarily involves subdividing land into lots and servicing land, as well as demolition and earthmoving work such as levelling construction sites, excavation of foundations, or removal of overburden.
Qualifications	CPC10111 Certificate I in Construction CPC20112 Certificate II in Construction CPC20211 Certificate II in Construction Pathways CPC30413 Certificate III in Demolition CPC41013 Certificate IV in Demolition
Analysis of businesses	As of 2015, there were 28,083 businesses operating in this sector. Between 2014-15, 3,615 businesses entered the sector, and 3,407 businesses exited. 67% of all businesses are one-person operations. ¹⁵ Many of the operators working in land development and subdivision are small-scale residential property developers. In contrast, those operators working in site preparation tend to have the majority of their operations in other industries, such as equipment and material wholesaling or manufacturing, building construction, or road and mine construction. ¹⁶
Peak bodies	AMWU, CEPU, CFMEU, Australian Workers Union, Australian Industry Group, Australian Institute of Building, Building Designers Australia, Elevating Work Platform, Master Builders Association, Housing Industry Association.
Licensing	State and local governments currently oversee industry regulation, which relates to land use zoning, treatment of waste, permitted construction

¹³ Artibus Innovation Industry Survey, June 2016.

¹⁴ IBISWorld: Industry Reports on Institutional Building Construction in Australia (2016) and Commercial and Industrial Building Construction in Australia (2016).

¹⁵ Australian Bureau of Statistics: 81650 Counts of Australian Businesses, including Entries and Exits, June 2011- June 2015.

¹⁶ IBISWorld: Industry Reports on Land Division and Subdivision and Site Preparation in Australia (2015-16).

Sector Descriptions	
	materials, population density, building design and minimum elevation of properties. Complying with these regulations necessitates a significant amount of time spent on the preparation and submission of legal paperwork and documentation. In site preparation, use of each type of site machinery generally requires endorsed licenses for operators, and state and territory authorities oversee OH&S regulations. ¹⁷
Challenges and opportunities	<ul style="list-style-type: none"> • This sector has a low level of globalisation and there is no significant international trade activity. • There is a heavy reliance on technology and machinery, with the bigger businesses in a better position to win contracts over smaller operators due to the need to access or own the necessary equipment. • Many of the employees in this sector are working in occupations such as earthmoving labourers or builder's labourers. However, there is also a need for highly skilled and specialised staff due to the high level of regulation. • This sector is highly transient and many businesses are only in the industry on a short-term basis, meaning workers need a broader skill base and to be adaptable to work in other industries.¹⁸
Building Structure Services	
Description	Relevant subsectors include concreting, bricklaying and blocklaying, roofing services and structural steel erection services.
Qualifications	CPC10111 Certificate I in Construction CPC20112 Certificate II in Construction CPC20211 Certificate II in Construction Pathways CPC20812 Certificate II in Metal Roofing and Cladding CPC30111 Certificate III in Bricklaying/Blocklaying CPC32313 Certificate III in Stonemasonry (Monumental/Installation) CPC30313 Certificate III in Concreting CPC30812 Certificate III in Roof Tiling CPC31111 Certificate III in Steel Fixing CPC31611 Certificate III in Paving
Analysis of businesses	As of 2015, there were 27,024 businesses operating in this sector. Between 2014-15, 4,238 businesses entered the sector, and 4,038 businesses exited. 56% of all businesses are one-person operations, a lower proportion of businesses compared to the industry overall. 43% of businesses are small operators employing between 1-19 employees. ¹⁹ The sector is characterised by many small-scale operators, many of which increase in size during growth phases in the housing cycle and contract accordingly. This sector also has relationships with labour hire organisations that assist in meeting the demand for labour. ²⁰

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Australian Bureau of Statistics: 81650 Counts of Australian Businesses, including Entries and Exits, June 2011- June 2015.

²⁰ IBISWorld: Industry Reports on Concreting, Bricklaying, Roofing and Structural Steel Erection Services in Australia (2015-16).

Sector Descriptions	
Peak bodies	Relevant peak bodies include: Australian Brick and Blocklaying Training Foundation, AMWU, CEPU, CFMEU, Australian Workers Union, Australian Institute of Building, Australian Industry Group, Elevating Work Platform, Housing Industry Association, Master Builders Association, Master Plumbers and Mechanical Services, Metal Roofing and Cladding Association.
Licencing	The level of regulation and licensing varies according to the trade involved, with each type of building structure services (e.g. roofing, concreting, bricklaying and structural steel erection) subject to its own building codes, insurance requirements and operator certification.
Challenges and opportunities	<ul style="list-style-type: none"> • This sector has limited formal qualifications and barriers to entry are generally low - new entrants can often enter easily from other construction trades. • There are a high number of unskilled workers employed in this sector, with approximately one third having only completed Year 10 or 11 as their highest level of educational attainment.²¹ • 99% of operators are employed by the private sector.²² • This sector of the industry has a low level of globalisation, with little prospect for international expansion.²³
Building Installation Services	
Description	Subsectors include plumbing and services, fire and security alarm installation and maintenance.
Building Installation Services	CPC20712 Certificate II in Drainage CPC20912 Certificate II in Urban Irrigation CPC32413 Certificate III in Plumbing CPC32513 Certificate III in Plumbing (Mechanical Services) CPC32612 Certificate III in Roof Plumbing CPC32713 Certificate III in Gas Fitting CPC32813 Certificate III in Fire Protection CPC40912 Certificate IV in Plumbing and Services CPC50412 Diploma of Plumbing and Services CPC50509 Diploma of Fire Systems Design CPC50612 Diploma of Hydraulic Services Design CPC80115 Graduate Certificate in Fire Systems Design Management CPP20511 Certificate II in Fire Protection Inspection and Testing CPP30811 Certificate III in Fire Protection Inspection and Testing
Analysis of businesses	As of 2015, there were 76,101 businesses operating in this sector (25,193 in plumbing services, 6,397 in air-conditioning and heating services, 3,168 in fire and security alarm installation). Between 2014-15, 10,238 businesses entered the sector, and 9,256 businesses exited. ²⁴ 48% of all

²¹ Commonwealth Department of Employment (Labour Market Information Portal): Educational Attainment by Industry Sector (2014).

²² Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly (Table 11. Employed Persons by Industry Division of Main Job (2015).

²³ IBISWorld: Industry Reports on Concreting, Bricklaying, Roofing and Structural Steel Erection Services in Australia (2015-16).

²⁴ Australian Bureau of Statistics: 81650 Counts of Australian Businesses, including Entries and Exits, June 2011- June 2015.

Sector Descriptions	
	businesses are one-person operations, a lower proportion when compared within the industry's average. Over half (51%) of businesses are small operators, with 1-19 employees. ²⁵ The plumbing services industry has the largest number of sole operators or partnerships in this sector, though in recent times, larger scale plumbing businesses have emerged, capturing larger scale contract work.
Peak bodies	Relevant peak bodies include: AMWU, CEPU, CFMEU, Australian Workers Union, Air Conditioning and Mechanical Contractors Association, Australian Institute of Building, Australian Industry Group, Building Designers Australia, Elevating Work Platform, Housing Industry Association, Master Builders Association, Master Plumbers and Mechanical Services, Metal Roofing and Cladding Association, National Fire Industry Association
Licencing	The level of regulation is heavy across each area of the sector, with stringent registration and licencing controls governing the entry of new contractors and business operations, administered separately by each state and territory.
Challenges and opportunities	<ul style="list-style-type: none"> • The degree of globalisation across this sector is low and there is low exposure to international trade.²⁶ • Despite this, significant regulatory change is predicted in the domestic air-conditioning sector as a response to international agreements on the discontinuation of use of ozone depleting refrigerants.²⁷ • Technological change is driving significant changes to job roles in some sectors (e.g. plumbing, where plumbers will need to develop skills in constructing airtight buildings and integrated plumbing systems).²⁸
Building Completion Services	
Description	Relevant subsectors include carpentry and joinery, plastering and ceiling services, tiling and lining, painting and decorating. This sector is also referred to as 'finishing trades'.
Qualifications	CPC10111 Certificate I in Construction CPC20112 Certificate II in Construction CPC20211 Certificate II in Construction Pathways CPC30211 Certificate III in Carpentry CPC30611 Certificate III in Painting and Decorating CPC31011 Certificate III in Solid Plastering CPC31211 Certificate III in Wall and Ceiling Lining CPC31511 Certificate III in Formwork/Falsework CPC31311 Certificate III in Wall and Floor Tiling CPC31812 Certificate III in Shop fitting CPC31912 Certificate III in Joinery

²⁵ Ibid.

²⁶ IBISWorld: Industry Reports on Concreting, Bricklaying, Roofing and Structural Steel Erection Services in Australia (2015-16).

²⁷ Energy Efficiency in HVACR, Australian Refrigeration Association (2016)

²⁸ Ibid.

Sector Descriptions	
	CPC32011 Certificate III in Carpentry and Joinery CPC32211 Certificate III in Joinery (Stairs)
Analysis of businesses	As of 2015, there were 93,193 businesses operating in this sector. Between 2014-15, 15,061 businesses entered the sector, and 14,287 businesses exited. 66% of all businesses are one-person operations. ²⁹ Across the subsectors of plastering and ceiling services, carpentry, glazing, tiling and carpeting, smaller firms working in localised markets dominate the industry. Tiling and painting and decorating services have a few larger players, tending to work in the commercial and institutional building markets. ³⁰
Peak bodies	Relevant peak bodies include: AMWU, CEPU, CFMEU, Australian Workers Union, Air Conditioning and Mechanical Contractors Association, Australian Institute of Building, Australian Industry Group, Building Designers Australia, Elevating Work Platform, Housing Industry Association, Master Builders Association, Master Painters Association.
Licencing	<ul style="list-style-type: none"> There is a medium level of regulation across the plastering and ceiling services, carpentry and glazing trades, with a similar regulatory environment to other building and construction trades – compliance with Australian Standards, health and safety regulations, environmental regulations (noise and waste), plus there are generally accepted pathways to qualify for entry to the industry via the traditional four-year apprenticeship model. In painting and decorating, the level of regulation is lighter, though there are still regulations governing health and safety, and paint products, and a voluntary certification program for painting contractors who are able to meet certain minimum performance standards.³¹
Challenges and opportunities	<ul style="list-style-type: none"> This area of the industry has a low level of globalisation, with little to no international trade in services, though some subsectors such as painting and glazing do import a small proportion of materials.³² Apprenticeship training, supplemented by short courses, has been the formal entry pathway to most sectors, however, a significant proportion of workers in some areas, such as plastering and ceiling services, are trained on-the-job, without formal qualifications. Increasingly, state-based licensing and insurance requirements are putting pressure on those without formal qualifications.³³
Other Construction Services	
Description	This sector mainly includes services not elsewhere classified, such as scaffolding, dogging, rigging, post-tensioning, waterproofing of buildings, and swimming pool and spa building.
Qualifications	CPC30511 Certificate III in Dogging CPC30711 Certificate III in Rigging

²⁹ Australian Bureau of Statistics: 81650 Counts of Australian Businesses, including Entries and Exits, June 2011- June 2015.

³⁰ IBISWorld: Industry Reports on Plastering and Ceiling, Carpentry, Tiling and Carpeting, Painting and Decorating, and Glazing Services in Australia (2015-16).

³¹ Ibid.

³² Ibid.

³³ Ibid.

