Draft Industry Skills Forecast and Proposed Schedule of Work

Mining, Drilling and Civil Infrastructure

Industry Skills Forecast and Proposed Schedule of Work

Mining, Drilling and Civil Infrastructure

May 2018

Private & Confidential

Xxxx

Xxxx

Xxxx

Xxxx

28/04/2017

Industry Skills Forecast and Proposed Schedule of Work

The Industry Skills Forecast and Proposed Schedule of Work (ISFPSW) presented here sets out the training product development priorities for the Mining, Drilling and Civil Infrastructure (MDCI) Industry Reference Committees (IRCs) through to June 2021. It is based on research, analysis and consultations with IRC members and other stakeholders. The content in the ISFPSW draws on SkillsDMC's 2016 4-Year Work Plan for the Resources and Infrastructure Industry (RII), though information included in this report has as best as practicable been verified by PwC's Skills for Australia. This skills forecast has a particular focus on the Council of Australian Government (COAG) principles for Training Package development. The principles, and our responses to them, are described below. Training packages must:

- **Reflect identified workforce outcomes.** We have used the most recent data available in this report to come to evidence based conclusions.
- **Support national (and international) portability of skills and competencies, including reflecting licensing and regulatory requirements**. Where applicable, we advocate for nationally recognised skills in the VET sector, and realise the value of a nationalised system.
- **Reflect national agreement about the core transferable skills and core job-specific skills required for job roles as identified by industry. Industry**, through the IRCs, has provided invaluable feedback throughout the consultation process. Their input forms a key part of our findings particularly as it relates to recognising and responding to the fact individuals are unlikely to remain in the same job for life.
- **Be flexible enough to meet the diversity of individual and employer needs, including the capacity to adapt to changing job roles and workplaces**. Our approach is to look to the future, and where we can, address issues proactively including the recognition that technology and other disruptors will change employer priorities and consequently skills needs.
- **Facilitate recognition of an individual's skills and knowledge, and support movement between the school, Vocational Education and Training (VET), and higher education sectors**. Accessing vocational education from school or reskilling should be a simple and effective process. Access to education always plays a major role in our recommendations.
- **Support interpretation by training providers and others through the use of simple, concise language and clear articulation of assessment requirements**. Plain English communication shows true understanding of the subject matter. We strive to deliver clarity on complex, technical issues.

PricewaterhouseCoopers, ABN 52 780 433 757
Darling Park Tower 2, 201 Sussex Street, GPO BOX 2650, SYDNEY NSW 1171
T: +61 2 8266 0000, F: +61 2 8266 9999, www.pwc.com.au

This ISFPSW has been prepared by PwC's Skills for Australia and the MDCI IRCs.

Yours sincerely

Sara Caplan	Tony Baulderstone	Darryl Cooper	Tim Westcott	Mark Knowles	Leanne Parker
CEO	Chair	Chair	Chair	Chair	Chair
PwC's Skills for Australia	Civil Infrastructure IRC	Coal Mining IRC	Drilling IRC	Metalliferous Mining IRC	Extractive IRC

Executive summary

[To be included in final version]

Proposed Schedule of Work

Our mandate as a Skills Service Organisation (SSO) to our IRCs, as set by the Australian Industry and Skills Committee (AISC), is to review all units of competency in the RII Training Package within the four years from 2017-18 to 2020-21, although it is noted that reviews of units of competency may not necessitate change to them. Drawing on the above analysis of trends and skills needs, the SSO and IRC developed the Proposed Schedule of Work to review the relevant RII units and qualifications through to June 2021. For more information on PwC's Skills for Australia and the IRC, see Appendix A.

There are two types of projects in our Proposed Schedule of Work:

- **Training product development (TPD) projects.** These projects encompass a review of unit of competency content and are undertaken for the explicit purpose of creating or updating training products.
- **Case for change activities.** Where there is not enough current information to determine the discrete nature of the training product development work, but where the IRC identifies subject matter that needs to be examined, this kind of activity has been termed case for change activity.

The Mining, Drilling and Civil Infrastructure IRCs endorsed the following 2018-19 projects to be submitted to the AISC. The rationale for each 2018-19 project, as well as the principles used for prioritisation and scheduling are included with the full Proposed Schedule of Work in Section 4.

Table 1: Summary of Proposed Schedule of Work

Year	Project type	Status	Project Code	Project name	Units of competency for review
2018-19	Case for change activities	IRC commissioned development of a case for change	2A	Trenchless Technology	10
2018-19	Case for change activities	IRC commissioned development of a case for change	2B	Common Skills	98
2018-19	Case for change activities	IRC commissioned development of a case for change	2C	Drilling	101
2018-19	Case for change activities	IRC commissioned development of a case for change	2D	Coal	94
2018-19	Case for change activities	IRC commissioned development of a case for change	2E	Small Mining	7
2018-19	Case for change activities	IRC commissioned development of a case for change	2F	Emergency Response	22
2018-19	Case for change activities	IRC commissioned development of a case for change	2G	Exploration	11
Total units of competency in scope of review in 2018-19					**343**

Contents

1 Sector overview

1.1 The sector at a glance

The Mining Drilling and Civil Infrastructure (MDCI) sector encompasses a broad range of individuals and organisations involved in activities such as civil infrastructure, coal and metalliferous mining, drilling and quarrying. Taken together, MDCI make up Australia's largest industry sector, employing more than 1 million people[1] and contributing approximately $236.8 billion to the economy in 2016.[2] Civil infrastructure in Australia has recently been bolstered by public investment, with both state and federal governments declaring infrastructure as a definitive priority for the country.[3]

The MDCI sector has been through significant changes over the past decade, following the extensive mining boom from 2007 to 2014 during which profits in the sector soared and employment was strong. In recent times however, all industries within the MDCI sector have experienced significant changes, either in the form of renewed interest, structural change or new technologies. As these trends are set to continue, the Resources and Infrastructure Industry (RII) Training Package will play an important role in ensuring workers' skills are kept up to date and that workers are well equipped to move between roles as this sector adapts to these changes.

1.2 Sub-sectors

The MDCI sector is defined, for the purposes of this ISFPSW, as all sub-sectors related to training in the RII Training Package. These are shown in Figure 1.

Figure 1: Composition of RII by sub-sector and IRC

Source: Australian Bureau of Statistics (2017) Australian Industry by subdivision – employment data. Catalogue 81550.DO002

Civil Infrastructure

This sub-sector comprises civil and industrial infrastructure works (excluding the erection of buildings), and the following activities: road construction, plant operation, pipeline construction, trenchless technology, bridge construction, rail construction and tunnelling. Small businesses are the most common type of employer, representing the private, small scale construction businesses that service the housing market.

Employment in civil infrastructure increased by 33 per cent from 2006-07 to 2015-16, suggesting strong growth.[4] Major transport projects are occurring in Brisbane, Melbourne and Sydney, as well as rurally, with the

[1] Australian Bureau of Statistics (2017) 81550DO001_201415 Australian Industry, 2015-16

[2] Minerals Council of Australia (2016) New Research Shows the Mining and METs Sector Accounts for 15% of GDP <http://www.minerals.org.au/news/new_research_shows_the_mining_and_mets_sector_accounts_for_15_of_gdp>

[3] Budget 2017-18 *Stronger Growth* <http://budget.gov.au/2017-18/content/glossies/jobs-growth/html/jobs-growth-01.htm>

[4] Australian Bureau of Statistics (2017). *Australian Industry by subdivision 2015-16. 81550DO002*

building of the Inland Rail.[5] Strong public investment is expected to drive growth in this sub-sector over the next five years.

Coal Mining

This sub-sector covers both open cut and underground coal mining. The industry is concentrated in New South Wales (NSW) and Queensland (QLD), with the states containing 97 per cent of confirmed black coal reserves.[6] Brown coal resources are concentrated in Victoria, with around 93 per cent of confirmed brown coal reserves located in the Latrobe Valley.[7] Large scale businesses dominate the employer market in coal mining, indicating the high capital costs and scaled production required to succeed in the industry.

Drilling

This sub-sector includes both onshore and offshore drilling in oil and gas, as well as drilling in mineral exploration and production (including coal), geothermal energy production, water well drilling, civil infrastructure and agriculture. Drilling itself is a multidisciplinary industry, and shares many core skills with the other sub-sectors within the wider MDCI sector.

There are a large number of small employers in the sub-sector, with 835 small sized employers as at June 2016,[8] representing the high proportion of contractors in the industry, as well as six large incumbents with over 200 employees each. Employment in the drilling sub-sector has increased steadily from 2007 to 2016, growing from around 10,000, peaking in 2015 at 23,000, with a slight contraction back to 19,000 in 2016.[9] The sub-sector will continue to transition from a construction to production phase over the next five years, with revenues forecast to increase as production ramps up.[10] The IRC has presented anecdotal evidence that there is currently a skills shortage to meet rising demand. Future growth in this sub-sector will depend on major Liquid Natural Gas (LNG) projects, the largest being the North West Shelf Venture, Gorgon, Wheatstone, Icythus and APLNG projects.[11]

Extractive Industries (Quarrying)

Quarrying focuses on the extraction of raw materials used in building and construction, such as sand, rock, gravel and limestone. Given the abundance of these raw materials in many parts of Australia, quarrying sites are generally located close to the major sites of building and construction. As such, the sub-sector is spread across Australia.

Like Drilling, there is a large portion of small operators in the market, with 704 small employers as at June 2016.[12] There are six employers with over 200 employees in the sub-sector, conducting more complex, high capital projects. Employment in the quarrying sub-sector has remained steady over the period 2007 to 2016, at around 12,000. The economic value of the quarrying sub-sector has been increasing steadily at a rate of 14 per cent over 2007 to 2016 period.[13] The future of quarrying is directly linked to the success of the civil infrastructure and residential construction sub-sectors, as these are the primary users of the materials quarrying produces. Given that the prospects of these sub-sectors are good, the quarrying sub-sector is also expected to pick up over the next five years.

---

[5] Infrastructure Australia (2017) Infrastructure Priority List: Australian Infrastructure Plan Project and Initiative Summaries <http://infrastructureaustralia.gov.au/policy-publications/publications/files/Australian-Infrastructure-Plan-2017.pdf>

[6] Australia's Identified Mineral Resources 2016. Geoscience Australia, p. 4.

[7] Work plan

[8] Australian Bureau of Statistics (2017) 8165.0 *Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016 (*Small is defined as 1-19 employees*)*

[9] Australian Bureau of Statistics (2017) *Australian Industry by subdivision. 81550DO002*

[10] IBISWorld (March 2017) *Oil and Gas Extraction – Industry Outlook*

[11] Australian Petroleum Production & Exploration Association (2017) *Australian LNG Projects*

[12] Australian Bureau of Statistics (2017) 8165.0 *Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016*

[13] Australian Bureau of Statistics (2017) *Australian Industry by subdivision. 81550DO002*

Metalliferous Mining

This industry includes both the surface and underground mining of iron ore, copper, nickel, gold, silver and zinc. For the purposes of grouping types of mines by sub-sectors, metalliferous mining also includes the mining of gemstone, uranium and mineral sands.

There are 63 major employers in the sub-sector, each employing over 200 people. This represents the wide variety of metals mined in the sub-sector, and the different skill sets and equipment required to mine each type of resource effectively.[14] The sub-sector boomed over the period 2007 to 2016, almost doubling in employment numbers (from 34,000 to 65,000 over the period) and seeing a 92 per cent increase in the economic value.[15] In 2016, while employment remained stable, the value of the sub-sector dropped by 13 per cent, down to approximately $53 billion.[16] Though the gold price is forecast to steadily decline over the coming decade due to rising interest rates,[17] high levels of global debt and political instability, work toward keeping the price of gold inflated, resulting in higher employment in the sub-sector. The sustained demand for Australia's iron ore exports also serves to keep employment strong.

1.3 Overview by location

To understand the complexity of this broad sector, it is also important to consider the sector through a state and territory lens. Key differentiating factors between the states and territories include:

- **Distribution of resources.** Given that coal mining, drilling and metalliferous mining are fully dependent on the location of particular ores and minerals, distribution of these activities is concentrated where large, easy to access deposits of the resources are discovered.
- **Sites of major projects.** Civil infrastructure is concentrated around areas of major development, such as greenfield development areas and large scale infrastructure sites. [18] As the materials involved in the quarrying sub-sector are relatively common throughout Australia, unlike coal and metalliferous ores, quarrying activity is concentrated in close proximity to civil infrastructure. These factors mean that civil infrastructure and quarrying activity is spread across the nation.

Figure 2 illustrates the geographical distribution of learners in the RII Training Package, and workers in the MDCI sector. The distribution of workers is skewed towards New South Wales and Queensland, due to the high proportion of coal mining that occurs in these two states.

[14] Australian Bureau of Statistics (2017) *8165.0 Counts of Australian Businesses, including Entries and Exits, Jun 2012 to Jun 2016*

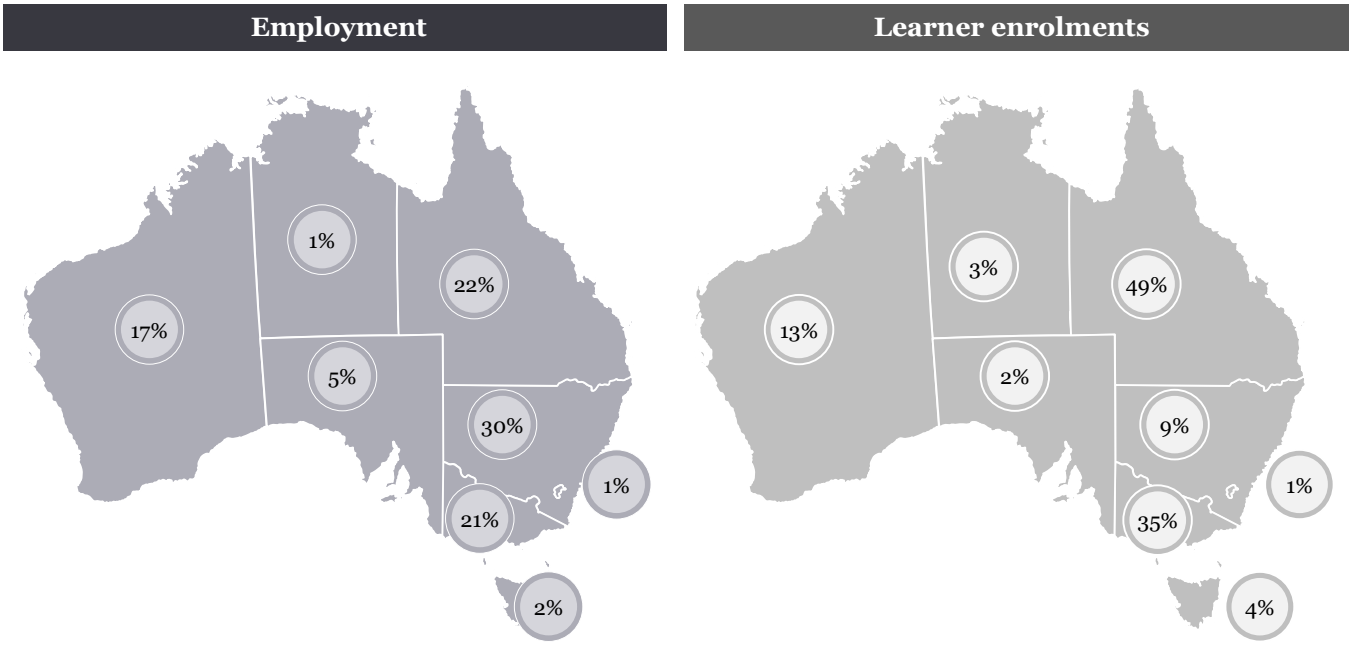
[15] Australian Bureau of Statistics (2017) *Australian Industry by subdivision. 81550DO002*

[16] Australian Bureau of Statistics (2017) *Australian Industry by subdivision. 81550DO002*

[17] World Bank Group (2017) *Commodity Markets Outlook January 2017 page 25, 31*

[18] For example, Clyde, Sunbury and Werribee in Victoria or Yanchep in Western Australia

Figure 2: Geographic spread of workers and learners



Note: Excludes all enrolments in Certificate I and II qualifications, as these qualifications are primarily used as VET in Schools training and do these do not lead as directly to occupational outcomes. The MDCI sector has been defined by individual occupations at the ANZSCO unit level (4 digit). This definition has been based upon taxonomy mapping and occupational outcomes of ICT qualifications.

