



# Architectural, Engineering and Technical Services

*This industry provides surveying, mapping, planning and design services for land use, buildings and structures.*

## Industry Developments and Workforce Challenges

**Demand.** According to Artibus Innovation, property services is a fast growing industry with the highest growth forecast in the architectural, engineering and technical services sector. The demand for surveyors in WA is largely dependent on the cyclical buoyancy of the resources industry, infrastructure work and land development being undertaken in the State. Commercial construction, major civil infrastructure projects and WA's recovering mining sector<sup>1</sup> continue to drive the need for surveyors. Anecdotally, recently there has been an increase in demand for surveyors specifically driven by underground mining in the Goldfields. Looking ahead, the current recovery in exploration and production will lead to future investment and further mining projects. McGowan Government's commitment to the development of a 20-year infrastructure strategy<sup>2</sup> flags a pipeline of projects, as does the \$1.6 billion allocation of Federal Government funds for road and rail infrastructure across WA.<sup>3</sup>

**Supply.** WA has a high concentration of engineering and technical service operators due to the demand for mapping and mine surveying.<sup>4</sup> Signs of skills shortages are beginning to emerge resulting in VET and tertiary surveying graduates finding employment quickly. In their 2018 environmental scan, Artibus Innovation identified architectural, building and surveying technicians and civil engineering professionals in the top five occupations in demand.<sup>5</sup> Their 2019 Skills Forecast and Proposed Schedule of Work notes a continued rapid growth for the property services industry, forecasting highest growth in the architectural, building and technical services sector.<sup>6</sup> In line with this, Hays anticipate construction and engineering skill shortages to intensify dramatically in response to the Metronet and major mining projects.<sup>7</sup> Similarly, a recent survey of local governments has revealed significant shortages of key occupations with building surveyors and town planners being in the top five.<sup>8</sup>

**Technology, Automation and Digitisation.** The sector continues to be impacted by technological advances which enable automation of processes, digitisation of data collection, cloud based processing and data storage. Sophisticated technology such as remote sensing, photogrammetry, satellite positioning, laser scanning, digital mapping and drones continue to drive operational changes, particularly in the surveying and spatial sector. Mapping drones are becoming a primary tool to accurately, safely and efficiently capture aerial data.<sup>9</sup>

**Building Information Modelling (BIM).** BIM is another program transforming the property services sector. BIM is a 3D modelling process for planning, designing, building and managing buildings and infrastructure throughout the lifecycle of a project. It connects a broad range of property services professionals through a flexible, integrated system of computer models, giving greater control over

<sup>1</sup> Bankwest for Business, [Bankwest Future of Business: Focus on Mining Services 2019 release](#).

<sup>2</sup> Media Statements, [Infrastructure WA Bill next step to growing the economy and creating jobs](#), 19 February 2019.

<sup>3</sup> Infrastructure Magazine, [Major investment in WA transport infrastructure](#), 29 March 2019.

<sup>4</sup> Artibus Innovation, [Property Services IRC Skills Forecast and Proposed Schedule of Work](#), 12 March 2019.

<sup>5</sup> Australian Industry and Skills Committee, [Construction, Plumbing and Services IRC Skills Forecast and Schedule of Work 2018](#).

<sup>6</sup> Artibus Innovation, [Property Services IRC Skills Forecast and Proposed Schedule of Work](#), 12 March 2019.

<sup>7</sup> Hays Jobs Report, [Construction: Perth. Hotspots of skills in demand: Jan – June 2019](#).

<sup>8</sup> WA Local Government Association, [Local Government Workforce and Future Skills Report Western Australia](#), September 2018.