Sector Descriptions	
	<p>CPC30911 Certificate III in Scaffolding</p> <p>CPC31411 Certificate III in Construction Waterproofing</p> <p>CPC31712 Certificate III in Post-Tensioning</p> <p>CPC32912 Certificate III in Construction Crane Operations</p> <p>CPC40808 Certificate IV in Swimming Pool and Spa Building</p>
Analysis of businesses	<p>As of 2015, there were 33,648 businesses operating in this sector. Between 2014-15, 5,271 businesses entered the sector, and 4,929 businesses exited. 60% of all businesses are one-person operations.³⁴</p> <p>This sector contains a diverse range of businesses, ranging from machinery and operator hire, to metal cladding, waterproofing, scaffolding. There is some level of foreign ownership in areas such as machinery operation and hire (e.g. crane operation companies); however, the vast majority of firms are still small to medium scale businesses, operating in narrow geographic and niche markets. Over 99% of the industry is employed in the private sector.³⁵</p>
Peak bodies	<p>Relevant peak bodies include: AMWU, CEPU, CFMEU, Australian Workers Union, Australian Institute of Building, Australian Industry Group, Building Designers Australia, Elevating Work Platform, Housing Industry Association, Master Builders Association, Australian Institute of Waterproofing, Swimming Pool and Spa Association.</p>
Licensing	<p>Across this sector, licensing requirements range from medium-heavy, given the regular use of machinery and the involvement of high-risk construction work. Contractors are required to hold formal certification in some areas, most notably in scaffolding services and for equipment operators, plus businesses must comply with a range of Australian and international Standards, occupational health and safety regulations. Relevant licenses for this sector are offered as individual units of competency by Registered Training Organisations.³⁶</p>
Challenges and opportunities	<ul style="list-style-type: none"> • The main challenges in this industry relate to equipment cost, maintenance and operation and work safety regulations. • There are a higher proportion of part-time workers in this sector than other construction services sectors, partially due to the transient nature of the work. • This sector is divided in the challenges it presents to new entrants – in some areas such as construction machinery and operator hire, there are high barriers to entry due to the high cost of purchasing and maintaining the capital equipment required and the sector's tight regulatory environment. In others, such as scaffolding, metal cladding and waterproofing businesses enter and exit the industry according to fluctuations in revenue and demand for services.³⁷ • Weather conditions, terrain and access issues, availability of equipment and delays in project commencements and timeframes all present challenges to businesses operating in this space.

³⁴ Australian Bureau of Statistics: 81650 Counts of Australian Businesses, including Entries and Exits, June 2011- June 2015.

³⁵ IBISWorld: Industry Reports on Construction Machinery and Operator Hire, and Metal Cladding, Waterproofing and Scaffolding Services in Australia (2015-16).

³⁶ Ibid.

³⁷ Ibid.

Sector Descriptions	
Architectural, Engineering and Technical Services	
Description	This sector includes building design, building surveying, and signage.
Qualifications	CPC30216 Certificate III in Signs and Graphics CPC60115 Building Surveying CPC80215 Building Surveying
Analysis of businesses	As of 2015, there were 63,024 businesses operating in this sector. Between 2014-15, there was a slight net decline in the number of businesses (<1%). 53% of businesses were non-employing as of 2015, and 45% employed between 1-19 people. ³⁸ This sector has low levels of foreign ownership and globalisation; however, this is increasing. The requirement for registration and accreditation limits import competition. Some local surveying firms also operate in international markets. ³⁹
Peak bodies	Relevant peak bodies include: AMWU, CEPU, CFMEU, Australian Workers Union, Australian Institute of Building, Australian Industry Group, Building Designers Australia, Australian Institute of Building Surveyors, Australian Sign and Graphics Association.
Licencing	<ul style="list-style-type: none"> The surveying industry is regulated by the Institute of Surveyors, and under the Mutual Recognition Act 1992 licensed surveyors may apply for registration in other states or territories. The industry operates under a broadly consistent legislation across Australia, based on the Model Building Code from the early 1990s. In 2000, the National Building and Surveying Alliance was formed to share information between builders and surveyors.⁴⁰ The signage industry is not regulated, though industry workers can apply for membership of the Australian Graphic Design Association, an organisation that also represents those working in specialised design services.
Challenges and opportunities	<ul style="list-style-type: none"> It is predicted that this sector will face a 7% decline in employment numbers in the next five years.⁴¹ The importance of technology and the high cost of equipment is a barrier to entry for the many sole traders and micro businesses bidding for contracts.⁴² The use of technology has also led to a reduction and separation between the industry occupations. While the knowledge bases remain discrete, the range of technological tools used at task level have led to skill sets that can be used across the range of occupations.

³⁸ Australian Bureau of Statistics: 81650 Counts of Australian Businesses, including Entries and Exits, June 2011- June 2015.

³⁹ IBISWorld: Industry Reports on Architectural, Surveying and Mapping and Specialised Design Services in Australia (2015-16).

⁴⁰ Ibid.

⁴¹ Commonwealth Department of Employment (Labour Market Information Portal): Industry Employment Growth and Projections by Industry Sector (2015).

⁴² IBISWorld: Industry Reports on Architectural, Surveying and Mapping and Specialised Design Services in Australia (2015-16).

Employment

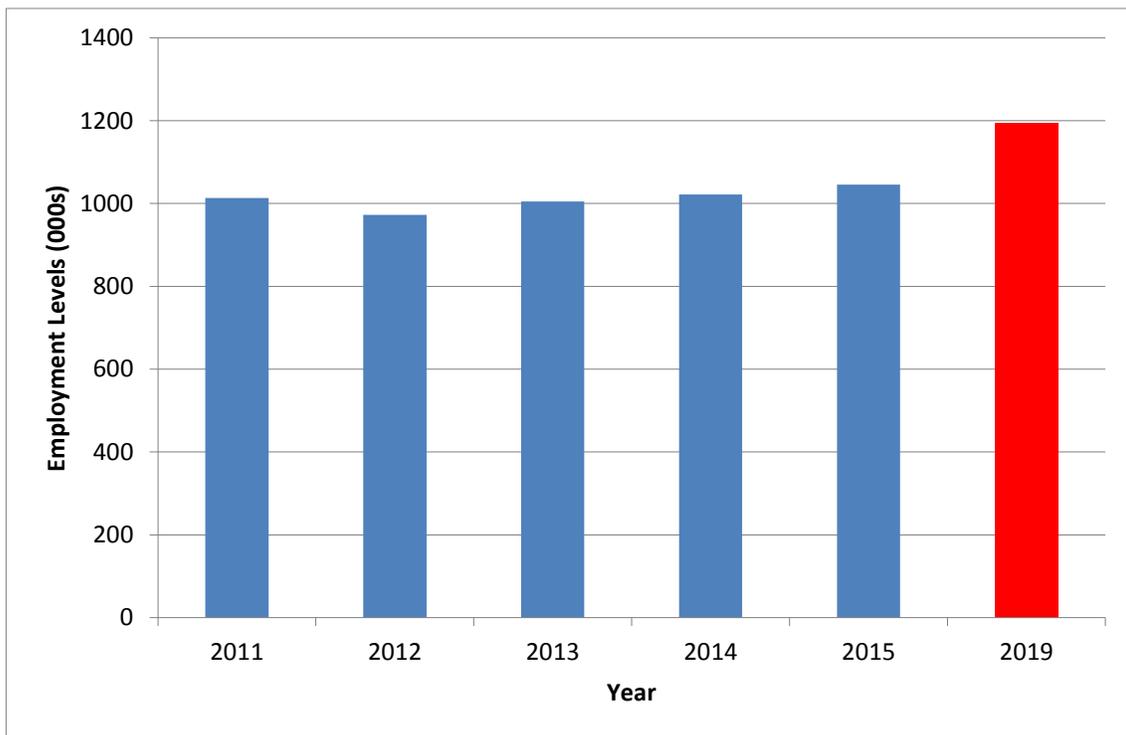
This section evaluates the employment growth of the construction industry in Australia, including the aggregate growth of the industry over a period time, the sectors and occupations which are experiencing higher than average growth rates.

Industry Analysis (ANZSIC)

The construction industry is Australia’s biggest industry by number of operating businesses, in excess of 330,000 or 16% of all businesses nationally. The industry currently employs over one million people, which accounts for 9% of the national workforce.⁴³

Overall, the industry has experienced a slight but steady increase in employment levels since 2012, and is expected to continue at this level of growth until 2019, by which time the industry will employ an estimated 1,200,000 people across the country.

Graph 1: Construction – Employment Levels (000s)⁴⁴

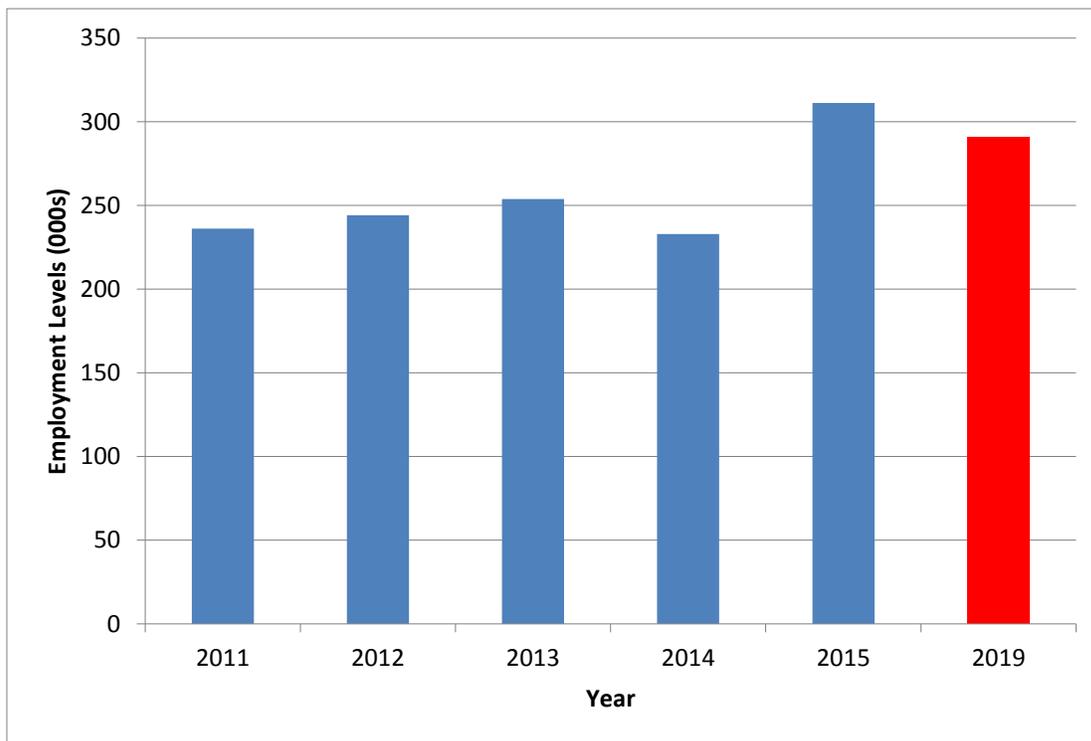


⁴³ Australian Bureau of Statistics, 2015

⁴⁴ Source: Department of Employment Labour Market Information Portal. Note: Figures are displayed at the ANZSIC Division E level. The graph includes current and historical employment levels, as well as a projected employment level by 2019.