Note 2: data presented at an indicative level and jurisdictions may not sum due to rounding conventions.

Source: ABS 6291.0.55.003 – Labour Force, Australia, Detailed (by occupation) November 2017, NCVER (2017) Total VET Activity 2016

The volume of learner enrolments tends to correlate with the level of industry involvement, with two notable exceptions: New South Wales and Queensland. New South Wales boasts the largest percentage of current employment in MDCI sector at 30 per cent, while learner enrolments are at 9 per cent. This may reflect the lack of reskilling in NSW, suggesting mining is well into the production phase of the life cycle, as opposed to the investment or construction phase. Conversely, Queensland has the largest percentage of enrolments at 49 per cent, whilst representing 22 percent of employment in the sector. The high percentage of enrolments is likely due to legislative requirements, but may also be in response to need for skilled construction workers for the 2018 Gold Coast Commonwealth Games, and the retraining of workers who were previously employed in major LNG plants which were completed in the last five years.

Throughout the 2016-17 financial year, Western Australia demonstrated the lowest growth rate of all Australian States and Territories, whilst also remaining below the national GDP growth rate.[19] Employment in the MDCI sector remains high relative to population, at 17 per cent, with many major mines still in the production phase. Victoria contains the second highest percentage of learner enrolments. High population growth in the state means that there is a concentration of civil infrastructure and quarrying activity in and around high growth areas, such as Melbourne. The Northern Territory may see increased employment in the sector following the commencement the Northern Gas Pipeline construction in July 2017, with the first gas scheduled to flow in late 2018.[20] Project Sea Dragon, a proposal to build the world's largest prawn farm, is also expected to go ahead, with environmental approval granted in March 2017.[21]

[19] Western Australian Treasury (2017) Gross State Product 2016-17

[20] Jemena (2018) *Northern Gas Pipeline*

[21] Sea Farms. (2018) *Project Status http://seafarms.com.au/project-status/*

1.4 Training Package profile

There are **58** qualifications in the Resources and Infrastructure Industry Training Package (see Table 2). Of the 4.2 million learners enrolled in vocational education qualifications in 2016, there were 92,204 learners enrolled in the Resources and Infrastructure Industry Training Package, comprising 2.2 per cent of all learners.[22]

1.5 Challenges and opportunities

The large international market for Australian resources in Asia presents an opportunity for Australia's Mining and Drilling industries, particularly by demand from China and India and increasing urbanisation in these countries. However, when the regions becomes increasingly developed and demand slows, the MDCI sector will need to look towards new markets, such as civil infrastructure.

At present, opportunity in civil infrastructure is largely driven by government investment domestically, with the majority of investment concentrated in large cities (Figure 4: Geographic spread of workers and learners). However the recently announced ASEAN-Australia infrastructure cooperative project may drive an increase in demand for skills in the international infrastructure sub-sector.[1]

MDCI Industry Stakeholders

PwC's Skills for Australia engages with a wide range of stakeholders relevant to the MDCI sector. A detailed list of stakeholders to be consulted per 2018-19 project can be found in Section 4.

Employer challenges and opportunities

Drawing from existing employer surveys, such as the NCVER (2017) Survey of Employers' Use and View of the VET system 2017, and ongoing consultation with industry, we are hearing two key messages from employers in the MDCI sector.

First, skills developed outside the sector are not applicable to the MDCI sector, so tailored training is required.

For example, individuals who hold maintenance qualifications obtained in a different industry sector will often need substantial retraining when they enter the resources sector. This is in part due to the size of the equipment used in the MDCI sector, the complexity and safety hazards that are often present, as well as the remote nature of much of the work in the sector, increasing the need for self-reliance.

Second, the MDCI sector is subject to increasing regulation, which increases the cost and administrative burden for employers.

Employers are often faced with the challenge of keeping up to the standards of the sector, while balancing costs, revenues and profitability. For example, on site verification of competence (VOC) has resulted in increased needs for assessor skills to facilitate VOCs. This presents an increased challenge for employers, balancing the need to demonstrate compliance in a cost effective and timely way, with achieving quality of skilling outcomes. Examples of three or more units of competency being trained and assessed in two days, rather than over a period of time alongside experience onsite, are common. Workers will often then be retrained and assessed as part of site specific inductions to ensure they can work safely and efficiently. Employers are ultimately responsible for the standard of training, bearing the cost.

Learner challenges and opportunities

To give learners the best possible opportunity to obtain viable work, it is important to understand the outcomes graduates receive from training. It is also useful to understand a basic profile of learners in the RII Training Package. A typical learner in the RII Training Package is:

[22] While data on graduate completion rates would add value to this table, completion rates data is generally less transparent than enrolment data. PwC is currently working with the MDCI IRC to gather and publish a reliable version of this data.

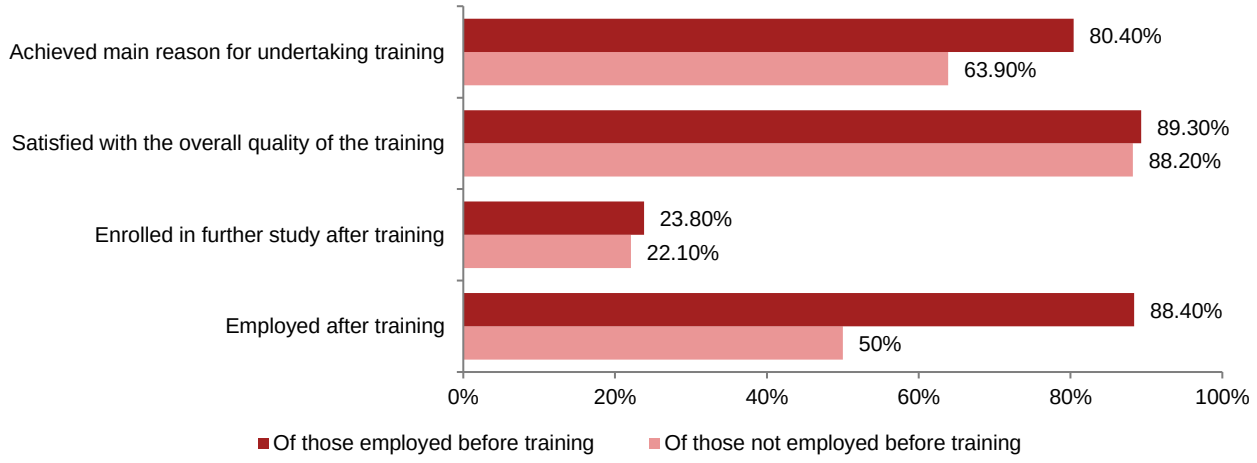
- **Predominantly male.** Males make up 91 per cent of learners in the MDCI sector, compared to approximately 50 per cent across all Training Packages.[23]
- **More likely to be Indigenous than learners of other Training Packages.** Indigenous learners make up 8 per cent of enrolments for RII Training Package, compared to 4 per cent across all Training Packages.[24]
- **In Queensland.** 56 per cent of RII qualifications are delivered in Queensland, compared to 23 per cent across all Training Packages.[25] This is in part due to the extensive legislative requirements in QLD surrounding workers.

A typical graduate from the RII Training Package is:

- **Earning more than other graduates.** Graduates from the RII Training Package earned a median salary of $67,700 in 2016, compared to $55,000 across all Training Packages.[26][27]
- **Employed at the same rate as other VET learners.** Graduates from the RII Training Package are employed at 79 per cent, whereas graduates from total VET programs are employed at 78 per cent.[28]

While data on learner outcomes is limited, one source, the NCVER survey data, gives us evidence on employment prospects.[29] A key finding from this data is that graduates of RII Training Packages are employed full time at a rate well above the VET average. 67 per cent of RII graduates have full time jobs, compared to the VET average of 47 per cent.[30]

Figure 3: MDCI sector student outcomes



Source: National Centre for Vocational Education Research (2017) *Total VET Student Outcomes*

1.6 Opportunities for future collaboration on training development across industry sectors

Training Packages are not always developed in a way that recognises the importance of skills in multiple sectors and enables them to be used to their full potential in various industry contexts. The AISC has identified several

[23] National Centre for Vocational Education Research (2017) *Students and courses Visual Analytics 2016*

[24] National Centre for Vocational Education Research (2017) *Students and courses Visual Analytics 2016*

[25] National Centre for Vocational Education Research (2017) *Students and courses Visual Analytics 2016*

[26] National Centre for Vocational Education Research (2017) *Employment outcomes after training Visual Analytics 2016*

[27] National Centre for Vocational Education Research (2017) *VET Graduate Outcomes 2017*

[28] National Centre for Vocational Education Research (2017) *Total VET graduate outcomes information 2017*

[29] NCVER (2017) Government-funded student outcomes.

[30] National Centre for Vocational Education Research (2017)a *Employment outcomes after training 2016*

cross sector skill areas where opportunities exist to create flexible and transferable package components that will benefit industry, learners and the broader VET sector.

PwC's Skills for Australia has been commissioned to develop Training Package components that address skill needs across industries in four cross sector skill areas: Cyber Security, Big Data, Teamwork and Communication, and Inclusion of People with Disability in VET. The expected outcomes of these cross sector projects include:

- significant reduction in the level of duplication across the national training system
- better support for individuals to move between related occupations
- improved flexibility and efficiency in Australia's VET system.

Table 2 below identifies opportunities for linkages between existing cross sector project work and the RII Training Package.

Table 2: Training development opportunities across industry sectors

Cross sector projects	Project description	Link to RII Training Package
Automation	Automated processes and the use of robotics, drones and remote operations systems.	Increased awareness of automation will be included in relevant units of competency, especially mobile plant operations. There may also be an opportunity to utilise units relating to drone operations within the RII Training Package.
Big Data	Data management, data analytics and data driven decision-making. Businesses are placing growing emphasis on the capture, storage and utilisation of this data, particularly with regards to decision-making and marketing.	May impact units of competency relating to supervisory skills as more data from machinery and operations is available to assist with monitoring mine sites.
Cyber Security	Information security, data protection and privacy.	The increasing use of the internet and wireless technology will result in new cyber security challenges. This challenge is beyond the scope of the RII Training Packages and will need to be addressed by individual manufacturers.
Digital Skills	Digital literacy; 3D printing /additive manufacturing; and coding skills.	New units of competency will be particularly relevant to the RII Training Packages as digital literacy becomes a prerequisite to working in the MDCI sector and existing workers require upskilling.
Environmental Sustainability	Environmentally friendly products, manufacturing and waste processes, and sustainable energy production.	New units of competency will be relevant to the RII Training Packages, particularly relating to emissions law and waste processes.
Inclusion of People with Disability in VET	Building the capability of educators and employers to promote inclusion of people with disability in vocational education, training and employment.	It is important that the RII Training Package prepares learners to communicate effectively with people with disabilities working within the MDCI industry, for example in managerial roles or in remote operations centres.

Cross sector projects	Project description	Link to RII Training Package
Teamwork and Communication	Developing common teamwork and communication units that can be contextualised across various industries.	More training on communication is required, particularly where workers move from roles where technical competency is key, to managerial positions. Any units of competency created will be imported into relevant RII qualifications.
Supply Chain	Traditional supply chain management practices as enabling services for the economy have recently been enhanced by technology.	Changes to the traditional supply chain management will affect the MDCI sector. A review of RII units relating to supply chain is on hold pending a cross sector review to determine where there is overlap and consider importing new units into the RII Training Packages where they are relevant and required by the MDCI sector.
Cross sector projects with no identified overlap with RII Training Packages		
Online consumer engagement and social media	Cultural awareness, customer service, marketing, communication and social media skills.	Currently no identified overlap, however any unit created as part of the project will be considered for importation into the RII Training Packages where they are relevant and required by the MDCI sector.

2 Employment and Skills Outlook

The purpose of this section is to provide a broad overview of the magnitude and growth of employment in the MDCI sector, and to discuss the factors which are likely to influence the supply of learners to fill positions in the sector. It provides context for the detailed analysis of trends influencing the MDCI sector, which flows through to skills priorities and training needs.

2.1 Industry employment outlook

Employment projections at a sector level are confined to specific occupational definitions used for statistical classification (as defined by ANZSCO).[31] Viewing the MDCI sector as a set of related occupations serviced by the Training Packages is more consistent with both the view of employers and the definitions used in this Industry Skills Forecast and Proposed Schedule of Work. The MDCI sector, as defined by the occupations related to the Training Package, collectively employs the largest number of Australians, at over 1 million in 2015.[32] Since the analysis of employment by occupation is complicated by the need to refer to a large number of occupations, which may be quite different in nature, the analysis in Table 3 is focused on a categorisation of occupations. However, it should be noted that, as the categories adopted are broad, it may be the case that some workers have been trained in other Training Packages.