In the more specialised area of Architectural, Engineering and Technical Services, there has been an irregular pattern of growth, including a dip in numbers in 2014 and a spike in 2015, to a height of 310,000 people. By 2019 this sector, which in the area of construction mainly includes working in signage and graphics and building surveying, is expecting moderate growth, with an estimated employment level of 290,000 people.

Graph 2: Architectural, Engineering and Technical Services – Employment Levels (000s)⁴⁵



Occupational level (ANZSCO)

Within the construction industry, selected occupation's employment rates are expected to increase over the next 3 years. The graph below details the major employing occupations in the industry, namely Carpenters and Joiners, Contract and Program Administrators, Plumbers, Construction Managers, and Structural Steel and Welding Trades Workers.⁴⁶ While representing the largest number of workers, Carpenters and Joiners have seen only moderate growth in the 5

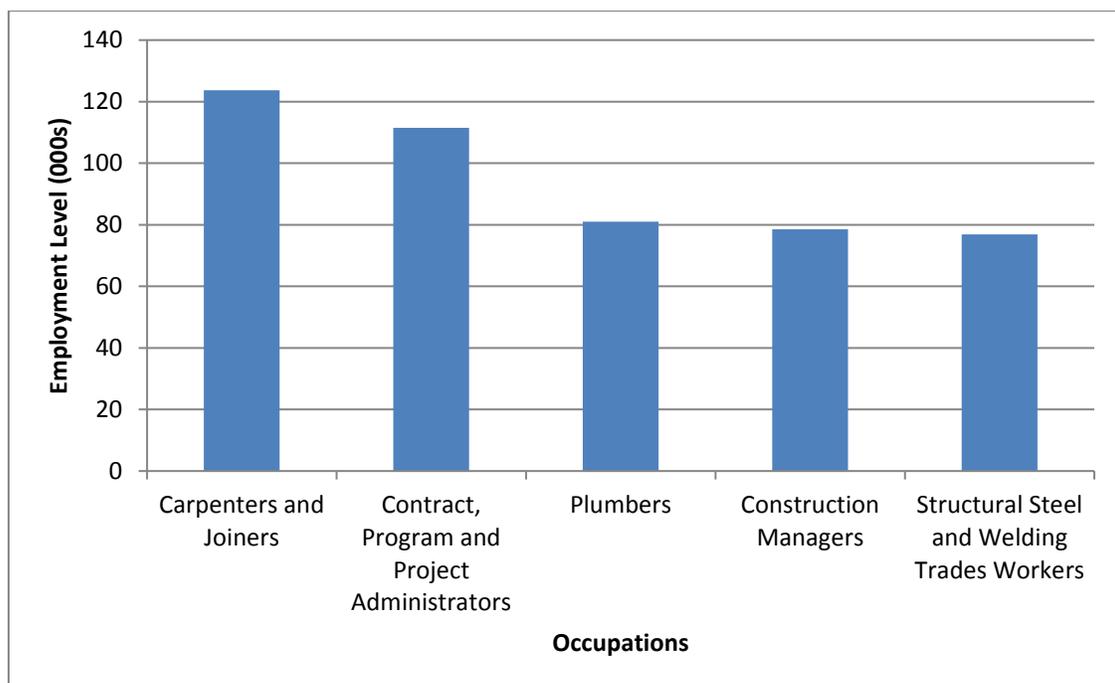
⁴⁵ Source: Department of Employment Labour Market Information Portal. Note: Figures are displayed at the ANZSIC Division 692 level. The graph includes current and historical employment levels, as well as a projected employment level by 2019.

⁴⁶ Note that these graphs represent the employment numbers of occupations across ALL industries, not just across the construction industry.

years to 2015, though they are expected to grow in numbers by 14% by the year 2019. Significant growth is also expected for Construction Managers, while Contract and Program Administrators will have more moderate growth in numbers, following some years of higher growth in numbers. Interestingly, occupations such as Plumbing and Structural Steel and Welding are estimated to pick up in numbers, following a period of no or negative growth.

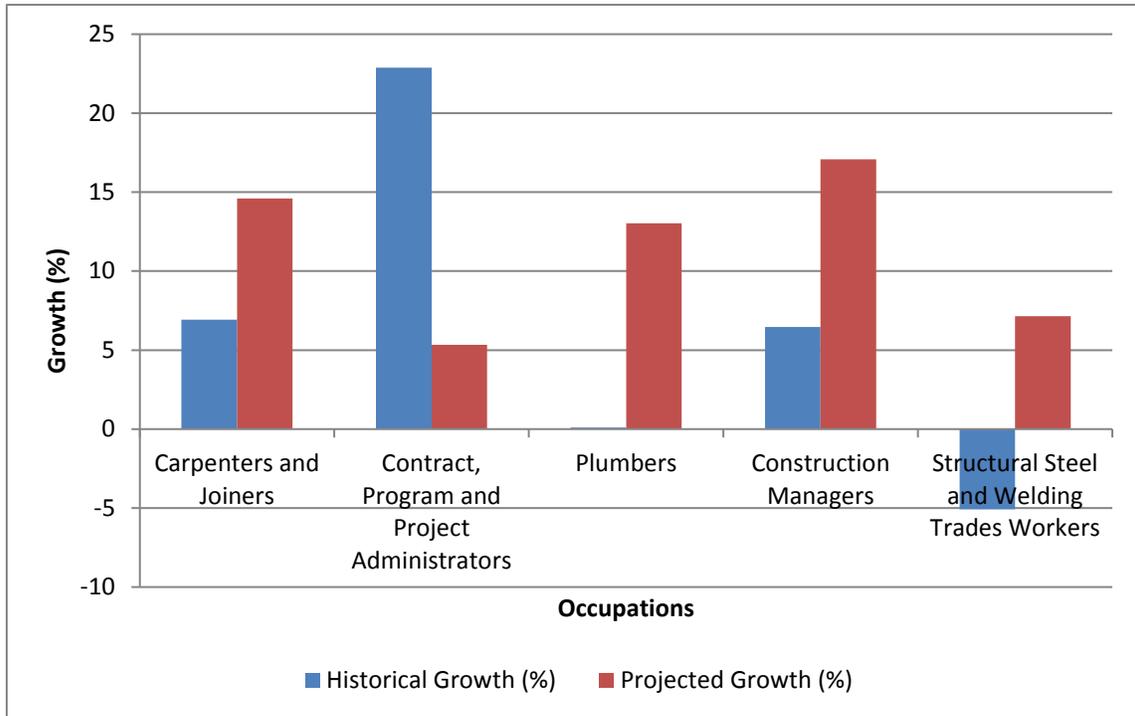
Architectural, Building and Surveying Technicians, who represent approximately 56,000 workers across all industries, is expected to grow by 9% in the next 5 years, while the smaller employment grouping of Other Building and Engineering Technicians will see stronger growth of 25% over the same period. The latter category is, however, principally employed outside the construction industry itself.

Graph 3: CPC Construction Key Occupations – Employment Levels (000s)⁴⁷



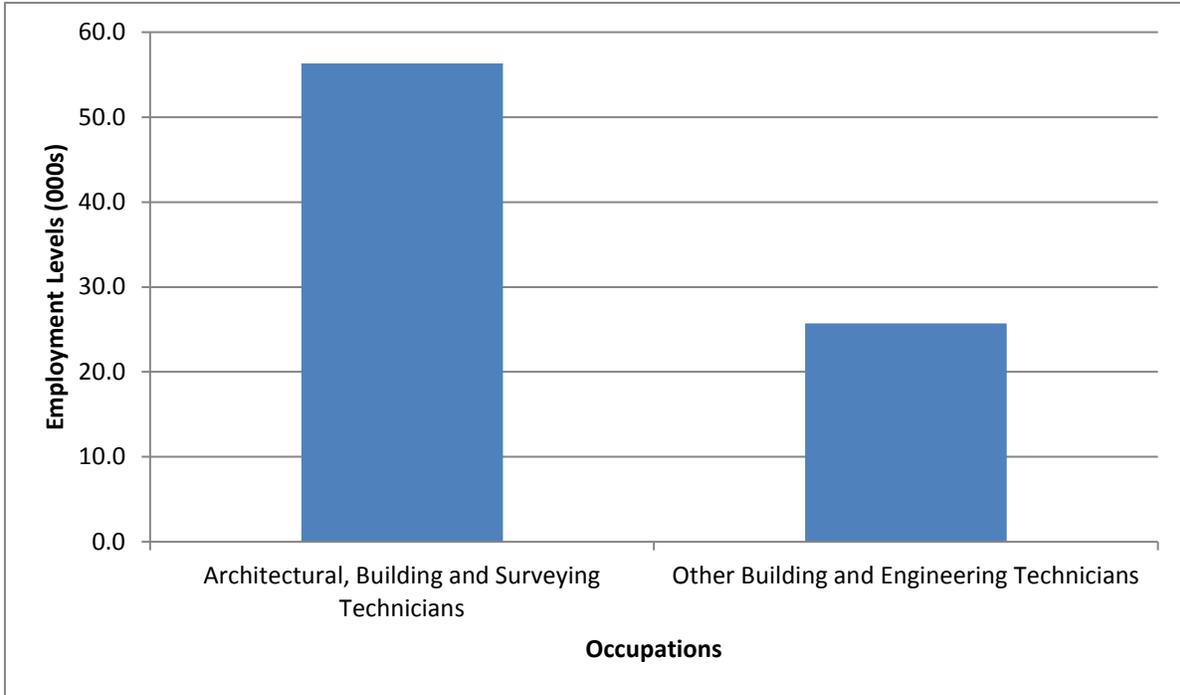
⁴⁷ Source: Australian Bureau of Statistics (ABS) Note: Occupations are at the four-digit ANZSCO code. Employment levels are the five-year annual average to 2015. Figures include all employed in the occupation across the economy, not just the relevant industry.

Graph 4: CPC Construction Key Occupations – Historical and Projected Growth (%)⁴⁸



⁴⁸ Source: Historical employment growth from the Australian Bureau of Statistics (ABS) and projected employment growth from the Department of Employment. Note: Occupations are at the four-digit ANZSCO code. The historical employment is the five-year growth rate to 2015 and the projected employment growth rate is the expected growth rate by 2019. Rates are based on figures that include all employed.

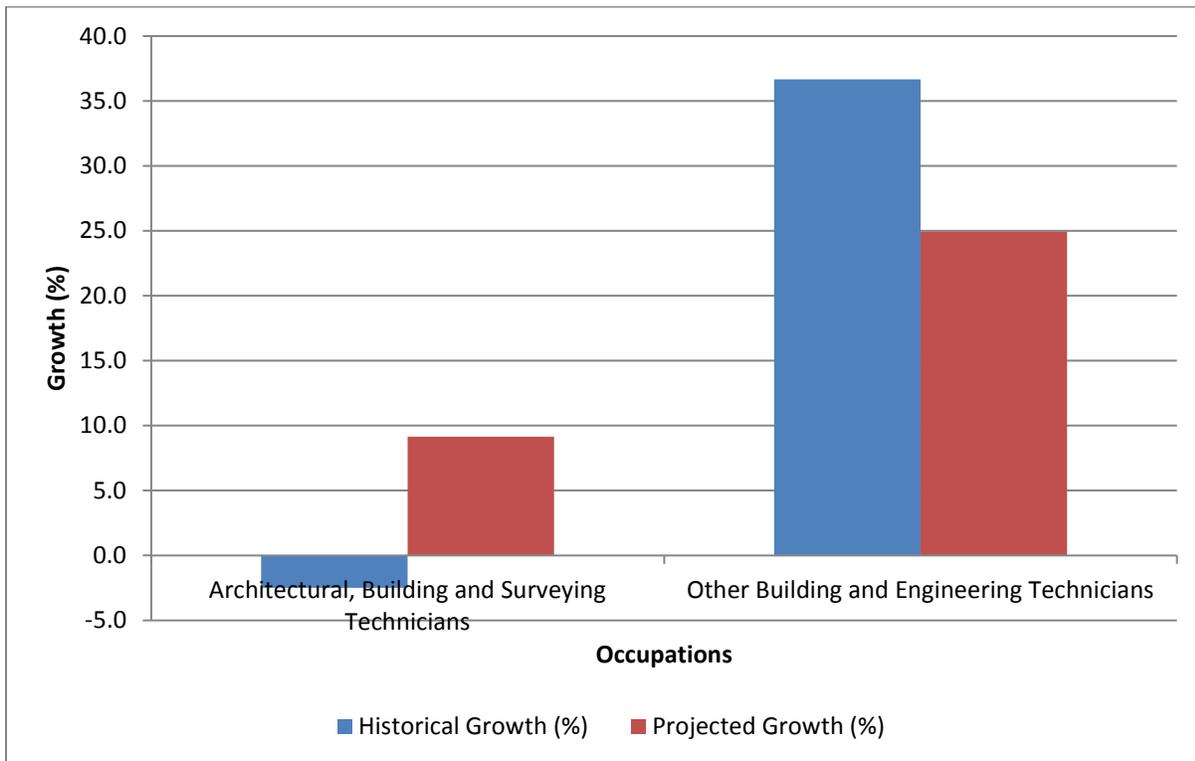
Graph 5: CPC Construction Key Occupations – Employment Levels (000s)⁴⁹



Graph 6: CPC Construction Key Occupations – Historical and Projected Growth (%)⁵⁰

⁴⁹ Source: Australian Bureau of Statistics (ABS) Note: Occupations are at the four-digit ANZSCO code. Employment levels are the five-year annual average to 2015. Figures include all employed in the occupation across the economy, not just the relevant industry.

⁵⁰ Source: Historical employment growth from the Australian Bureau of Statistics (ABS) and projected employment growth from the Department of Employment. Note: Occupations are at the four-digit ANZSCO code. The historical employment is the five-year growth rate to 2015 and the projected employment growth rate is the expected growth rate by 2019. Rates are based on figures that include all employed.



The projected employment growth for the next 5 is set out in the table below:

Table 2: Projected employment growth

Construction Industry Employment		
Key Occupational Growth in the 5 years to 2019 (%)⁵¹		
3129	Other Building and Engineering Technicians	25
8212	Concreters	19
3334	Wall and Floor Tilers	17
3333	Roof Tilers	17
1331	Construction Managers	17
3312	Carpenters and Joiners	15
3332	Plasterers	13
3341	Plumbers	13
8211	Building and Plumbing Labourers	13
3322	Painting Trades Workers	13
3996	Signwriters	11

⁵¹ Ibid.

3121	Architectural, Building and Surveying Technicians	9
7121	Crane, Hoist and Lift Operators	7
3223	Structural Steel and Welding Trades Workers	7
5111	Contract, Program and Project Administrators	5
3311	Bricklayers and Stonemasons	5
8217	Structural Steel Construction Workers	4
3125	Mechanical Engineering Draftspersons and Technicians	1

Supply-side challenges and opportunities

The construction industry in Australia faces several major issues relating to supply:

A fundamental technological shift in the nature of work

Changes in materials, processes and the level of technology applied to industry work practices are leading towards a future where traditional trades will fundamentally change and the industry will require a whole new range of skill sets to adapt to this. Thus the application of digital technology to construction leads away from ‘carpenter’, ‘bricklayer’ and ‘concreter’ towards ‘construction technologists’. 53% of industry employers responding to the recent Artibus Innovation survey recognised that emerging technologies were going to have an impact on their business and its operations over the next 1-5 years, particularly in areas such as Business Information Modelling (BIM), prefabrication, digital processes, energy and sustainability processes and new materials.

Significant oversupply/undersupply in some areas

The supply of new industry entrants must account for industry growth or decline, plus industry attrition. In some areas, such as in construction/labouring across the sectors, there is a significant oversupply of students undertaking courses for the number of entry-level positions available. In other areas, such as building structure services and building completion services, there has been a reported shortage of skills in several areas for a significant proportion of the last decade. Ensuring that there is a stream of skilled, qualified workers to meet the demands of the different sectors of the industry at any given point in time is an ongoing challenge.

The impact of licensing

In many areas of the industry regulation is heavy and can cover multiple facets of working – basic working qualifications, environmental issues, competing land use, building standards and workplace health and safety, among other areas. Not every sector requires a worker to be licensed in relation to their skills and/or experience, however, for many of the traditional trades, vocational qualifications go hand in hand with an operating license.

Demographic workforce issues

In several areas of the industry, the workforce is younger than the national average, with the most common age group being 25-39 years. VET in Schools courses in Construction have provided a stream of industry entrants with some knowledge of the industry who are keen to seek employment, however, there has been anecdotal feedback from the industry suggesting that these entrants are not necessarily “work ready” as their skills have not been developed in an industry context. Providing pathways for younger workers to progress through the industry is also important with this demographic profile, as though the industry is well catered for in terms of entry-level qualifications (principally through apprenticeships), there is far less engagement with higher-level vocational qualifications, despite the need for those who progress to management or business ownership to develop their skills and knowledge in those areas.

Supply-side challenges and opportunities – at the sectoral level	
Industry sector	Challenges/opportunities
Residential Building Construction	<ul style="list-style-type: none"> As of 2014, there were 13,310 students enrolled in CPC or CPC08 qualifications.⁵² On average, 77% of students are employed following training.⁵³

⁵² National Centre for Vocational Education Research: Data Collection on VET Students by Industry (2014-15).

⁵³ Ibid.

	<ul style="list-style-type: none"> • Skills shortages have been reported in the following areas:⁵⁴ <ul style="list-style-type: none"> ○ Construction estimator (for residential construction, requiring 5-10 years' experience) ○ Qualified stonemasons (a shortage for the past 9 years out of 10)
Non-Residential Building Construction	<ul style="list-style-type: none"> • As of 2014, there were 6,212 students enrolled in CPC or CPC08 qualifications.⁵⁵ • On average, 77% of students are employed following training.⁵⁶ • Skills shortages have been reported in the following areas:⁵⁷ <ul style="list-style-type: none"> ○ Qualified stonemasons (a shortage for the past 9 years out of 10)
Land Development and Site Preparation Services	<ul style="list-style-type: none"> • As of 2014, there were 5,057 students enrolled in CPC or CPC08 qualifications.⁵⁸ • On average, 79% of students are employed following training.⁵⁹ • 98% of businesses in this industry are either one-person operations or small businesses, which has implications for capacity to employ (particularly apprentices and trainees) and train/undertake professional development. • This sector is highly transient and many businesses are only in the industry on a short-term basis. • The level of regulation means that there is a market for highly skilled and specialised staff such as surveyors and valuers, as well as building labourers and machinery operators. • There is also a pathway issue, with the pathways available through the training system being unsuitable for industry's needs.
Building Structure Services	<ul style="list-style-type: none"> • As of 2014, there were 12,127 students enrolled in CPC or CPC08 qualifications.⁶⁰ • On average, 84% of students are employed following training.⁶¹ • Skills shortages have been reported in the following areas:⁶² <ul style="list-style-type: none"> ○ Bricklayer (shortage in 6 out of the last 10 years) ○ Roof tiler (shortage in 9 out of the last 10 years) ○ Sheet metal trades worker ((shortage in 9 out of the last 10 years) • Current enrolments in relevant courses in the CPC are very low for roof tilers and structural steel workers.⁶³ • There are low numbers enrolled in Bricklaying apprenticeships and high numbers of cancellations and withdrawals.⁶⁴

⁵⁴ Department of Employment, Skill Shortage List, Australia 2015.

⁵⁵ National Centre for Vocational Education Research: Data Collection on VET Students by Industry (2014-15).

⁵⁶ Ibid.

⁵⁷ Department of Employment, Skill Shortage List, Australia 2015.

⁵⁸ National Centre for Vocational Education Research: Data Collection on VET Students by Industry (2014-15).

⁵⁹ Ibid.

⁶⁰ Ibid.

⁶¹ Ibid.

⁶² Department of Employment, Skill Shortage List, Australia 2015.

⁶³ National Centre for Vocational Education Research: Data Collection on VET Students by Industry (2014-15).

⁶⁴ Ibid.

	<ul style="list-style-type: none"> • A high number of unskilled workers are employed in this sector, with 30% having completed year 10 and 11 as their highest level of educational attainment.⁶⁵
Building Installation Services	<ul style="list-style-type: none"> • As of 2014, there were 34,276 students enrolled in CPC or CPC08 qualifications.⁶⁶ • On average, 80% of students are employed following training.⁶⁷ • The Master Plumber’s Association advises that current and emerging skills gaps exist in some specialised plumbing areas such as type B gas and gas servicing as well as on some of the new technologies including black water and grey water treatment plants.⁶⁸
Building Completion Services	<ul style="list-style-type: none"> • As of 2014, there were 54,749 students enrolled in CPC or CPC08 qualifications.⁶⁹ • On average, 86% of students are employed following training.⁷⁰ • Despite the high numbers of students in training, the industry has reported skills shortages in the following areas:⁷¹ <ul style="list-style-type: none"> • Painting Trades Worker (shortage for 4 years over the last 10) <ul style="list-style-type: none"> ○ Solid Plasterer (shortage for 6 years over the last 10) ○ Fibrous plasterer (shortage for 4 years over the last 10) ○ Wall and floor tiler (shortage for 5 years out of the last 10) • Barriers to entry in the Plastering and Ceiling Services industry are low, as indicated by the high levels of entry and exit of establishments. The dominance of gypsum plasterboard in the cladding of walls and ceilings, in conjunction with the steady reduction of solid wet plaster over recent decades, has resulted in the level of skilled input into construction steadily diminishing. The higher levels of qualification previously needed no longer pose a prohibitive barrier to entry.⁷² • Apprenticeship training, augmented by intensive short courses, has been the formal entrance qualification to the industry, but on-the-job training is estimated to account for about 60.0% of the industry’s workforce. Experienced trade-qualified plasterers suggest that 18 months on the job is adequate training for plasterboard fixers. However, new entrants are better placed to compete on larger scale contracts or subcontracting to major building contractors if they hold formal qualifications.⁷³

⁶⁵ Commonwealth Department of Employment (Labour Market Information Portal): Educational Attainment by Industry Sector (2014).

⁶⁶ National Centre for Vocational Education Research: Data Collection on VET Students by Industry (2014-15).

⁶⁷ Ibid.

⁶⁸ Construction and Property Services Industry Skills Council: CPSCIC Environmental Scan 2015-16, Appendices (Plumbing Sector – Snapshot)

⁶⁹ National Centre for Vocational Education Research: Data Collection on VET Students by Industry (2014-15).

⁷⁰ Ibid.

⁷¹ Department of Employment, Skill Shortage List, Australia 2015.

⁷² IBISWorld: Industry Reports on Plastering and Ceiling, Carpentry, Tiling and Carpeting, Painting and Decorating, and Glazing Services in Australia (2015-16).