Table 3: Projected employment levels for the MDCI sector occupations

Occupation	Employment levels – May 2017 ('000s)	Projected employment levels – May 2022 ('000s)	Projected employment growth – 5 years to May 2022 (per cent)
Production Managers	58.0	58.0	0.0
Technicians and Trades Workers	9.2	9.6	+4.8
Science Technicians	12.6	13.0	+3.4
Architectural, Building and Surveying Technicians	66.2	72.9	+10.0
Civil Engineering Draftspersons and Technicians	13.4	13.7	+2.6
Safety Inspectors	3.4	3.5	+2.5
Other Building and Engineering Technicians	26.9	28.6	+6.4
Fire and Emergency Workers	13.5	14.0	+3.4
Drillers, Miners and Shot Firers	57.0	60.4	+5.9
Engineering Production Workers	17.8	16.3	-8.3

[31] Australian Bureau of Statistics (2006) *Australian and New Zealand Standard Classification of Occupations Cat. No. 1220.0 (2006)*

[32] Australian Bureau of Statistics (2016) 81550DO001_201415 Australian Industry, 2014-15

Occupation	Employment levels – May 2017 ('000s)	Projected employment levels – May 2022 ('000s)	Projected employment growth – 5 years to May 2022 (per cent)
Other Stationary Plant Operators	24.3	23.1	-4.9
Earthmoving Plant Operators	48.1	48.0	-0.2
Other Mobile Plant Operators	11.6	11.6	0.0
Other Construction and Mining Labourers	5.9	6.3	+7.7
Mining, Drilling and Civil Infrastructure Total Employment	**367.9**	**379**	**+3**

Source: Department of Jobs and Small Business (2017). 2017 Occupational Projections – five years to May 2022
Note 1: the occupations displayed in the above table are identified as the most relevant occupations. The categories do not represent an exhaustive list of all occupations in the sector.

2.2 Supply side challenges and opportunities

An important consideration in determining the magnitude and growth of employment in the MDCI sector is the supply of graduates trained for work in the sector. To gain a full understanding of how employment demand will be met requires an understanding of the factors which are likely to influence the decisions of learners to enrol in training and then enter the workforce.

Table 4 lists some of the factors which may influence the decision of workers to undertake training and enter the workforce. These listed influences may not be applicable to every occupation but rather represent an average of all RII Training Package learners. Emotion and perception are also likely to play a large part in the career decisions of workers, rather than explicit analysis of the factors listed in Table 3.[33] Further, it is noted that the decisions of RTOs to offer training may also influence the supply of graduates trained for work in the sector. As such, the impact on RTOs of any changes made to the RII Training Package will be considered when training products are reviewed.

Table 4: Supply side influences – challenges and opportunities

Supply side influence	Details
Wages	Graduates from RII qualifications enjoy higher earnings than the average VET graduate, earning $67,700 after completing training compared to the average of $55,000. This serves as a good opportunity for the sector to drive enrolments.
Job security	The cyclical nature of the MDCI sector results in a large turnover of staff in the lows of the cycle, and skill shortages in the highs. This is a large challenge to the MDCI sector, as workers looking for job security will avoid this sector.
Working conditions	There is a strong culture of fly in-fly out work in the MDCI sector, especially in mining. This results in workers being displaced from their homes and families. Given the temporary nature of many campsites for workers, the option to move closer to the site of the mine work permanently is not attractive to many workers.

[33] Jim Bright, Robert Pryor, Sharon Wilkenfeld, & Joanna Earl (2005) – *The Role of Social Context and Serendipitous Events in Career Decision Making* – International Journal for Educational and Vocational Guidance Vol 5 (1): 19-36

Supply side influence	Details
Promotion	Graduates from the RII Training Package report a high rate of promotion as a result of their training, at 22 per cent compared to 21 per cent across all VET graduates.[34] This serves as a good advertising opportunity for promoting the RII Training Package.
Diversity	Given the high proportion of males in the sector, at 91 per cent,[35] the sector can seem very daunting to females looking to enter the workforce. This represents a challenge to the sector, as half the population is effectively not participating.
Innovation	Australia has historically been a world leader in mining innovations. The rate of innovation in the sector is gathering pace, largely dominated by new processes and equipment. Alongside new techniques, automation, robotics, remote operations centres, use of drone technology, increased use of GPS and increased use of data in monitoring operations are all key features of innovation in the sector. This will impact roles in the sector and created an increased demand for technology skills, and competency in using new equipment and processes.

Supply side influences, such as funding availability, employment conditions and financial outcomes, suggest that learners are enticed and are deterred from pursuing a career in the sector for a range of different reasons.

Having the right number of people entering the labour market for certain occupations is different to those people having the right, future fit, skills. The following section analyses the trends affecting these potential workers and how training can ensure this supply of workers is skilled correctly to meet future demand.

2.3 Trends shaping the sector

This section outlines **four key trends** shaping the MDCI workforces over the medium to long term.

[34] National Centre for Vocational Education Research (2017) *Total VET Graduate Outcomes 2017*

[35] National Centre for Vocational Education Research (2017) *Students and courses 2016*

The RII Training Packages will play an important role in enabling VET learners to gain skills to successfully navigate this challenging environment and make the most of opportunities arising from growth sectors. However, given the breadth of the MDCI sector and the range of industries that are encompassed within it, not all trends apply equally to the industries.

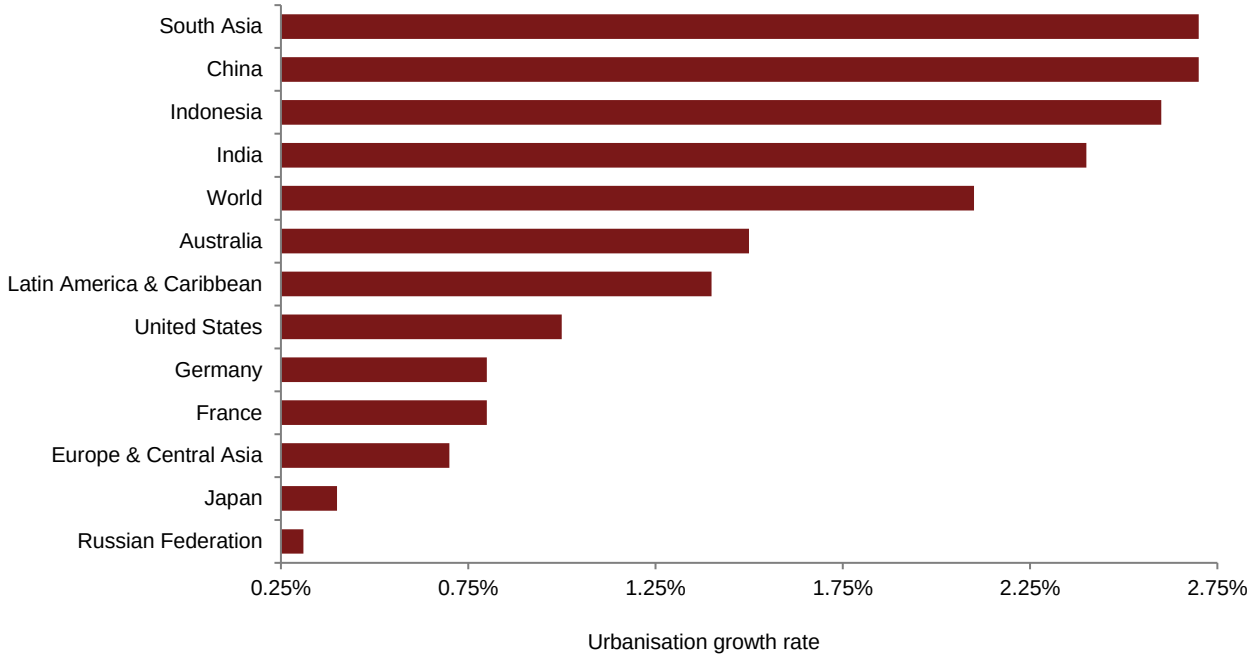
1. Industry growth opportunities

Growth in the MDCI sector is largely dependent on two key factors: the continuing urbanisation of Asia driving demand for Australia's resources overseas, and investment in Australian infrastructure projects driving demand for civil infrastructure skills at home. These areas are explained in more detail below:

Urbanisation of Asia driving demand for Australia's resources overseas.

The urbanisation of Asia, and China in particular, has been a key driver of the mining boom and continues to hold sway over the future of the mining and drilling industries. The rapid pace of development in the region has meant Asia cannot supply the quantity of materials required using materials from their relevant jurisdictions, ensuring sustained demand for resources from the Australian drilling, metalliferous and coal mining sub-sectors. This demand is both for materials for large infrastructure projects, as well as for energy to meet the increased demand for power from both industry and the growing middle class, urban population. This trend is reflected by China and India having the fastest growing rate of urbanisation of major population bases from 1990 to 2015 (Figure 4).

Figure 4: Annual growth rate in urban population from 1990 to 2015



Source: The World Bank. 3.12 – *World Development Indicators: Urbanisation*.

As the driving force for change in China and the Asian region moves from urbanisation and manufacturing to domestic production of goods and services, the growth in demand for Australia's resources will moderate. At present, 13 per cent of Australia's exports are thermal coal to China.[36] Australia's resource exports to China are likely to continue to grow, but at a slower rate, with natural gas to some extent supplanting coal. The value of the coal mining sub-sector to the Australian economy peaked in 2009 at $38.2 billion, then proceeded to

[36] https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/BriefingBook44p/China

decline to $16.1 billion in 2016, a decrease of 58 per cent.[37]Australian coal prices continued to advance by almost 30 per cent throughout 2017, however prices are forecasted to retreat over 2018. The Office of the Chief Economist of Australia forecasts an increase in coal exports overall, increasing from 202 million tonnes in 2016-17 to 209 million tonnes in 2021-22, while the total value of thermal coal exports is expected to drop from $18.9 billion to $15.8 billion over the same period.[38] [39] This is due in part to efforts by the Chinese government to curb coal production as China looks to develop renewable energies.[40]

Foreign investment efforts have come too from India with the Carmichael Coal Mine and Rail Project by proponent Adani Mining Pty Ltd; a $16.5 billion investment. The mine would create up to 1,075 construction jobs and up to 3,800 operational jobs while the railway line would create up to 1,400 construction jobs and up to 120 operational jobs in Australia[41].

As Asia further develops, demand for rare earth minerals which are used in advanced technology such as telecommunications will also increase.[42]

Investment in infrastructure is a priority for the Australian Government.

Infrastructure has become a national priority in Australia, with an increased emphasis on renewing and updating the country's infrastructure creatinga solid pipeline of large scale projects in civil infrastructure.[43] Projects, such as rail, roads, schools, hospitals and buildings, are vital to support urban populations and ensure access to basic services. These require large amounts of steel,[44] which in turn requires iron and coking coal. This suggests demand for Australian iron and coking coal will be sustained well into the future.

This increased investment in infrastructure across the country also leads to demand for the skills required to carry out these projects.

What does this mean for the MDCI workforce?

Job demand	• Uncertainty in demand for thermal coal miners. • Increase in demand for metalliferous miners (particularly copper and iron). • Increase in demand for civil infrastructure skills. • Sustained demand for coking coal miners.
Skills needs	• Adaptability in responding to changes in direction and pace of Asia's energy policy. • Strong management and supervisory skills to reside over remaining life of coal mines. • Analytical skills to predict future demand of particular resources and optimise current production.

[37] Australian Bureau of Statistics (2016) *Australian Industry by subdivision. 81550DO002*

[38] World Bank Group (2017) *Commodity Markets Outlook January 2017* page 32

[39] Office of the Chief Economist (2017) *Resources and Energy Quarterly March 2017*

[40] World Bank Group (2017) *Commodity Markets Outlook October 2017* page 2

[41] Queensland Department of State Development, Manufacturing, Infrastructure and Planning <https://www.statedevelopment.qld.gov.au/assessments-and-approvals/carmichael-coal-mine-and-rail-project.html>

[42] https://www.sciencedirect.com/science/article/pii/S0013935116302249

[43] Infrastructure Australia (February 2016) *Australian Infrastructure Plan: Priorities and reforms for our nation's future*.

[44] Asia is also looking to countries that have established vocational education systems in place, such as Australia, for guidance on how to effectively train workers and deliver these projects

2. Environmental issues

Environmental issues affect the level of regulation and demand for many of the commodities produced in Australia, such as coal and uranium, and have the ability to affect permanent structural change across the mining industry. This is driven both by international policy, and by changes in policy from state and federal governments as a result of environmental issues which all have the ability to enhance or diminish the viability of certain commodities.

The development of renewable energies, especially in Asia, will have an impact on the Australian MDCI sector.

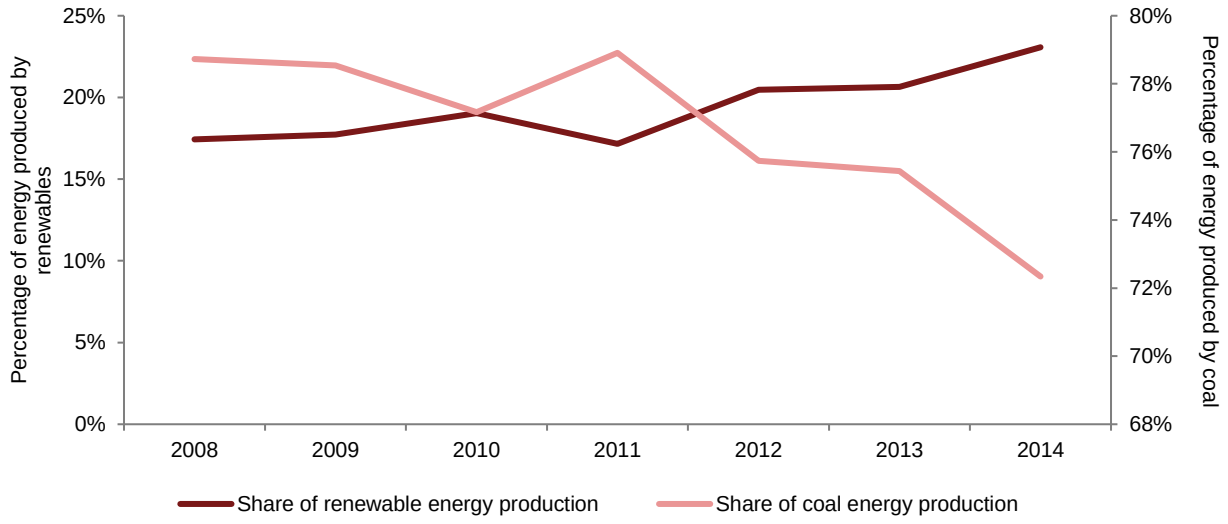
With the signing and ratification of the Paris Agreement by 135 countries, most notably China, Japan and India,[45] there has been a strong push for lower emissions technology to be used in power production globally. The Paris Agreement ultimately aims to reduce CO2 emissions from the signatory countries, primarily through increasing the supply of renewable energy and decreasing the burning of fossil fuels.

Japan, the largest consumer of Australian coal, aims to increase the share of its renewable energy production from 10 per cent (2014) to 22-24 per cent (2030).[46]

The push toward renewable, clean energy production is also being translated into policy in China[47] and India.[48]

In January 2017, China's National Energy Administration cancelled 103 coal fired power stations that were planned for production. Figure 5 shows the share of energy production in China from coal and renewables from 2008 to 2014. The share of renewable energy production has increased from 18 per cent to 23 per cent over this period, while coal power has reduced from 79 per cent to 72 per cent.[49] This has an adverse effect on the demand for Australian thermal coal.