⁷³ Ibid.

	<ul style="list-style-type: none"> • In New South Wales, government regulations require that plasterers (along with other building industry trades) be licensed to operate, but this is not the case in other jurisdictions. • In carpentry, tradespeople trained on-the-job face increasing difficulty in contracting due to state-based licensing and insurance requirements. The National Building Professionals Register is expected to become the base prerequisite for tendering for contracts in the Carpentry Services industry and will form a barrier to new entrants without registration.⁷⁴ • In many areas of the industry, the main barrier faced by new entrants is their lack of proven reputation for reliability and quality in an industry where established contacts are so important.
Other Construction Services	<ul style="list-style-type: none"> • As of 2014, there were 5,128 students enrolled in CPC or CPC08 qualifications.⁷⁵ • On average, 81% of students are employed following training.⁷⁶ • There is a higher proportion of part-time workers in this sector than other construction services sectors, partially due to the transient nature of the work • There are low numbers of students in training in many of the relevant trades in this sector, and high numbers of apprenticeships withdrawals.⁷⁷ • Higher level courses in management are not being utilised.
Architectural, Engineering and Technical Services	<p>There are currently several qualifications from the CPC training package that fall within this sector, though there is some functional overlap between the work outcomes of these and the surveying and spatial design and surveying qualifications in the CPP (Property Services) training package. The CPC training package contains a Certificate III in Signage, an Advanced Diploma in Building Surveying, as well as a Building Surveying qualification at Bachelor Honours Degree/Graduate Certificate/Graduate Diploma level.</p> <ul style="list-style-type: none"> • As of 2014, there were 696 people enrolled in qualifications in this sector, in the Certificate III in Signage only.⁷⁸ • In this sector employees are most likely to hold a Bachelor Degree (38%).⁷⁹ • According to the Department of Employment Skills Shortage List, shortages are currently being experienced in the following occupations:⁸⁰ <ul style="list-style-type: none"> ○ surveyors (shortage in 4 years out of the last five) and

⁷⁴ Ibid.

⁷⁵ National Centre for Vocational Education Research: Data Collection on VET Students by Industry (2014-15).

⁷⁶ Ibid.

⁷⁷ Ibid.

⁷⁸ Ibid.

⁷⁹ Commonwealth Department of Employment (Labour Market Information Portal): Educational Attainment by Industry Sector (2014).

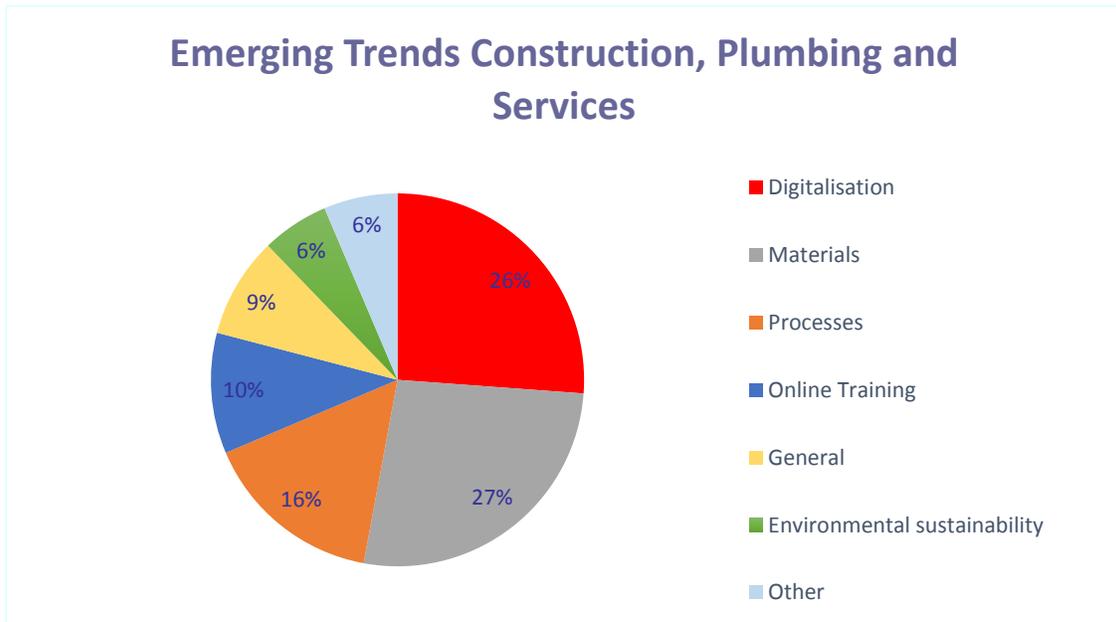
⁸⁰ Department of Employment, Skill Shortage List, Australia 2015.

	<ul style="list-style-type: none"> ○ quantity surveyors (shortage experienced in 3 years out of the last 5).
--	---

Skills Outlook

Overview

The construction industry faces a number of trends and is predicted to change drastically in the near future. Accordingly, the industry workforce requirements are predicted to change both at the occupational and skills competency level. Advances in technology, digital developments, the change towards ‘environmentally friendly’ materials, the increasing adoption of energy efficiency and sustainability practices and an ageing workforce are some of the key trends that are shaping the industry. The following analysis is a summary of the information that has been collected from the 2016 Artibus Innovation industry survey, research institutes, government sources and one-on-one consultations with key industry stakeholders. The main areas of change include: processes, materials, digitalisation and energy efficiency and sustainability. The chart below contains the results of the Artibus survey. As can be seen, the major changes in the industry revolve around materials and the digitalisation processes. These themes accounted for approximately 70% of all industry survey responses.



Changing processes

The term 'processes' refers to the way in which construction work is done. One of the most significant changes in this area is the increasing importance of pre-fabrication. Prefabrication was reported by survey respondents in every state and territory and was the most commonly mentioned trend. Major stakeholders, including construction training funds and boards around Australia, also reported prefabrication as an important trend. Prefabrication is predicted to have a significant impact on skills because the focus will shift to off-site machinery based construction, meaning less specialised skills will be required on-site.

Processes in the construction industry are also predicted to be significantly impacted by robotics and automated machinery that can complete jobs previously done by humans. For example, Construction Robotics in New York, (USA) has developed a semi-automated masonry machine, that can lay bricks three times faster than a human. Later this year, ETH Zurich will unveil a machine that produces wooden roofs (although the pieces will still need to be assembled on-site by humans). ETH Zurich is also working on creating a machine that can stack and lay ceramic tiles. In Germany the University of Kaiserslautern has developed (though not released) a robot that undertakes excavation work without human input. These technological developments may take a while to reach the Australian market; however, there will be significant consequences for workers when they do. Forrester Research published a report in 2015 that estimated that automation would eliminate 16% of all jobs in construction and extraction by 2025. The Centre for Technology Innovation in Washington DC states that the logical solution to these cuts is to prepare the workforce for the new jobs of a digital economy: to crunch data, work with software, and oversee automated machines.⁸¹

Materials

Changes in materials in this industry are extensive and ongoing. Many of these changes do not significantly impact job design. This section outlines some of the broader trends in the use of materials in this industry. For sector-specific information, please refer to table 4.

Prefabrication is also an important element of this trend. There has been a general movement towards easier-to-handle and prefabricated materials that reduce the cost and speed of construction. Another change is the substitution of traditional timber products with alternative materials, for example, engineered wood products (medium-density fibreboard, particleboards and craft wood). Glass and concrete based products are increasingly replacing steel and ceramic

⁸¹ *New Scientist* (16 January 2016), p. 22.

materials in commercial buildings, which has led to cost savings and shorter timeframes. There has also been a shift from brick-based housing to pre-fabricated concrete panels, fibre sheets, metal sheeting and polyurethane panels.

Digitalisation

Digitalisation is another theme impacting the construction industry. Digitalisation is occurring in both the day-to-day operations of construction businesses and in the equipment used in construction work. Construction businesses are increasingly adopting technology such as tablets, phones and apps to manage operational matters, (e.g. on finance, job allocation and project management). In addition, there is greater reliance on electronic tendering and procurement processes. New entrants need to be digitally competent and able to operate such technology.

Another important technological development is Building Information Modelling (BIM). BIM can provide detailed computer generated and 3D modelling of a building project, allowing interaction between architects, builders, engineers, government agencies contractors and allow for parametric change management. BIM impacts on many different sectors and streamlines the process from design to physical construction. It has been widely referenced in the Artibus Innovation industry survey and by key stakeholders and construction training funds around Australia. While it is not being used in some regional areas at this point in time, stakeholders still recommended the need to incorporate BIM into training packages content.

Other important digital developments include robotics (as discussed above), Unmanned Aerial Vehicles (UAVs) for aerial photography, hand-held global navigation satellite systems and web-based GIS, precision machine control systems and LiDAR.

Energy Efficiency and Sustainability

There is a significant and increasing focus on green building and sustainability in the Australian construction industry. Approximately 40% of survey participants indicated that there were environmental requirements, regulations and products emerging that will have an impact on training packages. Details of these changes can be viewed at a sectoral level in Table 4. Broadly, these changes include sustainability regulations or voluntary schemes (e.g. NABERS, Green star, and LEED), sustainable and renewable energy (biogas plants, solar technology and waste to energy projects), water-saving equipment, recycling of products, ozone and greenhouse gas targets.

Changing Job Roles

The Farsight Project⁸² recently undertaken by the CSIRO in conjunction with Construction Skills Queensland, reviewed the future of the construction industry in Queensland in terms of a 20-year time frame. It predicted a number of changes to traditional job roles, as well as emerging occupations which will be required, information which equally applies to the industry in other states and territories. Current occupations that are most likely to be impacted by industry changes, particularly in technology, included carpenters (insulation work), plumbers (installation of solar water heating), heating engineers, painters and plasterers (insulation, roofs and walls), roofers (solar – photo voltaic unit and thermal installation), and project managers (new issues to manage – e.g. sustainability). Possible jobs of the future include building assembly technicians, online property profile managers, construction artists, virtual/augmented reality trainers, building drone operators and robot resource managers.

The following table outlines the responses received by Artibus Innovation’s industry survey respondents in each sector of the industry when asked about technological and other developments on the horizon⁸³:

Table 4: Impacts predicted to affect the industry: An analysis across sectors

⁸² Quezada G, Bratanova, Boughen N, and Hajkowicz S, 2016. ‘Farsight for construction: Exploratory scenarios for Queensland’s construction industry to 2036’. CSIRO, Australia

⁸³ Artibus Innovation Industry Survey, June 2016.

Sector Analysis	
Sector	Specific information from the Artibus industry and stakeholder survey
Residential and Non-Residential Building Construction	<ul style="list-style-type: none"> • Cloud-based office • 3D printing • Cross laminated timber products • Structural insulated panels • Water re-use technologies • BIM • Prefabrication • Automation • Sustainability regulations (NABERS, Greenstar, LEED etc.) • Virtual reality • Collaborative methodologies • Non-conforming products • Robotics • New materials such as Hebel and preform
Land Development and Site Preparation Services	<ul style="list-style-type: none"> • Cloud-based office • 3D printing • Cross-laminated timber products • BIM • Prefabrication (modular and off-site preparation) • Use of drones • Automation and robotics • Use of technology in all construction activity, including deconstruction
Building Structure Services	<ul style="list-style-type: none"> • Concrete slabs replacing timber floors • Cross laminated and engineered timber products • Energy use technologies (batteries and solar storage, water reuse technologies) • BIM • Prefabrication • Light-weight housing • Augmented reality devices to enhance industry training

Sector Analysis	
Sector	Specific information from the Artibus industry and stakeholder survey
Building Installation Services	<ul style="list-style-type: none"> • CO testing • Electronic processing of documents • Press fit fittings for copper • Electronics in gas appliances • Electronic control of pumps • Cloud based scheduling • Sustainability and renewable energies, e.g. bio gas plants, waste to energy projects, solar energy • Pipe crimping technology and plastics • Electronic Certificates of Compliance • Push fit drainage • BPress piping systems • Pipe locating technology • Smartphone apps that affect how plumbing work is communicated • Use of non-standard materials • Type B gas fitting
Building Completion Services	<ul style="list-style-type: none"> • Cross laminated timber and massive timber buildings • Prefabrication • 3D printing • Lightweight building components and smart homes • Adhesives, CNC created components, fastenings • CLT and Cassette systems • Plastic wall and flooring components • Use of treated timber • 3D production • Wall cladding systems • Structural insulated panels • Wallpaper mural advancements • Spray technology in painting and decorating • New wall coverings • Low VOC materials and water based paints • Use of apps and other digital technologies
Other Construction Services	<ul style="list-style-type: none"> • Robotics and remote operation • Energy saving and water saving equipment • New construction materials

Sector Analysis	
Sector	Specific information from the Artibus industry and stakeholder survey
Architectural, Engineering and Technical Services	<ul style="list-style-type: none"> • Unmanned Aerial Vehicles (UAVs) and aerial photography • Hand-held global navigation satellite systems (GNSS) and web-based GIS • Precision machine control systems • Advanced total stations, scanners, database management • BIM • LiDAR • Energy efficiency requirements • NABERS, Greenstar, LEED

The following section of this four-year work plan outlines the five most important skills needs for the next 3-5 years. Several of these skills relate to the industry as a whole; some relate more closely certain sectors.

Table 5: Important Skills for the Industry

Five most important skills for the next 3-5 years		
Number	Skill	Rationale
1	Application of new materials and processes, particularly in the area of prefabrication	<p>The industry has pointed to the need for workers to have skills in planning for and applying a range of new materials and processes, based on advances in technology. This relates to new construction materials (e.g. engineered timber materials) and processes (new techniques increasing automation).</p> <p>The most significant area of change is in the use of pre-fabrication, which will require fewer on-site skills, as more work will be undertaken by machinery off-site. The increasing popularity of this approach has implications for industry training (e.g. shift in some roles from 'craftsman' to 'assembly technician' and 'project manager'). The Farsight Project reported that some major companies involved in prefabrication such as LendLease had been forced to purchase skills in prefabrication offshore due to unavailability of these skills in the domestic construction industry.⁸⁴</p>

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

2	Adoption of digital technology	There are a number of technologies, such as robotics, 3D printing and autonomous vehicles, which will impact on the skills needs of the industry in the medium-term (10-20 years). In the next 3-5 years, however, the skills need in terms of digital technology are more likely to focus on areas such as Building Information Modelling (BIM), cloud-based data storage, computing and use of augmented reality.
3	Construction and Business Management Skills	There is a continuing need for skills in construction and business management, driven by the fact that such a large proportion of the industry are single operators or small businesses, and that the traditional industry entry pathway is based on the apprenticeship model. In addition to essential skills in project management and financial management, emerging skills areas include use of peer-to-peer platforms, online and social marketing, BIM, as well as innovation management and entrepreneurial skills.
4	Working in High Risk Environments	Construction is a high-risk industry, responsible for a disproportionately high percentage of workplace injuries, diseases and fatalities for the size of the workforce. ⁸⁵ There is a need to address competencies in working with higher risk, both in high risk work specifically, on scaffolding, dogging, rigging work, work involving cranes, forklifts, reach stackers, boilers and boom-type elevating work platforms. In addition to areas such as installing pink batts, working in confined spaces (e.g. plumbing) and demolition work.
5	Application of Sustainability and Energy Efficiency Principles to Construction Work Practices	<p>Across the different sectors, the increasing importance of applying sustainability and energy efficiency principles can be seen in the following areas:</p> <ul style="list-style-type: none"> • The impact on building design standards and town planning; • The increase in demand for environmentally friendly products and buildings; • Design and construction of green buildings; • Use of sustainable materials; • Water conservation; • Wastewater recycling and treatment; • Energy efficiency assessments; and • An increase in global policies supporting sustainable construction.⁸⁶

⁸⁵ Construction Industry Profile, Safe Work Australia, 2015.

⁸⁶ Quezada G, Bratanova, Boughen N, and Hajkowicz S, 2016. 'Farsight for construction: Exploratory scenarios for Queensland's construction industry to 2036'. CSIRO, Australia.

		Industry survey respondents from each sector of the industry cited adapting to these growing environmental imperatives as an immediate concern.
--	--	---

The principal sources of information used in the compilation of this list include the whole-of-industry survey undertaken by Artibus Innovation in June 2016, intelligence gathered from the Construction, Plumbing and Services Industry Reference Committee and information obtained from current industry research reports such as Construction Skills Queensland’s Farsight Project. For a more detailed account of the other sources of information used to inform the production of this work plan, please refer to the Methodology section and the Reference List.

Table 6: Ranking of the skills

Ranking of 12 generic workforce skills (1= most important)	
Number	Skill
1	Financial
2	Entrepreneurial
3	Technology
4	Managerial / Leadership
5	Design mindset / Thinking critically / System thinking / Solving problems
6	LLN
7	Customer service / Marketing
8	STEM
9	Data analysis
10	Environmental and Sustainability
11	Communication / Virtual collaboration / Social intelligence
12	Learning agility / Information literacy / Intellectual autonomy and self-management

Other Relevant Skills – related insights for this sector

The Framework for Developing the Work Plan

The development of the plan was guided by a strategic framework. The framework recognises the connected yet diverse stakeholders of the training package (TP) and establishes an evaluation measure to guide future work on the TP.

A range of consultation methods was undertaken and triangulated. The methods included:

- An extensive literature search;
- An online survey with over 300+ responses;
- One-on-one interviews and workshop (40+); and
- Collection of responses from an online forum.

Feedback from the stakeholders was gathered to determine the following aspects:

- Current performance level of the TP;
- Determine specific areas of TP that required further improvement;
- Determine topics of relevance that are important for the future of the industry and the training needs; and
- Identify key industry skill needs.

Artibus Innovation developed and applied a model for determining the Quality, Utility and Relevance of TPs. These measures were added to the analysis.

The current performance of the Training Package (TP)

This was measured through both *Quality* and *Utility* factors.

Quality is a measurement of the TP's success to deliver its intended function(s) and is determined by assessment across all the stakeholder groups. The measure was determined through the parameter of *Customer Satisfaction*.

Utility explains the degree of effectiveness of the TP across different stakeholder groups.

Table 1, Figures 1 and 2 represent the results of these analytical methods and provides a benchmark of "Where are we now?"

Table 1: Average Satisfaction Level Across Stakeholders

User Group of TP	% Satisfaction level
RTOs	28
Employers	37
Regulators	10

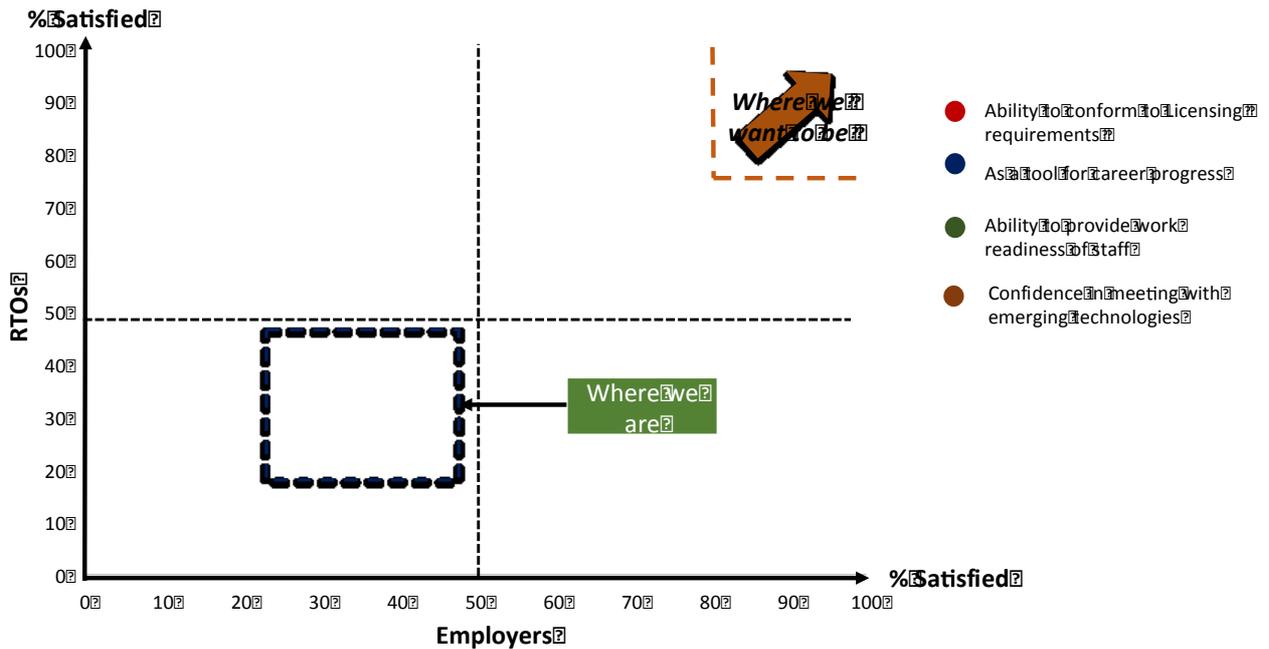


Figure 1: Utility of the Training Package: Support towards Workforce Development

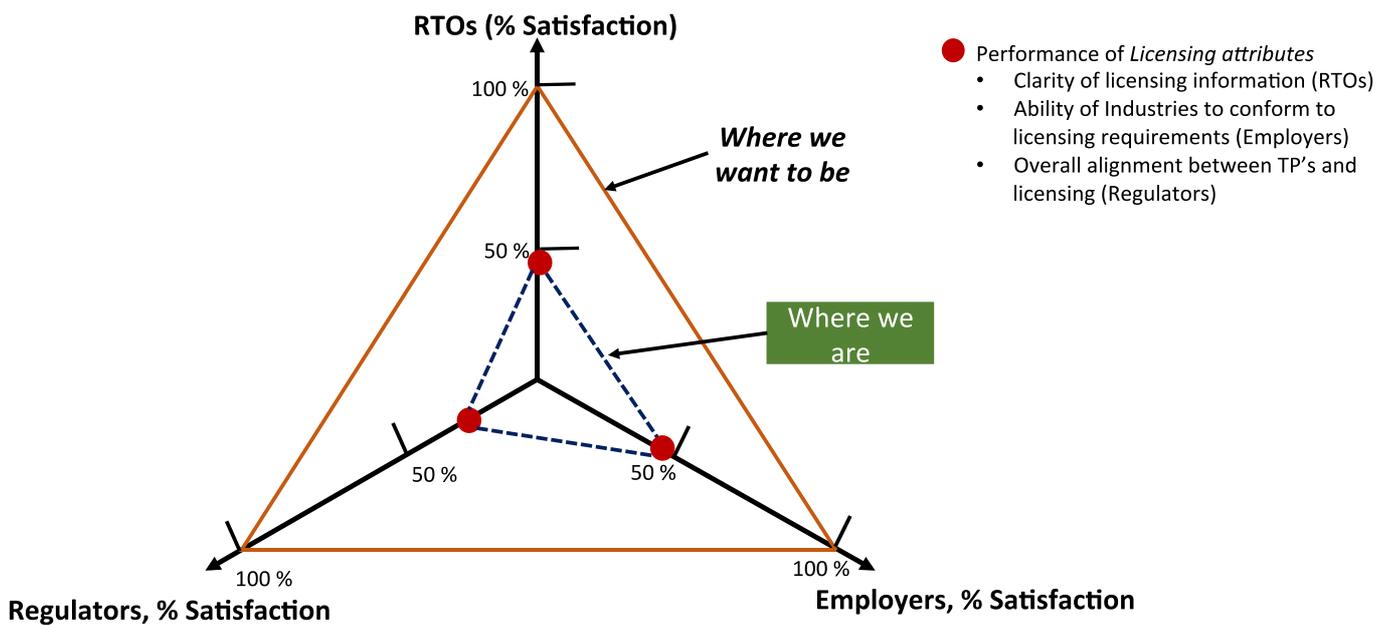


Figure 2: Utility of the Training Package: Support Towards Regulatory Framework

Looking into The Future

Macro trends such as technological advances and the adoption of environmentally sustainable practices require the industry and its occupational requirements to evolve. These trends were investigated through Topics of Relevance.