Figure 5: Percentage share of coal vs renewable energy production in China



Source: International Energy Agency (December 2014) People's Republic of China – Energy Statistics

The process of phasing out coal fired power stations is likely to be a gradual process, and the uptake of renewable energy will necessitate an increase in materials used in the renewable energy sector. Steel (iron), copper and aluminium are used extensively in the construction of wind turbines and solar panels, while steel

[45] United Nations (2016) *Paris Agreement*

[46] Japan Ministry of Economy, Trade and Industry (2014) *4th Strategic Energy Plan*

[47] New York Times (January 2017) *China Cancels 103 Coal Plants, Mindful of Smog and Wasted Capacity*

[48] The Economic Times (November 2015) *Will try to achieve pledged renewable energy targets in less than four and half years: Piyush Goyal*

[49] International Energy Agency (December 2014) *People's Republic of China – Energy Statistics*

and concrete are essential in hydroelectricity production. As Australia is a large exporter of all these materials, implementation of stricter environmental regulation in Asia will result in growth in in the iron, coking coal, copper and aluminium export trades.

What does this mean for the RII workforce?

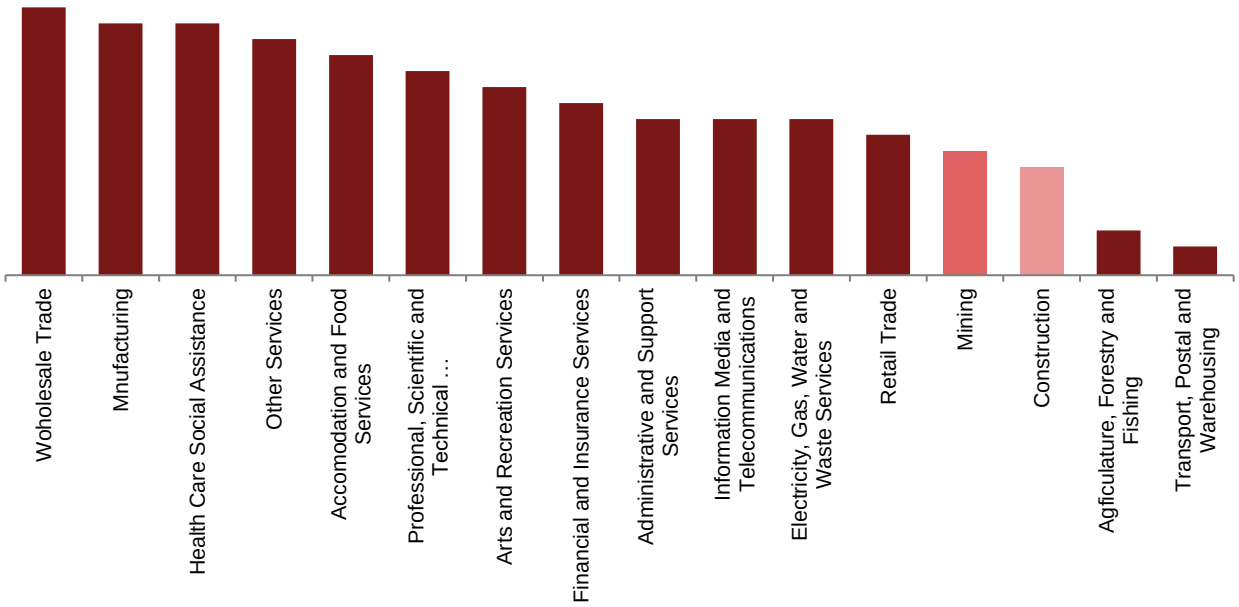
Job demand	• Uncertainty in demand for thermal coal miners. • Increase in demand for metalliferous miners (particularly copper, iron and aluminium). • Sustained demand for coking coal miners.
Skills needs	• Strong management and supervisory skills to reside over remaining life of coal mines. • Analytical skills to predict future demand of particular resources and optimise current production.

3. Technological Change

With the ever increasing sophistication of software programs and integration with automated technology, technological change will continue to affect all industries in the MDCI sector. Innovative practices and technological change will bolster economic growth and wealth in the MDCI sector. Technology driven growth will be important for the current workforce, creating new job opportunities for those in roles currently at risk of automation.

Compared to other sectors of the Australian economy, the MDCI sector has historically been a sector of comparatively low innovation. The Australian Bureau of Statistics measures how innovative sectors are through the annual business characteristics survey, the results for 2015 are as shown in Figure 6.

Figure 6: Percentage of business that implemented innovation by sector, 2015



Source: Australian Bureau of Statistics (2016) 81660DO002_201415 Summary of IT Use and Innovation in Australian Business, 2014-15. Research source: Oslo Manual, Guidelines for Collecting and Interpreting Innovation Data

Though innovation in the sector has been low, large players in the MDCI sector are beginning to innovate at higher levels. Australia's two largest mining companies, BHP Billiton and Rio Tinto, have been embracing automated technology in remote regions of Australia.

Rio Tinto began deploying autonomous technology in 2008 as part of their "Mines of the Future" program in order to remotely operate mines from a central location. The company continues to expand their 69 strong autonomous fleet with 38 haul trucks to be retrofitted with technology by mid-2019 as part of a $5 billion productivity drive.[50]

BHP Billiton is also in the early stages of the trend toward automation, with up to 30 fully automated drills to be deployed across five iron ore mines in Western Australia and their fleet of autonomous trucks to expand to 50.[51][52]

The rapid emergence of drone technology, digital engineering, 3D printing and automated manufacturing is also changing the way the construction sub-sector is operating. One particular technology, Building Information Modelling (BIM), has already gained widespread endorsement in Australia. BIM allows construction workers to view a digital representation of a project, from planning, through to construction and operation, serving as a central platform of collaboration for all stakeholders. As more information can be fed into a BIM system, such as through drone technology and laser mapping, greater levels of monitoring and control can be delivered to the worksite. In 2016, Infrastructure Australia recommended that BIM be mandatory for all large scale, complex infrastructure projects.[53]

Automation is likely to replace jobs in mobile plant operation and machine operation in the next 20 years, leading to a need for retraining to support employees to move into other areas if they are to remain in the MDCI sector on a long term basis.[54]

What does this mean for the RII workforce?

Job demand	• Increased demand for digital designers. • Decreased demand for low skilled labour. • Increased demand for remote operators. • Increased demand for data interpreters. • Increased demand for ongoing, agile learners.
Skills needs	• Digital technology skills, such as BIM, digital design and data interpretation. • Analytical skills to optimise current production. • Software skills to understand the capabilities and limitations of software used in the workplace.

4. Evolving Business pressures

Business pressures encompass a wide variety of factors, such as the phase of the industry in its life cycle, the level of competition and regulation within a sector, and the cyclical nature of many businesses. The major business pressures affecting the MDCI sector are:

- Focus on efficiency of production rather than expansion
- Increasing international competition
- Increased focus on safety concerns

A drive for efficiency as opposed to expansion as in previous years.

During the mining boom, a vast amount of capital was invested into the development of identified mineral resources, as well as exploration. Since the boom's end, there has been a shift in focus away from expansion and

[50] http://www.riotinto.com/media/media-releases-237_23802.aspx

[51] http://www.miningmagazine.com/development/automation/bhp-to-double-autonomous-trucks-at-jimblebar/

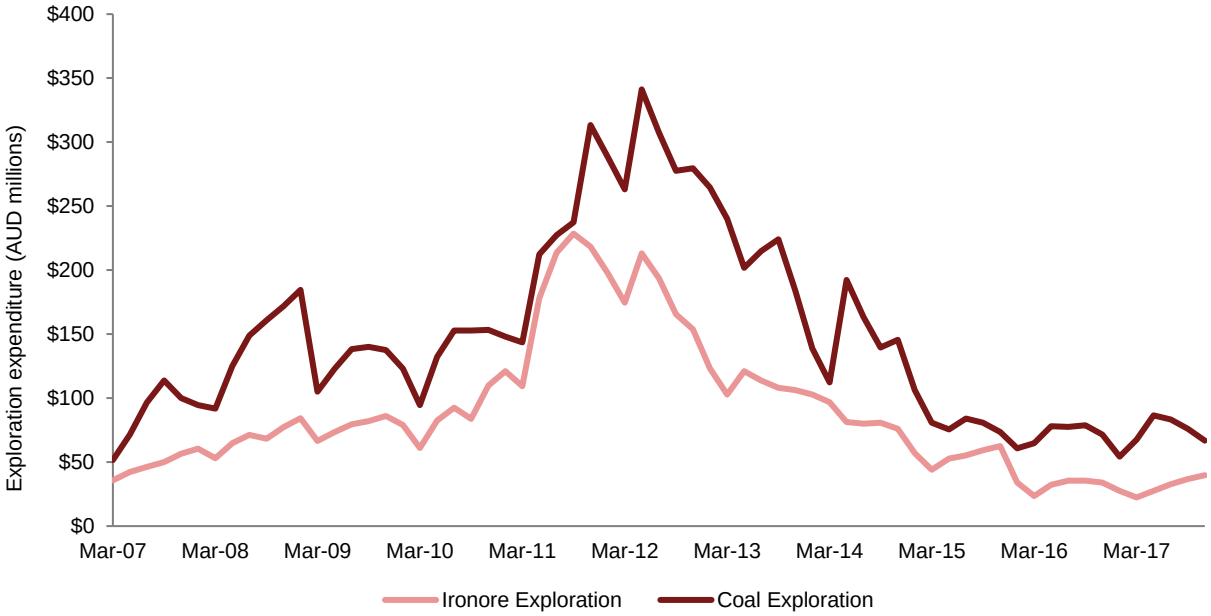
[52] IT News (June 2016) *BHP Billiton hits go on autonomous drills*

[53] Infrastructure Australia (February 2016) *Australian Infrastructure Plan – Priorities and Reforms for Our Nation's Future*

[54] PwC (2015) *A Smart Move* page 10

opening new mines, toward efficiency gains and production. Figure 7 below shows the escalation and decline of mining exploration expenditure of iron ore and coal in Australia.

Figure 7: Exploration expenditure in Australia (AUD millions) 2007-2017



Source: Australian Bureau of Statistics (December 2017) *8412.0 Mineral and Petroleum Exploration, Australia*

This trend places increased pressures on production managers, and has resulted in job losses of lower skilled labour in the sector. It also emphasises the need for optimisation of operations, which requires analytical software integration and the skills to monitor and interpret the data effectively. In the December 2017 quarter, the trend estimate for total mineral exploration was $457.1 million, an increase of $10.4m or 2.3 per cent, wherein gold was the most sought after mineral.[55]

Increased international competition

Australia faces increasing competition in mining from the international community. In iron ore developments, the largest iron ore mine was opened in Brazil in December 2016 by Vale, and is expected to produce over 90 million tonnes of iron ore per annum by 2018.[56]

In China, as the National Energy Administration (NEA) continued to push for a greater proportion of clean energy production, the NEA has announced the planned shutdown of 500 outdated coal mines, leading to a reduction of 50 million tonnes per annum.[57] This will serve to bring the average cost of production of coal down, as the more efficient mines will make up a greater proportion of overall production.

These two major developments will result in pressure for Australian mines to keep a low relative cost per unit of production, compared to Brazil and China. The high Australian wage, relative to Brazil and China, pronounces this pressure even further.

An increased focus on safety concerns

The trend of increasing regulation, particularly in WHS, is making it harder for small mining businesses to continue to operate. Small businesses are struggling to absorb the cost of meeting increasing requirements from regulation and legislation. New areas have become a focus for this sector in recent years, such as increased

[55] http://www.abs.gov.au/ausstats/abs@.nsf/mf/8412.0

[56] Wall Street Journal (April 2013) *Brazil's Vale Expects S11D Iron-Ore Mine License Soon*

[57] China Daily Asia (February 2017) *China to close 500 outdated coal mines*

awareness and monitoring of the risks around dust levels and silicosis in quarries and on dirt tracks, and the concerns raised worldwide around Diesel Particulate Matter (DPM) caused by newer diesel engines and the resulting additional ventilation systems required.

What does this mean for the RII workforce?

Job demand	• Increased demand for data interpreters. • Decreased demand for low skilled labour. • Increased demand for ongoing, agile learners.
Skills needs	• Analytical skills to optimise current production. • Software skills to better and capture and understand data, and where efficiencies can be achieved.

2.4 Creating a future fit workforce

The IRC is required to rank a supplied list of 12 generic workforce skills in order of importance to relevant employers. For the MDCI sector, these skills have been ranked below in Table 4.

All skills listed in Table 5 are important. Low ranking does not imply that the skill is not important, but rather lower ranking only indicates that these skills are not critical priorities for employers in the MDCI sector. Note that these skills are read in line with definitions provided to us by the Department.

Table 5: Ranking of key generic workforce skill

Skills	Rankings				
	Civil Infrastructure	Coal Mining	Drilling	Extractive Industries	Metalliferous Mining
Managerial/Leadership	5	1	7	2	4
Technology and application	3	6	4	6	1
Design mindset/Thinking critically/System thinking/Solving problems	6	2	2	7	2
Learning agility/Information literacy/Intellectual autonomy and self-management	2	7	3	5	3
Communication/Collaborating virtually including virtual collaboration/Social intelligence	8	5	10	10	8
Science, Technology, Engineering and Mathematics (STEM)	4	9	5	3	7
Language, Literacy and Numeracy (LLN)	1	3	1	1	6
Data analysis	10	4	9	11	5
Environmental and Sustainability	9	10	8	9	12
Entrepreneurial	12	11	12	8	9
Customer service/Marketing	7	12	6	12	10
Financial	11	8	11	4	11

3 Key Drivers for Change and Proposed Responses

Section 3 and 4 effectively serve as the cases for change for projects scheduled in 2018-2019:

- Section 3 outlines the key drivers for change and how they will be reflected in 2018-19 training product development work.
- Section 4 outlines the status of 2016-17 projects and the proposed schedule of work through to 2019-20, and a brief overview of proposed projects to be undertaken beyond 2019-20. It also contains the 2018-19 project details including rationales behind projects, Ministers' priorities addressed, consultation plans and the scope of the projects.
- Please refer to Appendix B for a summary of the training product changes being proposed in 2018 – 2019.

The mining, drilling and civil infrastructure sector is changing in response to both intrinsic and extrinsic factors. It is critical to understand the forces driving this change in order to prioritise the skills in the RII Training Package. This will ensure that learners and workers have capabilities necessary to succeed in the workforce of the future.

This section explores the key drivers for change, and our proposed responses for how our projects will address them. We have identified the following key drivers:

1 Increased demand for workforce agility

2 Increased investment in the infrastructure industry

3 The impact of new technology on ways of working

4 Increased focus on safety measures in the MDCI sector

5 Developing leaders: the transition from technical competence to managerial skills

Key Driver 1 – Increased demand for workforce agility

Traditional career paths are changing, with it being increasingly common for MDCI workers to move between job roles, specialisms or industries.[58] This trend, which is present across most sectors of Australia's economy, is exacerbated in the MDCI sector by boom and bust cycles of activity and growth. In particular, workers tend to move from mining into civil infrastructure roles during downturns, and the reverse when the mining industry is performing well, as salaries tend to be higher.

Often in these instances, there is a need for workers to fill a skills shortage in a particular area in a short timeframe. To do this, the MDCI workforce needs to be supported by an RII Training Package that enables and encourages workforce agility through training that is up to date and applicable to job roles across a range of industry contexts. There are a number of opportunities to update the structure and content of the RII Training Package to ensure it is supporting this industry need.

Another factor driving the need for an agile workforce is the way in which new technologies are changing traditional ways of working, requiring workers to learn new skills in order to meet the demands of changing job roles. To be successful in this environment learners need training in these new skills, but also need to have

[58] Foundation for Young Australians (FYA) *The New Work Smarts* (2017), p26

foundation skills and knowledge which enable them to acquire new skills in the first place. This is discussed further in Key Driver 3.

Learners and employers need to be supported by an RII Training Package that is flexible, simple to navigate, and provides learners with skills that are relevant in multiple MDCI sub-sectors. This will enable employers to fill skills shortages faster, adopt new technologies sooner, and maintain higher levels of productivity.

Proposed Response

Identify opportunities within the RII Training Package to promote greater flexibility by providing learners with skills that are transferable and relevant to a range of job roles and industries, supporting them to transition more easily and effectively between job roles. This can be achieved by reducing the total number of training products in the RII Training Package, ensuring that those which remain are suitable for a larger number of job roles.

How this will be reflected in training product development

Project 2B Common Skills	• Review training in 'common skills areas' – training products which relate to a broad range of MDCI job roles – to ensure training supports workforce agility. • Specifically, review 98 units of competency relating to general employability skills within the RII Training Package to improve their suitability to a range of job roles across industry contexts. This review will also consider what common skills are specific to the RII Training Package, and which could be better imported from other Training Packages. • Review Certificate I and II in Resources and Infrastructure Operations, and Certificate II in Cross Industry Operations to ensure these pathway qualifications provide learners with suitable entry points into the MDCI sector.
Project 2C Drilling	• Review the overlap between onshore drilling and well servicing qualifications, and consider opportunities to develop a single qualification which would serve both roles. • Review the ongoing need for offshore drilling qualifications in light of industry concerns that these qualifications may not be relevant to job roles given the global movement of this workforce.
Project 2D Coal	• Review overlap between the Certificate II qualifications in Coal and in Surface Extraction to identify areas that are common to both, and explore the idea of a "skills passport" to allow flexibility for people to move across roles and industries. • Review Certificate III in Underground Coal Operations to allow more flexibility to select units relevant for job roles.
Project 2E Small Mining	• Review the Certificate III in Small Mining Operations and in particular the 7 units relating to small mines to determine whether there is an ongoing need for this qualification, or whether these units sit better as a skill set within the Certificate III in Surface Extraction which has similar units.
Project 2G Exploration	• Review the Certificate II in Mining/Field Exploration and the Certificate II in Mining Exploration, 8 Exploration and Field Work units, and 3 Conservation and Rehabilitation units to ensure these support learners following either a mine technician or field technician career path. • The majority of core units within the Certificate II in Mining/Field Exploration and Certificate III in Mining Exploration relate to 'soft skills' which are not RII specific. These may sit better under the Business Services Training Package.

Key driver 2 – Increased investment in the infrastructure industry

Increased government spending on infrastructure has led to a rise in the number of civil infrastructure projects across Australia. This in turn has resulted in increased demand for qualified workers in the industry, and seen a rise in new businesses forming to meet this need.

The legislation and regulation around some aspects of safety in civil infrastructure is not as stringent as in other MDCI sub-sectors, which means in some cases people are entering the workforce without appropriate training. This poses a risk to communities, for example, untrained individuals may drill through pipes and cause harm. This has happened in other countries, such as in the USA where there have been incidences of explosions caused by people drilling through gas pipes. The continued success of Australia's civil infrastructure industry is contingent on a workforce that follows safe work practices, and receives appropriate training in safe work practices that are relevant to the civil infrastructure work environment.

These safety concerns are a particular focus in the Certificate III in Trenchless Technology. Whilst many providers state in contracts that crews must have at least one Certificate III-qualified person, they do not currently specify if this needs to be in Trenchless Technology. Most RTOs encourage people to enrol in the civil construction qualifications as these were updated recently and allow greater flexibility in selecting electives to suit the role.

Proposed Response

Update the structure of the Certificate III in Trenchless Technology, or combine the specific units relating to Trenchless Technology with the Certificate III in Civil Construction to ensure RTOs, employers and learners select appropriate training.

Address safety concerns specifically relating to drilling near underground services by ensuring the unit of competency RIICCM202D identify, locate and protect underground services in relevant qualifications.

How this will be reflected in training product development

Project 1A Trenchless Technology	• Review the split between core and elective units in the Certificate III in Trenchless Technology to allow greater flexibility to select electives relevant to job roles. • Consider whether it would be better for job outcomes in trenchless technology to be achieved via a specialisation in the Certificate III in Civil Construction rather than via a distinct qualification. • Review RIICCM202D identify, locate and protect underground services, and consider creating additional units to form a vacuum excavation industry skill set.

Key driver 3 – The impact of new technology on ways of working

New technology in the sector is changing ways of working, leading to changes in the skills required for the workforce of the future. Key developments include the increased use of automated vehicles, remotely operated vehicles, remote operation centres and drone technology particularly in mining, and of cyber chair, sonic drilling, and coil tube rigs in drilling. With the increased adoption of these new technologies, as well as the increasing use of satellite phones, GPS systems and 3D printing, the skills required by the MDCI sector are shifting. There is a need for skills in operating these new technologies, in addition to maintenance and programming of the new equipment used on site. There is also an increasing need from industry for workers with skills in interpreting data from machines, particularly with the move towards autonomous drill rigs and remote operations centres in coal and metalliferous mining.

At present, the RII Training Package does not provide learners with training in the skills required to make best use of these new technologies. Conversely, there are units of competency contained within the Training Package that refer to technologies and practices which are now outdated. The continued success of the MDCI sector requires learners to receive up to date training.

Proposed Response

Create new units of competency to address skills gaps where new equipment and technologies have been introduced, and amend other units of competency to ensure training reflects current work practices. Remove and/or amend units of competency which are now obsolete due to advances in technology and work practices.

How this will be reflected in training product development

Project 2A Trenchless Technology	• Review unit RIICCM202D Identify, locate and protect underground services to update it for new technology used, especially electromagnetic locating equipment. • Consider creating additional units to form a vacuum excavation industry skill set to improve consistency in operator skills and knowledge.
Project 2C Drilling	• Create new units of competency to support the use of new technology in the sector. • Review content and packaging rules to ensure new technologies are reflected in the job roles that require them.
Project 2D Coal	• Review units of competency to address skills gaps in relation to new technology in the coal mining industry, particularly for automated programming, autonomous vehicles and drones. • Remove units for technology which relate to technologies and methods which are no longer relevant to the coal industry.

Key driver 4 – Increased focus on safety measures in the MDCI industry

Industry, regulators and RTOs are concerned about the inconsistency in approaches taken to implement appropriate safety training across the MDCI sector. A key area of concern is that high risk licences for activities such as rigging, scaffolding, lifting and loading, and dogging can be acquired too easily and at junior levels, which puts the operations, workforce and individual at risk. In many instances the inclusion of these units in Certificate II-level qualifications seems too advanced in relation to the rest of the training at this level, and the roles this would be appropriate for. There is a strong feeling that these skills need to be assessed on site, and that a simulated environment is insufficient to demonstrate competency. A lack of clarity exists around the distinction between units of competency skilling workers in knowledge of tasks relating to high risk licences, and granting a licence to perform them which is required to comply with legislative requirements. This creates confusion for learners and employers, which can place people at risk of serious injury.

There is also a broader concern about training related to workplace health and safety. Industry is concerned that this is often treated as a tick box exercise to meet compliance requirements, and that there has not been an appropriate level of scrutiny over what is included in the training, and how it is delivered. Greater clarity is needed about what can be assessed in a simulated environment, and what needs to be assessed on site.

Proposed Response

Review units of competency relating to high risk licences, both in terms of the content of these units and their assessment conditions, and whether they sit within the right AQF level qualifications. There is also a need to review the wording to distinguish between knowledge of activities, and holding a licence to perform them that meets legislative requirements.

Review units of competency and qualifications relating to workplace health and safety and emergency response and rescue to ensure they meet the needs of industry.

How this will be reflected in training product development

Project 2B Common Skills	• Review the inclusion of units of competency relating to high risk work licences in the Certificate II in Cross Industry Operations, and the Certificate II in Resources and Infrastructure Work Preparation. • Review WHS units of competency to ensure they meet industry needs.
Project 2D Coal	• Review packaging rules and consider moving units of competency relating to high risk activities such as conduct wheel vehicle operations, rigging, scaffolding, and dogging, from Certificate II-level coal qualifications to Certificate III.
Project 2F Emergency Response and Rescue	• Review the packaging rules for Certificate III in Mine Emergency Response and Rescue, particularly whether the governance and quality units in group A – which focus on skills for supervisors – should be moved to electives, or removed from the qualifications listed elective units of competency. • Review which units of competency are considered core to the qualification, and whether additional units are required (e.g. there are no road crash units, and confined space rescue is not a core unit of competency at present).
Project 2G Exploration	• Review units of competency relating to mine rehabilitation to ensure they meet legislative requirements. • Consider whether environmental concerns relating to quarrying are addressed appropriately, including monitoring of silica dust levels and Diesel Particulate Matter (DPM).

Key driver 5 – Developing leaders: the transition from technical competence to managerial skills

The transition from operational to managerial job roles is significant and sometimes challenging for workers in the MDCI sector, because workers' success in these different roles is dependent on them acquiring different skills and attributes. Operational roles require technical competency, while managerial roles require additional leadership and management skills. Currently, the RII Training Package falls short in adequately preparing learners to make the transition from technical to managerial roles.

The skill set needed for managerial roles is more geared towards transferable skills in general management. Employers increasingly value emotional intelligence in these roles, with a greater emphasis being placed on skills in communication, project management, leadership and other general business competencies. Many of these skills are not specific to the MDCI sector and can be imported from other Training Packages. A particular gap which is specific to the MDCI sector has been identified in training to support workers with mental health issues and the challenges of the Fly In Fly Out (FIFO) lifestyle and hazardous work environment.

The focus on 'soft skills' is supported by legislation, such as the recent introduction of the maintenance of current competency legislation in NSW, which required workers to complete 30 days of training over 2 years, with a prescribed split between technical and soft skills.

This greater interest in career pathways and leadership development raises questions about the intersection of VET and higher education pathways at Diploma and Advanced Diploma levels. At managerial levels, workers may have come through vocational training which builds technical competence, or have completed degrees in subjects such as engineering. These qualifications need to be flexible enough to provide supplementary technical skills if required, whilst not forcing learners to repeat skills acquired previously.

Proposed Response

Assess how units of competency on leadership and management in other Training Packages could be imported into RII Training Package qualifications to aid workers in their transition from technical to managerial job roles. Create new units of competency which focus on addressing mental health issues that are more commonly experienced by the MDCI workforce than the general population.

For training in coal and drilling in particular, assess the suitability of Diploma-level and Advanced Diploma-level qualifications including a high proportion of training focused on technical competencies relative to managerial and leadership skills.

How this will be reflected in training product development

Project 2B Common Skills	• Review units of competency at a nominal Certificate IV-level and above to see if they are fit for purpose for leadership roles, and consider whether they sit best in the RII Training Package, or whether units of competency from other training package could provide more suitable training.
Project 2C Drilling	• Review the Diploma of Drilling Operations which focuses on soft skills and management. Either add more to the Diploma to make it more drilling focused, or guide people to work up to Certificate IV in industry specific qualifications, then enrol in a general management qualification at managerial levels.
Project 2D Coal	• Review the Diploma in Surface Coal Mining and Certificate IV in Surface Coal mining to ensure they align with what inspectorates require.

Impact of proposed responses

Implication of proposed response for stakeholders

Table 6 provides a description of all expected impacts relative to stakeholders, given the proposed responses.

Table 6: Implication of proposed response for stakeholders

Stakeholder	Impact
Industry/ Employers	• Employers will find it easier to find people who are qualified and have the right skill set by recognising transferable skills. This will also remove the burden of putting people through additional, repetitive training as a tick box exercise and means more time can be spent on specialisations and upskilling. • Employers will have confidence in the rigour with which qualifications are assessed, reducing the amount of time spent on additional in-house training and competency checks. • Industry will have more workers available with the right skills in new technologies in the sector. • Employers will have better training for leaders and managers.
Learners/ Workers	• Learners will have greater freedom to move between roles in response to fluctuations in industry demand during boom and bust periods, and gain recognition for their transferable skills. • Learners will have the opportunity to interact with technology that is going to become more and more prevalent. • Learners will have greater awareness of the WHS requirements and the specific challenges of different mine environments, creating a safer environment for all. • Learners will be able to complete courses and gain skills on that are relevant for their job roles instead of being forced to retain information that will be of little use in their roles. • Advanced qualifications will strike a balance between technical competence and managerial skills, drawing on units from other industries which have wider recognition.
Registered Training Organisations	• RTOs can base training on clear assessment and performance criteria that are up to date and relevant to the sector. • RTOs will have greater flexibility to tailor qualifications to meet the needs of employers and learners.

Implication of proposed response for occupations in the MDCI sector

- All learners have the appropriate baseline skill set, with employers then being able to choose units from the elective bank or upskill their existing workers using skill sets to create the most appropriate specialisations.
- The advanced skill sets will allow learners to upskill and complete more technical roles.
- Trenchless Technology workers will have a skill set or qualification for their specialism, and recognition for it within the wider civil construction industry.
- A skill set will be created for workers in underground service location and vacuum services as their skills are becoming more in demand due to the increased use of trenchless technology for infrastructure projects, such as NBN.
- Workers in underground coal mining will be able to choose electives that train them in up to date technology and techniques and that account for the specific challenges and safety concerns of operating in an underground mining environment.
- Training in well-servicing within the drilling industry will be more specific to the nature of the jobs in this sector, rather than replicating much of the content in the general drilling operations units.
- Workers progressing from roles requiring technical competence to managerial positions will have appropriate training and support. At the same time, units of competency will be aligned to responsibilities at different levels. This applies especially to the move from driller to rig manager in the drilling industry.
- Workers in exploration will acquire a general skill set at foundation levels, allowing them to specialise later in either the mine technician or field technician career path.
- Safety qualifications will be more trusted by the MDCI sector, not only for workers directly involved in emergency response teams, but also where units on WHS occur in other industry qualifications.