Across all stakeholders 48% acknowledged the impact of impending technologies, and 44% recognised the impact of other macro trends.

The following themes were identified as most likely to affect the future of the construction, plumbing and services industry:

- Building Information Modelling (BIM);
- Prefabrication;
- Digital processes;
- Environmentally sustainable practices; and
- New materials.

The following skills were identified as key future priorities for the industry:

- Application of new materials and processes, particularly in the area of prefabrication;
- Adoption of digital technology;
- Construction and business management skills;
- Working in high risk environments;
- Application of sustainability and energy efficiency principles; and
- Sound understanding of regulatory policies.

Planning the Future

This analysis emphasises the need to consider the following aspects in the future design of the CPC Training Package:

- The need to improve Quality aspects, e.g. clarity of language, assessment guidelines, licensing information, companion volumes and packaging rules;
- The need to improve Utility aspects, e.g. workforce development and conformation with the regulatory framework; and
- Timely incorporation of Topics of Relevance to TP content.

Part Two- Proposed Plan

Training Product Review Plan and Rationale

The first year of the four-year plan is shaded in grey. This work has been approved by the AISC and is already underway.

Work to be undertaken	Justification	Activity
2016-17		
Finalise work on the White Card so that the unit can be approved in its entirety and implemented.	<p>The White Card unit of competency has been conditionally endorsed by the AISC.</p> <p>Endorsement of a revised unit is critical as it is used extensively across multiple qualifications and across Training Packages.</p>	Finalisation requires complying with AISC conditions, including sign off from Safe Work Australia on the Companion Volume Implementation Guide referencing the White Card unit of competency.
<p>Certificate III in Concreting</p> <p>Certificate III in Post-Tensioning</p>	<p>Work is being done to ensure that the Certificate III in Concreting and Certificate III in Post Tensioning meets the 2012 Standards for Training Packages and to finalise the case for endorsement.</p> <p>The qualification will better align to industry needs while also conforming to training package standards.</p>	The IRC proposes further work and consultation so that the case can be endorsed and implemented.

<p>CPC10111 Certificate I in Construction CPC20112 Certificate II in Construction CPC20211 Certificate II in Construction Pathways CPC31912 Certificate III in Joinery CPC30211 Certificate III in Carpentry CPC32011 Certificate III in Carpentry and Joinery</p>	<p>A review of the content of the Certificate I and II qualifications is required, to examine how effectively they are supporting industry pathways and entry into traditional trade streams of the industry, as well as the genuine work-ready vocational skills of those undertaking these qualifications. The industry strongly suggests undertaking this work in conjunction with the review of the Certificate III in Joinery, Certificate III in Carpentry and Certificate III in Joinery and Carpentry.</p> <p>A proposal and rationale for this work is being prepared for submission to the Department.</p>	<p>Development of a Business Case</p>
<p>Certificate III in Joinery Certificate III in Carpentry Certificate III in Carpentry and Joinery</p>	<p>It is a priority for the IRC that the draft case for endorsement with these components be finalised and consulted to be presented to the AISC.</p>	<p>Review and potentially redevelop the Case for Endorsement, in conjunction with extensive industry consultation.</p>
<p>Translate the 11 high-risk work licensing (HRWL) units of competency to the 2012 Standards for Training Packages and ensure they meet current regulatory requirements.</p>	<p>The high-risk work licensing (HWRL) units of competency have not been transitioned to the 2012 Standards for Training Packages. These units play a significant role in many industries such as transport, mining and civil construction and are subject to regulatory and licensing requirements.</p>	<p>Prepare a Business Case</p>
<p>Review units (Install Ceiling Insulation, Install Batt Insulation Products) to consider how required training could be</p>	<p>Following the Royal Commission into Home Insulation Program (HIP) it is recommended that States and Territories consider how the</p>	<p>Undertake review of 2 units of competency, following industry consultation across states</p>

<p>provided to overcome identified deficiencies.</p>	<p>required training could be provided for those likely to enter roof spaces.</p> <p>A key Standard for both these units, AS 3999, was updated in July 2015 with both units currently referring to an old version of the standard - AS 3999:1992.</p> <p>In addition to this, insulation installation practices and procedures have undergone a recent revision process and new risk factors (e.g. solar PV installations) have been identified.</p> <p>Neither of these units has been reviewed since their respective endorsement (3027A in 2010, and 3014A in 2008).</p> <p>The reviewed units will comply with the 2012 Training Package Standards, and will promote safer practices for insulation installation.</p>	<p>and territories. Development of a Case for Endorsement for submission to the AISC.</p>
<p>CPC30413 Certificate III in Demolition CPC41013 Certificate IV in Demolition</p>	<p>Finalising a case for endorsement for submission to the AISC</p>	<p>Development of Case for Endorsement for submission to the AISC.</p>
<p>2017-18</p>		
<p>Building Information Modelling Project (BIM) in the Construction, Plumbing and Services Industry.</p>	<p>A review of Building Information Modelling (BIM) across all sectors of the construction, plumbing and services industry, considering the impact it is having on service delivery, skills needs and job design. This will be completed alongside a review of BIM in the property services industry and will identify the units of competency and qualifications that will need amendment to meet this emerging</p>	<p>Development of a Business Case.</p>

	technology. These will be identified through the current transition work being undertaken	
<p>Review of all plumbing qualifications in the CPC and CPC08:</p> <p>CPC20712 Certificate II in Drainage CPC20912 Certificate II in Urban Irrigation CPC20812 Certificate II in Metal Roofing and Cladding CPC32612 Certificate III in Roof Plumbing CPC32413 Certificate III in Plumbing CPC32513 Certificate III in Plumbing (Mechanical Services) CPC40912 Certificate IV in Plumbing and Services CPC32713 Certificate III in Gas Fitting CPC50412 Diploma of Plumbing and Services CPC50509 Diploma of Fire Systems Design CPC50612 Diploma of Hydraulic Services Design CPC80115 Graduate Certificate in Fire Systems Design Management</p>	<p>Following the CPSISC Scoping Study for the CPC08 Plumbing & Services Qualifications, recommendations were made in relation to revision of unit content and deletion of qualifications, based on extensive industry consultation.</p>	<p>Development of a Business Case.</p>
<p>CPC40808 Certificate IV in Swimming Pool and Spa Building</p>	<p>The industry has reported that the Certificate IV in Construction (Building) does not adequately address the needs of the swimming pool and spa-building sector.</p>	<p>Development of Business Case</p>

<p>CPC30111 Certificate III in Bricklaying/Blocklaying CPC32313 Certificate III in Stonemasonry (Monumental/Installation) CPC31611 Certificate III in Paving</p>	<p>Identified through past projects as an area for industry review (CPSISC Continuous Improvement Plan). Industry consultation has been undertaken in the past in this area; however, this work has not been progressed further.</p> <p>Review of industry consultation already undertaken in relation to bricklaying/blocklaying, stonemasonry and paving.</p>	<p>Development of Business Case</p>
<p>Review the Certificates in the 'Finishing Trades' CPC30611 Certificate III in Painting and Decorating CPC31011 Certificate III in Solid Plastering CPC31211 Certificate III in Wall and Ceiling Lining CPC31311 Certificate III in Wall and Floor Tiling CPC31411 Certificate III in Construction Waterproofing</p>	<p>These 5 qualifications in the finishing trades will be due for review in 2017 as part of the 4-yearly review cycle.</p> <p>Review of qualifications in painting and decorating, solid plastering, wall and ceiling lining, wall and floor tiling and construction waterproofing.</p>	<p>Development of Business Case.</p>
<p>CPC30511 Certificate III in Dogging CPC30711 Certificate III in Rigging CPC30812 Certificate III in Roof Tiling CPC30911 Certificate III in Scaffolding CPC31111 Certificate III in Steel fixing CPC32912 Certificate III in Construction Crane Operations</p>	<p>Industry feedback has revealed that there are significant inconsistencies in the use of units of competency across these qualifications.</p> <p>This set of units is due for a full review in 2017 as part of the 4-yearly review cycle.</p>	<p>Development of Business Case.</p>

	Review of qualifications in dogging, rigging, roof tiling, scaffolding, steel fixing and construction crane operations.	
2018-19		
<p>Review of Building and Construction Management qualifications:</p> <p>CPC40208 Certificate IV in Building and Construction (Contract Administration)</p> <p>CPC40308 Certificate IV in Building and Construction (Estimating)</p> <p>CPC40408 Certificate IV in Building and Construction (Sales)</p> <p>CPC40611 Certificate IV in Building and Construction (Specialist Trades)</p> <p>CPC40708 Certificate IV in Building and Construction (Trade Contracting)</p> <p>CPC50308 Diploma of Building and Construction (Management)</p> <p>CPC60212 Advanced Diploma of Building and Construction (Management)</p> <p>CPC40110 Certificate IV in Building and Construction (Building)</p> <p>CPC40508 Certificate IV in Building and Construction (Site Management)</p> <p>CPC50210 Diploma of Building and Construction (Building)</p>	<p>Business and management skills remain important to the industry, and grouping all relevant qualifications to ensure that they are part of the same review cycle for industry consultation will ensure efficiencies.</p> <p>These qualifications will be due for review between 2017 and 2018.</p>	Development of a Business Case
Prefabrication Project	Industry surveys and published industry reports have consistently highlighted the growing trend towards prefabrication in the construction industry, and pointed to the	Development of a Business Case

	<p>impact this will have on job design and relevance of qualifications.</p> <p>Examine prefabrication processes and their impact on the content of units and qualifications across the different sectors of the construction, plumbing and services training package.</p>	
Robotics and Automation Project	<p>As above, further research is required to investigate the impact of automation and robotics on industry trades and skills needs.</p> <p>Examine robotics and use of automation in the construction industry and their impact on the content of units and qualifications across the different sectors of the construction, plumbing and services training package.</p>	Development of a Business Case
2019-20		
<p>Review of Building Surveying qualifications: CPC60115 Advanced Diploma of Building Surveying</p>	<p>These qualifications will be due for review in 2019.</p>	Development of Business Case.

IRC Signoff

This Work Plan was agreed to by:

Name of Chair

Signature of Chair

Date:

IRC Training Product Review Plan 2016-17 to 2019-2020

Construction, Plumbing and Services Industry Reference Committee

Contact details: Artibus Innovation, 373 Elizabeth Street, Hobart TAS 7000. Ph: (03) 6218 2841

Date submitted to the Department of Education and Training: 29 September 2016

Planned review start (Year)	Training package code	Training package name	Qualification code	Qualification name	Unit of Competency code	Unit of competency name
IRC to recommend the most appropriate financial year in which to review the training product. E.g. – 2016-17	Note: The Department will pre-populate these fields		IRCs to complete only if they propose to review different qualifications or units of competency of a training package at different stages.			
2016-17	CPC08	Construction, Plumbing and Services			CPCCWHS100	Prepare to work safely in the construction industry

Planned review start (Year)	Training package code	Training package name	Qualification code	Qualification name	Unit of Competency code	Unit of competency name
2016-17	CPC08	Construction, Plumbing and Services	CPC30313	Certificate III in Concreting		
2016-17	CPC08	Construction, Plumbing and Services	CPC31712	Certificate III in Post Tensioning		
2016-17	CPC08	Construction, Plumbing and Services	CPC31812	Certificate III in Shopfitting		
2016-17	CPC08	Construction, Plumbing and Services	CPC32111	Certificate III in Signs and Graphics		
2016-17	CPC08	Construction, Plumbing and Services	CPC10111	Certificate I in Construction		
2016-17	CPC08	Construction, Plumbing and Services	CPC20112	Certificate II in Construction		
2016-17	CPC08	Construction, Plumbing and Services	CPC20211	Certificate I in Construction Pathways		
2016-17	CPC08	Construction, Plumbing and Services	CPC31912	Certificate III in Joinery		
2016-17	CPC08	Construction, Plumbing and Services	CPC30211	Certificate III in Carpentry		
2016-17	CPC08	Construction, Plumbing and Services	CPC32011	Certificate III in Carpentry and Joinery		
2016-17	CPC08	Construction, Plumbing and Services Training Package			CPCCLTC4001A	Licence to operate a tower crane
2016-17	CPC08	Construction, Plumbing and Services Training Package			CPCCLTC4002A	Licence to operate a

Planned review start (Year)	Training package code	Training package name	Qualification code	Qualification name	Unit of Competency code	Unit of competency name
						self-erecting tower crane
2016-17	CPC08	Construction, Plumbing and Services Training Package			CPCCLSF2001A	License to erect, alter and dismantle scaffolding basic level
2016-17	CPC08	Construction, Plumbing and Services Training Package			CPCCLSF3001A	License to erect, alter and dismantle scaffolding intermediate level
2016-17	CPC08	Construction, Plumbing and Services Training Package			CPCCLSF4001A	License to erect, alter and dismantle scaffolding advanced level
2016-17	CPC08	Construction, Plumbing and Services Training Package			CPCCLDG3001A	Licence to perform dogging
2016-17	CPC08	Construction, Plumbing and Services			CPCCLRG3001A	Licence to perform

Planned review start (Year)	Training package code	Training package name	Qualification code	Qualification name	Unit of Competency code	Unit of competency name
						rigging basic level
2016-17	CPC08	Construction, Plumbing and Services			CPCCLRG3002A	Licence to perform rigging intermediate level
2016-17	CPC08	Construction, Plumbing and Services			CPCCLRG4001A	Licence to perform rigging advanced level
2016-17	CPC08	Construction, Plumbing and Services			CPCCLHS3002A	Licence to operate a materials hoist
2016-17	CPC08	Construction, Plumbing and Services			CPCCLHS3001A	Licence to operate a personnel and materials hoist
2016-17	CPC08	Construction, Plumbing and Services			CPCCPB3027A	Install ceiling insulation
2016-17	CPC08	Construction, Plumbing and Services			CPCCPB3014A	Install batt insulation products

Planned review start (Year)	Training package code	Training package name	Qualification code	Qualification name	Unit of Competency code	Unit of competency name
2016-17	ZBE02	Boral Interior Lining	ZBE40102	Certificate IV in Boral Interior Lining Operations		
2017-18	CPC08	Construction, Plumbing and Services	CPC20712	Certificate II in Drainage		
2017-18	CPC08	Construction, Plumbing and Services	CPC20912	Certificate II in Urban Irrigation		
2017-18	CPC08	Construction, Plumbing and Services	CPC20812	Certificate II in Metal Roofing and Cladding		
2017-18	CPC08	Construction, Plumbing and Services	CPC32612	Certificate III in Roof Plumbing		
2017-18	CPC08	Construction, Plumbing and Services	CPC32413	Certificate III in Plumbing		
2017-18	CPC08	Construction, Plumbing and Services	CPC32513	Certificate III in Plumbing (Mechanical Services)		
2017-18	CPC08	Construction, Plumbing and Services	CPC40912	Certificate IV in Plumbing and Services		
2017-18	CPC08	Construction, Plumbing and Services	CPC32713	Certificate III in Gas Fitting		
2017-18	CPC08	Construction, Plumbing and Services	CPC50412	Diploma of Plumbing and Services		
2017-18	CPC08	Construction, Plumbing and Services	CPC50509	Diploma of Fire Systems Design		

Planned review start (Year)	Training package code	Training package name	Qualification code	Qualification name	Unit of Competency code	Unit of competency name
2017-18	CPC08	Construction, Plumbing and Services	CPC50612	Diploma of Hydraulic Services Design		
2017-18	CPC08	Construction, Plumbing and Services	CPC80115	Graduate Certificate in Fire Systems Design Management		
2017-18	CPC08	Construction, Plumbing and Services	CPC40808	Certificate IV in Swimming Pool and Spa Building		
2017-18	CPC08	Construction, Plumbing and Services	CPC30111	Certificate III in Bricklaying/Blocklaying		
2017-18	CPC08	Construction, Plumbing and Services	CPC32313	Certificate III in Stonemasonry (Monumental/Installation		
2017-18	CPC08	Construction, Plumbing and Services	CPC31611	Certificate III in Paving		
2017-18	CPC08	Construction, Plumbing and Services	CPC30611	Certificate III in Painting and Decorating		
2017-18	CPC08	Construction, Plumbing and Services	CPC31011	Certificate III in Solid Plastering		
2017-18	CPC08	Construction, Plumbing and Services	CPC31211	Certificate III in Wall and Ceiling Lining		
2017-18	CPC08	Construction, Plumbing and Services	CPC31311	Certificate III in Wall and Floor Tiling		
2017-18	CPC08	Construction, Plumbing and Services	CPC31411	Certificate III in Construction Waterproofing		

Planned review start (Year)	Training package code	Training package name	Qualification code	Qualification name	Unit of Competency code	Unit of competency name
2017-18	CPC08	Construction, Plumbing and Services	CPC30511	Certificate III in Dogging		
2017-18	CPC08	Construction, Plumbing and Services	CPC30711	Certificate III in Rigging		
2017-18	CPC08	Construction, Plumbing and Services	CPC30812	Certificate III in Roof Tiling		
2017-18	CPC08	Construction, Plumbing and Services	CPC30911	Certificate III in Scaffolding		
2017-18	CPC08	Construction, Plumbing and Services	CPC31111	Certificate III in Steel fixing		
2017-18	CPC08	Construction, Plumbing and Services	CPC32912	Certificate III in Construction Crane Operations		
2018-19	CPC08	Construction, Plumbing and Services	CPC40208	Certificate IV in Building and Construction (Contract Administration)		
2018-19	CPC08	Construction, Plumbing and Services	CPC40308	Certificate IV in Building and Construction (Estimating)		
2018-19	CPC08	Construction, Plumbing and Services	CPC40408	Certificate IV in Building and Construction (Sales)		
2018-19	CPC08	Construction, Plumbing and Services	CPC40611	Certificate IV in Building and Construction (Specialist Trades)		

Planned review start (Year)	Training package code	Training package name	Qualification code	Qualification name	Unit of Competency code	Unit of competency name
2018-19	CPC08	Construction, Plumbing and Services	CPC40708	Certificate IV in Building and Construction (Trade Contracting)		
2018-19	CPC08	Construction, Plumbing and Services	CPC50308	Diploma of Building and Construction (Management)		
2018-19	CPC08	Construction, Plumbing and Services	CPC60212	Advanced Diploma of Building and Construction (Management)		
2018-19	CPC08	Construction, Plumbing and Services	CPC40110	Certificate IV in Building and Construction (Building)		
2018-19	CPC08	Construction, Plumbing and Services	CPC40508	Certificate IV in Building and Construction (Site Management)		
2018-19	CPC08	Construction, Plumbing and Services	CPC50210	Diploma of Building and Construction (Building)		
2019-20	CPC	Construction, Plumbing and Services	CPC60115	Advanced Diploma of Building Surveying		
2019-20	CPC	Construction, Plumbing and Services	CPC80215	Graduate Diploma of Building Surveying		

List of References

Artibus Innovation Industry Survey, Construction, Plumbing and Services Industry, June 2016.

Australian Bureau of Statistics: 81650 Counts of Australian Businesses, including Entries and Exits, June 2011- June 2015.

Australian Bureau of Statistics: 6291.0.55.003 Labour Force, Australia, Detailed, Quarterly (Table 11. Employed Persons by Industry Division of Main Job (2015)).

Commonwealth Department of Employment (Labour Market Information Portal): Educational Attainment by Industry Sector (2014).

Commonwealth Department of Employment (Labour Market Information Portal): Industry Employment Growth and Projections by Industry Sector (2015).

Commonwealth Department of Employment, Skill Shortage List, Australia 2015.

Construction and Property Services Industry Skills Council: CPSCIC Environmental Scan 2015-16, Appendices (Plumbing Sector – Snapshot).

Construction Industry Profile, Safe Work Australia, 2015.

Energy Efficiency in HVACR, Australian Refrigeration Association (2016).

IBISWorld: Industry Reports on House Construction and Multi-Unit Apartment and Townhouse Construction in Australia (2015-16).

IBISWorld: Industry Reports on Institutional Building Construction in Australia (2016) and Commercial and Industrial Building Construction in Australia (2016).

IBISWorld: Industry Reports on Institutional Building Construction in Australia (2016) and Commercial and Industrial Building Construction in Australia (2016).

IBISWorld: Industry Reports on Land Division and Subdivision and Site Preparation in Australia (2015-16).

IBISWorld: Industry Reports on Concreting, Bricklaying, Roofing and Structural Steel Erection Services in Australia (2015-16).

IBISWorld: Industry Reports on Plastering and Ceiling, Carpentry, Tiling and Carpeting, Painting and Decorating, and Glazing Services in Australia (2015-16).

IBISWorld: Industry Reports on Plastering and Ceiling, Carpentry, Tiling and Carpeting, Painting and Decorating, and Glazing Services in Australia (2015-16).

IBISWorld: Industry Reports on Construction Machinery and Operator Hire, and Metal Cladding, Waterproofing and Scaffolding Services in Australia (2015-16).

IBISWorld: Industry Reports on Architectural, Surveying and Mapping and Specialised Design Services in Australia (2015-16).

National Centre for Vocational Education Research: Data Collection on VET Students by Industry (2014-15).

New Scientist (16 January 2016), p. 22.

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