Risk of not proceeding with proposed responses

The base case (the 'do nothing') option must be considered as an alternative to the proposed changes in order to enable effective comparison between the two scenarios. This option negates the need for investment in training products, however does not address the current state issues identified. The likely impacts of this option are outlined below:

Table 7: Likely impacts if not addressed

Existing issue	Likely impact(s) if not addressed
Existing qualifications and training do not reflect the equipment and materials that workers will use in industry.	• Graduates are not able to meet industry requirements and require further "on the job" training at a cost to the employer. • The increased safety and WHS implications may not be appropriately understood by industry participants, thereby leading to increased hazards and risks. • Employers create their own non-accredited training, which does not support the COAG principles to ensure training supports individuals across Australia.
Learners are not developing the required technical skills to work with new technology.	• Employers are required to provide training in using new technology, which is time-consuming and costly. • Learners are not equipped with the appropriate skills for their job roles. • Australian workers lag behind the skills of international counterparts in using new equipment. • Workers are not trained on the latest approaches to ensuring environmental risks are managed and controlled, which puts colleagues and communities at risk.

Existing issue	Likely impact(s) if not addressed
Transferable skills are not recognised by employers and industry.	• There will be skills shortages, or time lost as people are required to complete additional training for skills they already have demonstrated for similar qualifications.
There is a lack of support and training for workers moving into managerial roles.	• There is a gap in capability at management levels, meaning that teams are inefficient and increasing the risk of safety concerns.

4 Proposed Schedule of Work

Section 3 and 4 effectively serve as the cases for change for projects scheduled in 2018-2019. Section 4 outlines:

- The status of 2016-17 projects and the proposed schedule of work through to 2021-22.
- The 2018-19 project details including rationales behind projects, Ministers' priorities addressed, consultation plans and the scope of the projects.
- A brief overview of proposed projects to be undertaken beyond 2019-20.
- Please refer to Appendix B for a summary of the training product changes being proposed in 2018 – 2019.

Proposed Schedule of Work 2017-18 to 2021-22

Table 8 contains the activities endorsed by the IRC through to June 2020 in the previous Industry Skills Forecast. Previously endorsed projects have been reviewed to ensure alignment with AISC and COAG Industry and Skills Ministers' priorities, following advice from the Department. Specifically, the Department asks that the review of units of competency is aligned to the qualifications that form part of the VET Student Loans Program, review of qualifications with low or no enrolments, reduction of duplication across the system, creation of cross-industry units of competency and great recognition of skill sets.

Table 8 presents the MDCI sector Proposed Schedule of Work through to June 2022. Because projects have been defined on a unit of competency basis, only indicative qualifications have been included to show where a project has a focus aligned with a qualification. This does not mean that all the units of competency from that qualification are included in the project, nor that they are the only qualifications that contain the included units.

Table 8: MDCI sector Proposed Schedule of Work

Year	Project Type	Status	Project Code	Project Name	Responsible IRC	Number of units of competency
2016-17	TPD Projects	Case for Endorsement approved	1A	Mobile plant operations	All	76
2016-17	TPD Projects	Case for Endorsement in development	1B	Traffic Management	Civil Infrastructure	2
2016-17	TPD Projects	Project complete	1C	First emergency response	Coal Mining, Metalliferous Mining, Drilling	3
2016-17	TPD Projects	Project complete	1D	Shotfiring	Coal Mining, Metalliferous Mining	2

Year	Project Type	Status	Project Code	Project Name	Responsible IRC	Number of units of competency
2016-17	TPD Projects	Case for Endorsement in development	1E	Tyre fitting	All	2
2016-17	TPD Projects	Case for Endorsement in development	1F	Mine Supervision	Coal Mining, Metalliferous Mining	3
Total units of competency reviewed in Year 1						**88**
2017-18	Case for Change Activities	IRC commissioned development of a case for change	1G	Bituminous Surfacing	Civil Infrastructure	31
2017-18	Case for Change Activities	IRC commissioned development of a case for change	1H	New and emerging tech/Remote Operations	All	4
2017-18	Case for Change Activities	Incorporated into 2018-19 projects.	1I	1I Underground Coal Operations/Surface Extraction	Coal Mining	N/A
2017-18	Case for Change Activities	Incorporated into 2018-19 projects.	1J	1J Underground service location and vacuum systems	Civil Infrastructure	N/A
2017-18	Case for Change Activities	Incorporated into 2018-19 projects.	1K	1K Drilling Equipment & Methods	Drilling	N/A
2017-18	Case for Change Activities	IRC commissioned development of a case for change	1L	Blasting methods	Coal Mining, Metalliferous Mining, Extractive	24
2017-18	Case for Change Activities	IRC commissioned development of a case for change	1M	Supply chain approach to skilling	All	N/A
2017-18	Case for Change Activities	IRC commissioned development of a case for change	1N	Geotechnical Risks	Extractive	3
2017-18	Case for Change Activities	On hold pending cross-sector review.	1O	Construction materials testing units for on-site labs	Extractive	4

Year	Project Type	Status	Project Code	Project Name	Responsible IRC	Number of units of competency
Total units of competency reviewed in Year 2						**66**
2018-19	Case for Change Activities	IRC commissioned development of a case for change	2A	Trenchless Technology	Civil Infrastructure	10
2018-19	Case for Change Activities	IRC commissioned development of a case for change	2B	Common Skills	All	98
2018-19	Case for Change Activities	IRC commissioned development of a case for change	2C	Drilling	Drilling	101
2018-19	Case for Change Activities	IRC commissioned development of a case for change	2D	Coal Mining	Coal	93
2018-19	Case for Change Activities	IRC commissioned development of a case for change	2E	Small Mining	Metalliferous	7
2018-19	Case for Change Activities	IRC commissioned development of a case for change	2F	Emergency Response and Rescue	All	22
2018-19	Case for Change Activities	IRC commissioned development of a case for change	2G	Exploration	Extractive	11
Total units of competency reviewed in Year 3						**342**
2019-20	Case for Change Activities	IRC to submit case for change in year 4	2H	Civil Construction	Civil Infrastructure	170
2019-20	Case for Change Activities	IRC to submit case for change in year 4	2I	Metalliferous	Metalliferous	111
2019-20	Case for Change Activities	IRC to submit case for change in year 4	2J	Extractive	Extractive	29
Total units of competency reviewed in Year 3						**310**

Year	Project Type	Status	Project Code	Project Name	Responsible IRC	Number of units of competency
2020-21	Case for Change Activities	Review training products originally in scope of 2016-17 work that were not amended for currency and relevance	3A	TBD	All	TBD
2021-22	Case for Change Activities	Review training products originally in scope of 2017-18 work that were not amended for currency and relevance. Review the need for the creation of new training products to cater for new and emerging technologies and related skills.	3B	TBD	All	TBD
Total units of competency planned to be reviewed in all years						**806**

2018-19 Project Details

2018-19 project details in the Proposed Schedule of Work

The Department has advised that the AISC will use the recommendations made by all IRCs, together with an analysis of the relevant Industry Skills Forecast and Proposed Schedule of Work reports, to develop a national schedule of all units of competency across Training Packages.

Project 2A – Review of Trenchless Technology Qualifications

Table 9: Project 2A – Rationale and Scope

Project 2A – Review of Trenchless Technology Qualifications	
Description	• Review the split between core and elective units in the Certificate III in Trenchless Technology to allow greater flexibility. • Consider whether the Certificate III in Trenchless Technology would be better as a skillset within the Certificate III in Civil Construction, given there are only 5 units which are different. • Review unit RIICCM202D – Identify, locate and protect underground services to update it for new technology used, and consider creating additional units to form a vacuum excavation industry skillset.

Project 2A – Review of Trenchless Technology Qualifications	
Rationale	As outlined in Section 3 (see pages 19-26), this project will address the following drivers: • Increased investment in the infrastructure industry. • Impact of new technology on ways of working.
Scope of Project	We expect a Case for Endorsement to be provided to the AISC by June 2019. **Training Package to be developed/revised***:* Resources and Infrastructure Training Package (RII) **1 Qualification to be revised:** • Certificate III in Trenchless Technology **Skill sets to be developed/revised:** • Potential for skillset to be developed for underground location services. **1 of a total 11 existing units of competency in scope to be revised:** • Please refer to Appendix B for list of units of competency.

Consultation Plan

PwC's Skills for Australia intends to engage a wide range of stakeholders relevant to the civil infrastructure sub-sector of the MDCI sector. Types of stakeholders to be consulted with include:

Table 10: Project 2A – Stakeholders to be consulted

Employers	Industry associations/Peak bodies	RTOs	Public/Government bodies
• Cleanaway • Talis Civil Construction • Power on Cabling • Bullseye Boring • RobCarr • GM Microtunnelling	• Civil Contractors Federation • Australian Constructors Association • Institute of Public Works Engineering Australasia (IPWEA) • Australasian Society for Trenchless Technology (ASTT) • Dial Before You Dig	• Enterprise RTOs • Private and Community RTOs • Technical and Further Education institutions (TAFEs)	• STAs • Licensing bodies where applicable

Employers	Industry associations/Peak bodies	RTOs	Public/Government bodies
	• Construction & Mining Equipment Industry Group (CMEIG) • National Utility Locating Contractors Association (NULCA) • Building Industry Consultative Council Industry Advisory Body (VIC) • Construction Industry Training Board (SA) • Construction Forestry Mining & Energy Union (CFMEU) • Australian Workers' Union (AWU)		

Project 2B – Review of Common Skills in Qualifications

Table 11: Project 2B – Rationale and Scope

Project 2B – Review of Common Skills in Qualifications	
Description	• Review units relating to skills which are common across a number of qualifications and sectors with a view to clarifying ownership of them and rationalising the total number that sit within the RII Training Package.
Rationale	As outlined in Section 3 (see pages 19-26), this project will address the following drivers: • Increased demand for workforce agility. • Increased focus on safety measures in the MDCI sector. • Lack of support for the transition from technical competence to managerial skills.
Scope of Project	We expect a Case for Endorsement to be provided to the AISC by June 2019. **Training Package to be developed/revised:** Resources and Infrastructure Training Package (RII) **3 Qualifications to be revised:** • Certificate I in Resources and Infrastructure Operations • Certificate II in Resources and Infrastructure Work Preparation • Certificate II in Cross Industry Operations **Skill sets to be developed/revised:** • N/A **98 existing units of competency be reviewed: 79 to remain within the RII Training Package, and the remaining 19 to be reviewed with a view to removing them:** • Please refer to Appendix B for list of units of competency.

Consultation Plan

PwC's Skills for Australia intends to engage a wide range of stakeholders relevant to this sub-sector of the MDCI sector. Types of stakeholders to be consulted with include:

Table 12: Project 2B – Stakeholders to be engaged

Employers	Industry associations/Peak bodies	RTOs	Public/Government bodies
• A broad selection of large and small companies and contractors across all MDCI sub-sectors.	• Civil Contractors Federation • Australian Constructors Association • Institute of Public Works Engineering Australasia (IPWEA) • Minerals Council of Australia (MCA) • Australian Mines and Metals Association (AMMA) • Mine Managers Association Australia (MMAA) • Queensland Coal Mining Safety and Health Advisory Committee (CMSHAC) • Mines Rescue Services (Queensland and New South Wales) • Australian Drilling Industry Association (ADIA) • Australian Drilling Industry Training Committee (ADITC) • Institute of Quarrying Australia (IQA) • NSW Mining and Petroleum Competence Board • Construction Forestry Mining & Energy Union (CFMEU) • Australian Workers' Union (AWU)	• Enterprise RTOs • Private and Community RTOs • Technical and Further Education institutions (TAFEs)	• STAs • Licensing bodies where applicable

Project 2C – Review of Drilling Qualifications

Table 13: Project 2C – Rationale and Scope

Project 2C – Review of Drilling Qualifications	
Description	• Review the structure of Drilling qualifications and career pathways in onshore drilling, offshore drilling, drilling operations and well servicing from Certificate II to Advanced Diploma. • Review the balance between technical and managerial skills required at Certificate IV and Diploma will be revised to align them with the needs of drillers and rig managers. • Review **34 core units** to update them to meet the needs of industry, and ensure clear career pathways. • Review **10 supervision units**, to ensure they incorporate the right content for job roles. • Review **12 assist units** to see if they sit best in Certificate II or Certificate III. • Review **6 elective well-servicing units** to update the content to be more specialised for these job roles. • Review **1 unit** on conduct air drilling to be reverse circulation are drilling or broaden it to be about all kinds of air drilling. • Review **1 unit** from the HAN units related to drilling to align this with the updates from our review of MPO/HAN units. • Create **7 new units** to address new technology in the sector in sonic drilling, coil tube drilling and cyber chair drilling. Units on air drilling will be reviewed and updated to reflect the broad range of techniques this covers.
Rationale	As outlined in Section 3 (see pages 19-26), this project will address the following drivers: • Increased demand for workforce agility. • The impact of new technology on ways of working. • Increased focus on safety measures in the MDCI sector. • Lack of support for the transition from technical competence to managerial skills.
Scope of Project	We expect a Case for Endorsement to be provided to the AISC by June 2019. **Training Package to be developed/revised:** • Resources and Infrastructure Training Package (RII) **17 Qualifications to be revised:** • Certificate II in Drilling Operations • Certificate II in Drilling Oil/Gas (Offshore) • Certificate II in Drilling Oil/Gas (On shore)

Project 2C – Review of Drilling Qualifications
• Certificate III in Drilling Operations • Certificate III in Drilling Oil & Gas (Off shore) • Certificate III in Drilling Oil/Gas (On shore) • Certificate IV in Drilling Operations • Certificate IV in Drilling Oil & Gas (Off shore) • Certificate IV in Drilling Oil & Gas (On shore) • Diploma of Drilling Operations • Diploma of Drilling Oil & Gas (Off shore) • Diploma of Drilling Oil & Gas (On shore) • Advanced Diploma of Drilling Management • Certificate II in Well Servicing Operations • Certificate III in Well Servicing Operations • Certificate IV in Well Servicing Operations • Diploma of Well Servicing Operations **Skill sets to be developed/revised:** • N/A **64 of 101 existing units of competency to be revised and 7 new units of competency to be created:** • Please refer to Appendix B for list of units of competency.

Consultation Plan

PwC's Skills for Australia intends to engage a wide range of stakeholders relevant to this sub-sector of the MDCI sector. Types of stakeholders to be consulted with include:

Table 14: Project 2C – Stakeholders to be engaged

Employers	Industry associations/Peak bodies	RTOs	Public/Government bodies
• Western Irrigation • Savannah Energy	• Australian Drilling Industry Association (ADIA)	• Enterprise RTOs • Private and Community RTOs	• STAs • Licensing bodies where applicable

Employers	Industry associations/Peak bodies	RTOs	Public/Government bodies
• Titeline Drilling Pty Ltd • RESA • African Underground Mining Services (AUMS) • Drillpower QLD • Barminco • Wallis Drilling	• International Association of Drilling Contractors (IADC) • National Uniform Drillers' Licensing Committee (NUDLC) • Australian Drilling Industry Training Committee (ADITC) • NSW Mining and Petroleum Competence Board • Australian Workers' Union (AWU)	• Technical and Further Education institutions (TAFEs)	

Project 2D – Review Coal Qualifications

Table 15: Project 2D – Rationale and Scope

Project 2D – Review of Coal Qualifications	
Description	• Review **12 core units** to ensure the structure and packaging rules of Coal Mining qualifications from Certificate II to Advanced Diploma provides a clear career pathway for workers in underground coal mining. • Move units relating to high risk activities such as conduct wheel vehicle ops, rigging, scaffolding, and dogging, from Certificate II level Coal qualifications to Certificate III to be better aligned to job roles and responsibilities. • Review the **23 elective units** in the Certificate III in Underground Coal Operations to ensure there is sufficient scope to tailor the qualification and take units which are relevant to job roles. • Review the overlap between the Certificate II qualification in Underground Coal Mining (in scope) and in Surface Extraction to identify areas that are common to both, and explore the idea of a "skills passport" to allow flexibility for people to move across roles and industries. • Remove **3 units** on shore side mooring, ship loading and rail dispatch which are not relevant to the coal mining sector. • Review **7 units** to ensure they align with changes made to related MPO/HAN units. • Review **1 unit** on auger mine operations to ensure it reflects current techniques used in underground coal mining.

Project 2D – Review of Coal Qualifications	
Rationale	As outlined in Section 3 (see pages 19-26), this project will address the following drivers: • Increased demand for workforce agility. • The impact of new technology on ways of working. • Increased focus on safety measures in the MDCI sector. • Lack of support for the transition from technical competence to managerial skills.
Scope of Project	• We expect a Case for Endorsement to be provided to the AISC by June 2019. **Training Package to be developed/revised:** • Resources and Infrastructure Training Package (RII) **7 Qualifications to be revised:** • Certificate II in Underground Coal Mining • Certificate III in Underground Coal Operations • Certificate IV in Surface Coal Mining (Open Cut Examiner) • Certificate IV in Underground Coal Operations • Diploma of Underground Coal Mining Management • Advanced Diploma of Underground Coal Mining Management • Advanced Diploma of Surface Coal Mining Management **Skill sets to be developed/revised:** • N/A **46 out of a total of 93 existing units of competency to be reviewed, 3 units of these to be reviewed to remove them from RII Training Package:** • Please refer to Appendix B for list of units of competency.

Consultation Plan

PwC's Skills for Australia intends to engage a wide range of stakeholders relevant to this sub-sector of the MDCI sector. Types of stakeholders to be consulted with include:

Table 16: Project 2D – Stakeholders to be engaged

Employers	Industry associations/Peak bodies	RTOs	Public/Government bodies
• Glencore Coal • Ensham • Rio Tinto • Curragh Mine • BHP • AGL Energy Ltd	• Minerals Council of Australia (MCA) • Australian Mines and Metals Association (AMMA) • Coal Services NSW • Mine Managers Association Australia (MMAA) • Queensland Coal Mining Safety and Health Advisory Committee (CMSHAC) • NSW Mining and Petroleum Competence Board • Mines Rescue Services (Queensland and New South Wales) • Construction Forestry Mining & Energy Union (CFMEU) • Australian Workers' Union (AWU)	• Enterprise RTOs • Private and Community RTOs • Technical and Further Education institutions (TAFEs)	• STAs • Licensing bodies where applicable

Project 2E – Review Small Mining Qualification

Table 17: Project 2E – Rationale and Scope

Project 2E – Review Small Mining Qualification	
Description	We recommend that a separate case for change should not be taken forward at this point in time for this project, which was to review the 7 Metalliferous Mining (Small Mines) units within the Certificate III in Small Mining Operations qualification. This is because there is currently only one learner enrolled, and one RTO offering this qualification. These units of competency will be reviewed as part of the proposed 2019-20 holistic review of training in metalliferous mining.

Project 2E – Review Small Mining Qualification	
	However, a proposal has been submitted to the QLD Government for a program designed to increase the skills and capacities of resident workers and small businesses in regional Queensland through a targeted program involving the rehabilitation of 15,000 abandoned mine sites in the region. If this proposal goes ahead, then the Case for Change for this project will be reconsidered as a priority project to occur in 2018.
Rationale	As outlined in Section 3 (see pages 19-26), this project could address the following drivers: • Increased demand for workforce agility.
Scope of Project	**Training Package to be developed/revised:** • Resources and Infrastructure Training Package (RII) **1 Qualification to be revised:** • Certificate III in Small Mining Operations **Skill sets to be developed/revised:** • N/A **0 of 7 existing units of competency to be revised:** • Please refer to Appendix B for list of units of competency.

Consultation Plan

PwC's Skills for Australia intends to engage a wide range of stakeholders relevant to this sub-sector of the MDCI sector. Types of stakeholders to be consulted with include:

Table 18: Project 2E – Review of Small Mining Qualification, Stakeholders consulted

Employers	Industry associations/Peak bodies	RTOs	Public/Government bodies
• TAS Advanced Minerals Mine	• Metalliferous IRC members • Resources Training Council • Resources Training Council Members	• Tas TAFE • Madigan Pty (out of business)	• QLD Targeted Minesite Rehabilitation Program Lead • STAs • Licensing bodies where applicable

Project 2F – Review Emergency Response and Rescue Qualifications

Table 19: Project 2F – Rationale and Scope

Project 2F – Review Emergency Response and Rescue Qualifications	
Description	• Review the structure and packaging rules of the Certificate III in Mine Emergency Response and Rescue to ensure it meets industry needs, and that it is deliverable and assessable. • Review **9 units** relating to skills which could be tested using simulation, to provide clarity on when this is acceptable, and which skills should be assessed in the relevant environment. • Review additional **3 units** relating to the underground mining due to the high risk nature of this environment.
Rationale	As outlined in Section 3 (see pages 19-26), this project will address the following drivers: • Increased movement of workers between industries. • Increased focus on safety measures in the MDCI sector.
Scope of Project	We anticipate the Case for Endorsement to be provided to the AISC in late 2018 or early 2019. **Training Package to be developed/revised:** • Resources and Infrastructure (RII) **1 Qualification to be revised:** • Certificate III in Mine Emergency Response and Rescue **Skill sets to be developed/revised:** • N/A **12 out of 22 existing units of competency to be revised:** • Please refer to Appendix B for list of units of competency.

Consultation Plan

PwC's Skills for Australia intends to engage a wide range of stakeholders relevant to this sub-sector of the MDCI sector. Types of stakeholders to be consulted with include:

Table 20: Project 2F – Review of Emergency Response and Rescue Qualifications, Stakeholders to be engaged

Employers	Industry associations/Peak bodies	RTOs	Public/Government bodies
• Glencore Coal • Ensham • Rio Tinto • Curragh Mine • BHP • AGL Energy Ltd • Mount Isa Mines • METS Ignited	• Minerals Council of Australia (MCA) • Australian Mines and Metals Association (AMMA) • Coal Services NSW • Mine Managers Association Australia (MMAA) • Queensland Coal Mining Safety and Health Advisory Committee (CMSHAC) • Mines Rescue Services (Queensland and New South Wales) • NSW Mining and Petroleum Competence Board • Construction Forestry Mining & Energy Union (CFMEU) • Australian Workers' Union (AWU)	• Enterprise RTOs • Private and Community RTOs • Technical and Further Education institutions (TAFEs)	• STAs • Licensing bodies where applicable

Project 2G – Review Exploration Qualifications

Table 21: Project 2G – Rationale and Scope

Project 2G – Review Exploration Qualifications	
Description	• Review the packaging rules and content of Certificate II in Mining/Field Exploration and the Certificate III in Mining Exploration to address areas for improvement and meet industry needs. • Review **5 units** to ensure they include the use of new technologies. • Create **2 new** units to address new technology that is used, namely the addition of a unit on portable XRS training and radiation safety.
Rationale	As outlined in Section 3 (see pages 19-26), this project will address the following drivers: • Increased movement of workers between industries. • The impact of new technology on ways of working. • Increased focus on safety measures in the MDCI sector.
Scope of Project	We expect a Case for Endorsement to be provided to the AISC by June 2019. **Training Package to be developed/revised:** • Resources and Infrastructure Training Package (RII) **2 Qualifications to be revised:** • Certificate II in Mining/Field Exploration • Certificate III in Mine Emergency Response and Rescue **Skill sets to be developed/revised:** • N/A **5 of 11 existing units of competency to be revised, 2 new units to be created:** • Please refer to Appendix B for list of units of competency.

Consultation Plan

PwC's Skills for Australia intends to engage a wide range of stakeholders relevant to this sub-sector of the MDCI sector. Types of stakeholders to be consulted with include:

Table 22: Project 2F – Review of Emergency Response and Rescue Qualifications, Stakeholders to be engaged

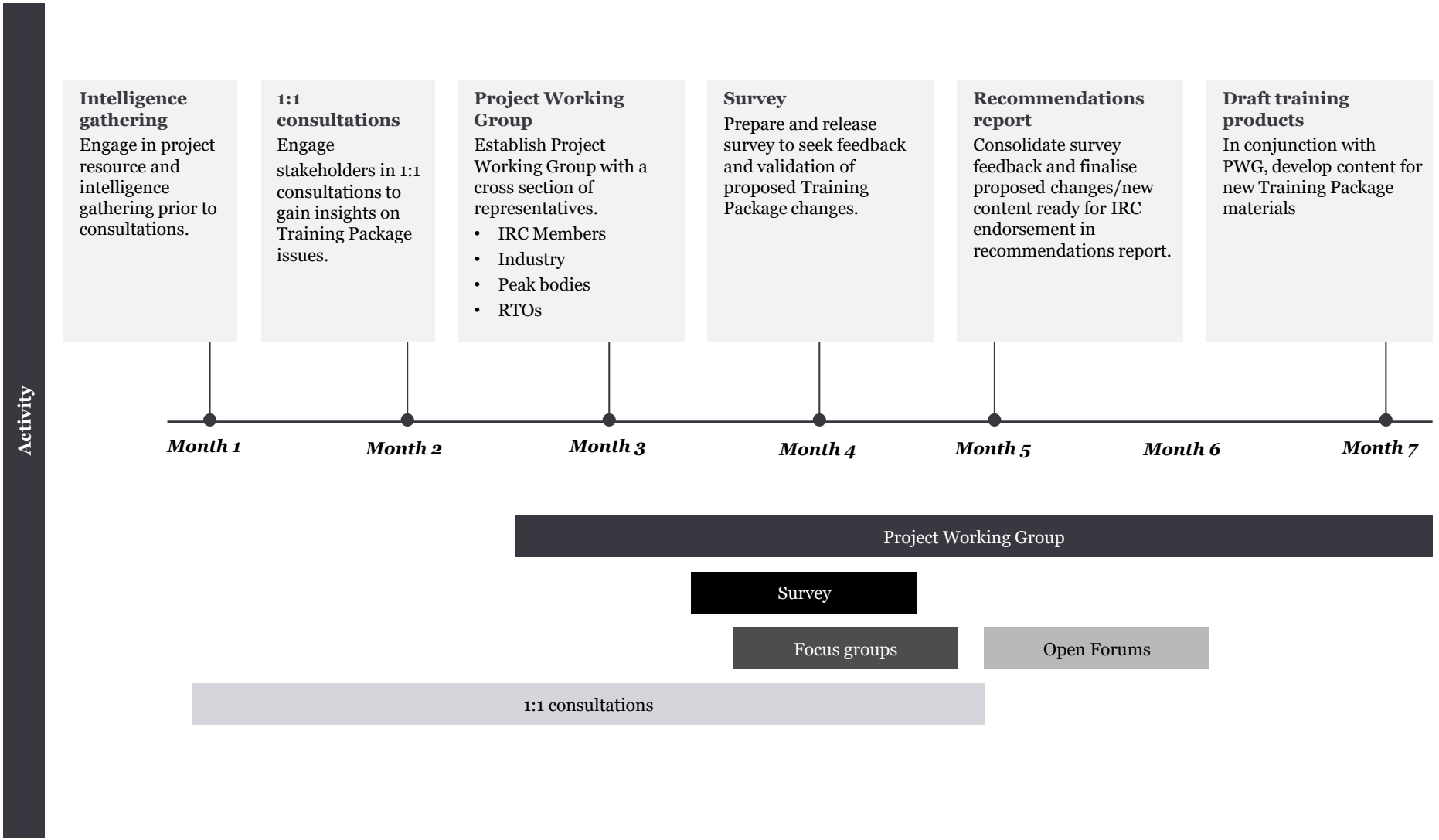
Employers	Industry associations/Peak bodies	RTOs	Public/Government bodies
• AngloGold Ashanti • Digirock Pty Ltd • Earth Science WA • Minjar Gold Pty Ltd • Glencore Coal • Ensham • Rio Tinto • Curragh Mine • BHP • AGL Energy Ltd • Mount Isa Mines	• Institute of Quarrying Australia (IQA) • Cement, Concrete and Aggregates Australia (CCAA) • Victorian Limestone Producers Association (VLPA) • NSW Mining and Petroleum Competence Board • Minerals Council of Australia (MCA) • Australian Mines and Metals Association (AMMA) • Construction Forestry Mining & Energy Union (CFMEU)	• Enterprise RTOs • Private and Community RTOs • Technical and Further Education institutions (TAFEs)	• STAs • Licensing bodies where applicable

Table 23: Project 2F – Ministers' Priorities

Reform	Evidence of reform being addressed
Removing obsolete and superfluous qualifications from the training system	The RII Training Package will be reviewed to remove obsolete and superfluous units as part of the following projects: • **2B Common Skills:** will rationalise units within the RII Training Package by replacing units with ones from other industries where there is not a need to have an RII specific focus. We expect this to lead to the removal of 22 units from the RII Training Package. • **2D Coal:** will review three units for removal from the RII Training Package. These units relate to shipping and rail dispatch skills, which sit outside of MDCI job roles.
Making more information available about industry's expectations of training delivery	Training package components will be written so they align with industry expectations for training delivery, specifically around practical experience, and will be released with an RII Companion Volume that provides additional information.

Reform	Evidence of reform being addressed
Ensuring the training system better supports individuals to move easily from one related occupation to another	The proposed enhancements to this package will focus on specific occupation requirements, with a focus on skills relating to new technologies used in the MDCI sector. They will also ensure the right skills are included at the appropriate levels, and ensure the qualifications provide sufficient flexibility to tailor to individual learner needs. Qualifications at the higher levels, Certificate IV, Diploma and Advanced Diploma, will be reviewed to ensure support is provided for learners as they transition from roles focusing on technical competency, to managerial positions requiring more general leadership skills. The following projects have a particular emphasis on this priority: • **2A Trenchless Technology:** will consider how the Certificate III in Trenchless Technology and the Certificate III in Civil Construction sit alongside each other, to ensure workers can move between them. • **2B Common Skills:** will consider 107 units relating to common skills used across the RII Training Package, and look at areas of overlap with other industries. This will help ensure learners gain recognition for units in general employability skills if they transfer into other roles in the MDCI sector, or into jobs in other sectors.
Improving the efficiency of the training system by creating units that can be owned and used by multiple industry sectors and housing these units in a work and participation bank	No new units are being developed for use across multiple industry sectors.
Fostering greater recognition of skill sets	The creation of skillsets will be considered as part of the following projects: • **2A Trenchless Technology:** will consider creating a skillset in underground service location and vaccuum systems. • **2E Small Mining:** will consider whether the Certificate III in Small Mining should remain a separate qualification, or be included in the Metalliferous qualifications as a specialist skillset.

Figure 8: Indicative Consultation Plan for Training Product Development



5 IRC signoff

This Industry Skills Forecast and Proposed Schedule of Work was agreed to by:

Tony Baulderstone	Darryl Cooper	Tim Westcott	Mark Knowles	Leanne Parker
Chair	Chair	Chair	Chair	Chair
Civil Infrastructure IRC	Coal IRC	Drilling IRC	Mining IRC	Extractive IRC
[Date]	[Date]	[Date]	[Date]	[Date]

Appendix A Administrative information

About PwC's Skills for Australia

PwC's Skills for Australia supports the Civil Infrastructure IRC, Coal Mining IRC, Drilling IRC, Extractive Industries IRC and Metalliferous Mining IRC.

As an SSO, PwC's Skills for Australia is responsible for working with industry to:

- Research what skills are needed in our industries and businesses, both now and in the future, to provide the right skills to match our job needs; helping us to stay at the forefront of global competitiveness and support continued economic prosperity.
- Identify and understand current and emerging trends in the global and domestic economy and how they impact on Australia's skills needs.
- Work with the IRC to revise our qualifications and training content to better match what people learn with the skills needs of our industries and businesses, giving our population the best possible chance of developing work ready skills.

About the Industry Reference Committees

The MDCI IRCs contain the following members:

- Civil Infrastructure IRC – 13 members;
- Coal Mining IRC – 10 members;
- Drilling IRC – 10 members;
- Extractive Industries IRC – 10 members; and
- Metalliferous Mining IRC – 11 members.

Name	Organisation	Category	IRC role
Civil Infrastructure			
Tony Baulderstone	Jenton Projects	Individual with expertise in road construction and maintenance including road marking	IRC Chair
Tanja Conners	Australian Asphalt and Paving Association (AAPA)	Peak Body	IRC Deputy Chair
Christopher Melham	Civil Contractors Federation (CCF)	Peak Body	IRC Member
Craig Moss	Institute of Public Works Engineering Australasia (IPWEA)	Peak Body	IRC Member
Keith McIlwain	Institute of Public Works Engineering Australasia (IPWEA)	Individual with expertise in civil foundations	IRC Member
Michael Fitzgerald	Talis Civil	Individual with expertise in bridge and/or tunnel construction	IRC Member
Pamela Lau	Roads Australia	Peak Body	IRC Member

Name	Organisation	Category	IRC role
Paul Casey	Traffic Management Association of Australia (TMAA)	Individual with expertise in traffic management	IRC Member
Philip Cassell	Eco Group	Individual with expertise in plant operation	IRC Member
Shane Roulstone	Australian Workers Union (AWU)	Employee association	IRC Member
Stuart Maxwell	Construction, Forestry, Mining and Energy Union (CFMEU)	Employee association	IRC Member
Trevor Gosatti	Australasian Society for Trenchless Technology	Peak Body	IRC Member
Yvonne Webb	Industry Skills Advisory Council	State industry training advisory body	IRC Member
Coal Mining			
Darryl Cooper	Minerals Council of Australia (MCA)	National peak body	IRC Chair
Andrew Clegg	QLD Resources Council	State minerals council	IRC Deputy Chair
Andrew Palmer	NSW Mining and Petroleum Competence Board	State agencies / regulators	IRC Member
Brant Softley	Australian Manufacturing Workers' Union (AMWU WA Branch)	Employee association	IRC Member
David Connell	NSW Mines Rescue	Mines rescue services	IRC Member
Duncan Campbell	Ensham Resources	Individual with expertise in underground coal mining	IRC Member
Greg Dalliston	Construction, Forestry, Mining and Energy Union (CFMEU)	Employee association	IRC Member
Michael Hall	AGL Energy Ltd	Individual with expertise in surface coal mining	IRC Member
Russell Albury	QLD Mines Inspectorate	State agencies / regulators	IRC Member
Scott Layton	BHP	Individual with expertise in surface coal mining	IRC Member
Drilling			
Tim Westcott	TDW Consulting Pty Ltd/Australian Drilling Industry Association	Industry expertise Blast hole drilling	IRC Chair
Ross Pickering	• EHS&T Coordinator at African Underground Mining Services (AUMS); • Previously SRG Ltd (Mining)	Industry expertise Underground drilling	IRC Deputy Chair
Andrew Ogden	Western Irrigation	Industry expertise Water well drilling	IRC Member
David Meesey	Savanna Energy	Industry expertise Oil and gas drilling, including well servicing	IRC Member

Name	Organisation	Category	IRC role
Peter Hall	Australian Drilling Industry Association	Peak body	IRC Member
Philip Spence	Titeline Drilling Pty Ltd	Industry expertise Mineral exploration drilling	IRC Member
Phillip de Courcey	RESA	State industry training advisory body	IRC Member
Rob Wallace	Australasian Assurance Services	Industry Expertise Drilling safety	IRC Member
Steven Mathams	Drillpower QLD	Industry Expertise Geotechnical/environmental drilling	IRC Member
Waeel Ilahi	WA Department of Mines, Industry Regulation and Safety (DMIRS)	State regulator	IRC Member
Extractive Industries			
Leanne Parker	Cement, Concrete and Aggregates Association (CCAA)	Peak body	IRC Chair
Elizabeth Gibson	Construction Material Processors Association (CMPA)	State association	IRC Deputy Chair
Damien Davies	Boral Construction Materials	Industry expertise Large operating industry enterprise	IRC Member
Fiona Petty	Nucrush Group	Industry expertise Small or independent enterprise	IRC Member
Glenn McLaren	Australian Manufacturing Workers' Union (AMWU)	Employee association	IRC Member
Maria Floro	Hanson	Industry expertise Large operating industry enterprise	IRC Member
Paul Sutton	Institute of Quarrying Australia (IQA)	Peak body	IRC Member
Sean Burke	Australian Workers' Union (AWU)	Employee association	IRC Member
Waeel Ilahi	WA Department of Mines, Industry Regulation and Safety (DMIRS)	State regulator	IRC Member
Wesley Woodman	Holcim	Industry expertise Large operating industry enterprise	IRC Member
Metalliferous Mining			
Mark Knowles	Independent consultant	Industry expertise Resource processing	IRC Chair
Aaron Gray	Rio Tinto	Statutory positions and/or mine management	IRC Deputy Chair
Annie Holt	RITCWA/CITIC Pacific Mining	State minerals councils/ chambers (RITCWA)	IRC Member

Name	Organisation	Category	IRC role
Darryl Cooper	Minerals Council of Australia (MCA)	Industry expertise Underground mining	IRC Member
Glenn McLaren	Australian Manufacturing Workers' Union (AMWU)	Employee association	IRC Member
Greg Burke	Minerals Council of Australia	National peak body	IRC Member
Martin Ralph	WA Department of Mines, Industry Regulation and Safety (DMIRS)	State regulator	IRC Member
Nigel Haywood	Resources Industry Training Council	State industry training advisory body or equivalent	IRC Member
Shane Roulstone	Australian Workers' Union (AWU)	Employee association	IRC Member
Vicki Anderson	Mount Isa Mines	Industry expertise Surface mining	IRC Member
Virginia Lawson	Mining, Equipment, Technology and Services Growth Centre (METS Ignited)	Industry growth centre	IRC Member

Appendix B 18/19 units for review

Table 24: Scale of qualification involvement[59] [60]

Qualification level	RTOs with scope (January 2018)	Units of competency (native and imported)	2016 enrolments
Civil construction			
Certificate I in Resources and Infrastructure Operations	21	16	710
Certificate II in Resources and Infrastructure Work Preparation	74	33	5,241
Certificate II in Civil Construction	71	36	2,242
Certificate II in Bituminous Surfacing	0	25	3
Certificate III in Civil Construction	110	187	10,795
Certificate III in Civil Construction Plant Operations	195	63	28,962
Certificate III in Civil Foundations	5	44	18
Certificate IV in Civil Construction Operations	15	60	34
Certificate IV in Civil Construction Supervision	69	89	1,675
Certificate IV in Civil Construction Design	8	75	129
Diploma of Civil Construction Design	10	82	460
Diploma of Civil Construction Management	12	44	154
Advanced Diploma of Civil Construction Design	9	31	34
Advanced Diploma of Civil Construction	3	31	43
Extractive industries			
Advanced Diploma of Extractive Industries Management*	5	24	0
Coal mining			
Certificate II in Underground Coal Mining	13	82	1,237
Certificate III in Underground Coal Operations	10	54	164
Certificate IV in Underground Coal Operations	15	33	105
Certificate IV in Surface Coal Mining (Open Cut Examiner)	15	38	768
Diploma of Underground Coal Mining Management	9	30	23

[59] Note that some RTOs listed as having a qualification on scope may only deliver some units in the course

[60] The structure of the table is such that qualifications that are shared across sub-sectors, such as surface extraction being shared across coal, extractive, metalliferous mining and drilling, are in a shared section, so as to avoid duplication.

Qualification level	RTOs with scope (January 2018)	Units of competency (native and imported)	2016 enrolments
Advanced Diploma of Underground Coal Mining Management *	6	28	1
Advanced Diploma of Surface Coal Mining Management	2	25	4
Metalliferous mining			
Certificate II in Underground Metalliferous Mining	23	64	458
Certificate III in Underground Metalliferous Mining	24	66	321
Certificate IV in Metalliferous Mining Operations (Underground)	10	35	27
Diploma of Underground Metalliferous Mining Management	2	28	Unknown
Advanced Diploma of Metalliferous Mining *	3	32	2
Drilling			
Certificate II in Drilling Oil/Gas (On shore)	13	27	1,964
Certificate II in Resource Processing	22	93	484
Certificate II in Mining/Field Exploration *	1	23	11
Certificate II in Drilling Operations	18	43	441
Certificate II in Well Servicing Operations	10	20	259
Certificate II in Drilling Oil/Gas (Offshore)	0	21	Unknown
Certificate III in Well Servicing Operations	10	24	157
Certificate III in Drilling Oil & Gas (Offshore)	0	18	Unknown
Certificate III in Drilling Oil/Gas (On shore)	10	24	271
Certificate III in Drilling Operations	20	59	402
Certificate IV in Drilling Oil & Gas (Offshore)	0	16	Unknown
Certificate IV in Drilling Oil & Gas (Onshore)	10	20	258
Certificate IV in Well Servicing Operations	9	24	102
Certificate IV in Drilling Operations	10	42	79
Diploma of Drilling Oil & Gas (Onshore)	12	20	17
Diploma of Drilling Oil & Gas (Offshore)	0	19	Unknown
Diploma of Drilling Operations	6	25	23
Diploma of Well Servicing Operations	10	17	41
Advanced Diploma of Drilling Management	5	14	7

Qualification level	RTOs with scope (January 2018)	Units of competency (native and imported)	2016 enrolments
Cross industry (these qualification apply to multiple sub-sectors)			
Certificate II in Surface Extraction Operations	77	76	15,332
Certificate II in Cross Industry Operations	2	20	36
Certificate III in Surface Extraction Operations	120	104	14,927
Certificate III in Mining Exploration	5	24	64
Certificate III in Mine Emergency Response and Rescue	46	35	1,467
Certificate III in Resource Processing	40	130	955
Certificate III in Trenchless Technology	10	51	108
Certificate III in Small Mining Operations *	2	44	0
Certificate IV in Surface Extraction Operations	24	57	947
Certificate IV in Resource Processing	10	35	47
Diploma of Minerals Processing	4	24	0
Diploma of Surface Operations Management	14	51	157

Source: National Centre for Vocational Education Research (2015) Total VET activity, enrolments and completions; Training.gov.au (2016) RTO Scope Search Reports

Note: Enrolments & completions in 2016. 'Unknown' indicates that no data was available on this qualification. In most cases data was not available because the qualification was introduced after Total VET activity reporting began.

Note 2: RTOs with scope correct as of January 2018 and may be subject to change.

Note 3: * indicates that the current course enrolment data is unavailable.

Note 4: All enrolment data displayed incorporates that of any relevant superseded units, whereby students are still enrolled.

Licensing, regulatory or industry standards issues

Licensing and regulatory requirements in the MDCI sector are high, with various federal and state stipulations. Given the diversity of activity undertaken in the sector, the regulatory and licensing requirements for each sub-sector can vary significantly. Table 3 identifies relevant sector regulation and occupational licensing for each sector. Note that this information is based off the interim SSO's findings. The information below will be supplemented through further research by PwC's Skills for Australia.

Table 25: Licence and regulatory requirements

Regulator	Sub-sectors affected
Mining regulators	
New South Wales Department of Industry – Resources Regulator	Coal, metalliferous, drilling and quarrying
Queensland Department of Natural Resources, Mines and Energy	Coal, metalliferous, drilling and quarrying
Tasmanian Department of Infrastructure, Energy and Resources	Coal, metalliferous, drilling and quarrying
Victorian Department of Economic Development, Jobs, Transport and Resources	Coal, metalliferous, drilling and quarrying

Regulator	Sub-sectors affected
Northern Territory Department of Mines and Energy	Coal, metalliferous, drilling and quarrying
Western Australian Department of Mines and Petroleum	Coal, metalliferous, drilling and quarrying
South Australian Department of Primary Industries and Regions South Australian Mineral Resources Division	Coal, metalliferous, drilling and quarrying
Safety regulators	
Safe Work Australia	All sub-sectors
Work Safe ACT – Office of Regulatory Services	All sub-sectors
WorkCover New South Wales	All sub-sectors
NT WorkSafe	All sub-sectors
Fair and Safe Work QLD	All sub-sectors
SafeWork SA	All sub-sectors
Workplace Standards Tasmania	All sub-sectors
WorkSafe Victoria	All sub-sectors
Worksafe WA – Department of Commerce	All sub-sectors
Specialist regulators	
Australian Explosives Industry Safety Group	Coal, metalliferous, drilling and quarrying
NSW Office of Water, Department of Industry – Water, WaterNSW	Water well drilling
QLD Department of Natural Resources and Mines	Water well drilling
VIC Department of Environment, Land, Water and Planning	Water well drilling
SA Department of Environment, Water and Natural Resources	Water well drilling
TAS Department of Primary Industries, Parks Water and Environment	Water well drilling
NT Department of Land Resource Management	Water well drilling
WA Department of Water	Water well drilling
Australian Drilling Industry Association	Water well drilling

www.pwc.com.au