<sup>9</sup> Artibus Innovation, [Property Services IRC Skills Forecast and Proposed Schedule of Work](#), 12 March 2019.



project decisions. BIM provides insights into building design constructability, reduces errors and improves the efficiency and effectiveness of construction, maintenance and facilities management. Evolving technology integrates cloud based application, realistic visualisation and virtual walk-through animation, predictive capability and asset tracking. The continued increase in the use of BIM will have a profound effect on the building design industry over the next 5 – 10 years and has the potential to impact all of property services' current processes, tasks and occupations.<sup>10</sup> This will require training not only for those entering the industry for the first time but existing workers that want to remain competitive in a changing landscape. Although BIM is projected to completely replace current computer-aided design (CAD) systems, its current adoption is mostly quarantined to complex commercial projects.<sup>11</sup> It is anticipated governments may follow Queensland's lead and mandate BIM for large government construction projects<sup>12</sup> into the future.

**Housing Diversity.** Western Australia's population is expected to double by 2050. The State Planning Strategy 2050<sup>13</sup> forecasts that up to 550,000 new dwellings will need to be built in Perth alone to cater for this increase in population. Housing diversity is essential to WA's long-term prosperity, infill targets and improved liveability. Density housing is fuelling local planning debates as local governments review their local planning schemes to incorporate medium density housing in well-established suburbs without negatively impacting their appeal.<sup>14</sup> The WA Government is implementing a staged approach to higher density development and infill throughout Perth. It has released a set of guidelines for developers and local governments to ensure apartments are built to a higher standard, focusing on design for the built environment, new residential design codes for apartments and a design review guide.<sup>15</sup> Similarly, the State Government is directing its focus on compact housing for more affordable and diverse housing options for a range of buyers, including first home buyers and seniors. The Western Australian Planning Commission released a new policy to guide subdivision, building design and development of small lots in new residential areas and transit precincts.<sup>16</sup>

**Pre-Fabrication.** The increase demand for pre-fabricated modular homes and use of partial pre-fabrication will see a decrease in the demand for drafts people as people rationalise efficiencies and look for lower maintenance and cheaper building options.

**Training.** The need for surveyors in the resources sector and the mining conditions in WA have shaped a unique training environment, offering both vocational and tertiary pathways into employment. Well placed as a feeder into the growing Goldfields mining sector (gold employment growth of 8.1% in the year to June 2018),<sup>17</sup> South Regional TAFE (Bunbury) currently delivers surveying qualifications at Certificate IV and Diploma levels. However, their delivery of the entry level Certificate III in Surveying and Spatial Information Services has been withheld for 2019 due to lack of access to lecturing staff and they may cease delivery of all surveying qualifications by the end of 2019. North Metropolitan TAFE is the only other provider offering the full suite of qualifications from Certificate III to Advanced Diploma levels at the East Perth campus. Although delivered full time, a number of students are undertaking part time study, with some traineeships in Kalgoorlie and with Roy Hill.

**Skills.** The quality and magnitude of data collected by use of current technologies and automation processes is driving a need for surveyors to have skills beyond the ability to use and apply technologies to measure and record data. A greater emphasis is being placed on application of data for planning and development, including the ability to process, analyse and manipulate data, think critically, problem solve and innovate solutions. Similarly, the interrelatedness and sheer quantity of big data available and its relevance across industries have created a greater intersect between people from diverse disciplines looking to interrogate the data to determine breadth of application within other sectors and businesses. This requires heightened communication skills and a greater focus on client needs.

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<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

<sup>12</sup> Queensland Government, Department of State Development, Manufacturing, [Infrastructure and Planning, Building Information Modelling \(BIM\)](#).

<sup>13</sup> Government of Western Australia, Department of Planning, Lands and Heritage, [State Planning Strategy 2050](#).

<sup>14</sup> REIWA, [Housing diversity essential to WA's long-term prosperity](#), 05 March 2019.

<sup>15</sup> REIWA, [Design WA guidelines to raise the bar for apartment buildings](#), 19 February 2019.

<sup>16</sup> Government of Western Australia, Media Statements, [Small lots policy big on innovation and affordability](#), 4 June 2019.

<sup>17</sup> Bankwest for Business, [Bankwest Future of Business: Focus on Mining Services 2019 release](#).



**Regulatory Compliance.** The surveying and spatial sciences occupations are increasingly embracing advanced technologies, requiring new workforce entrants and existing workers to have highly specific, technical skills and knowledge. With growing use of technology such as drones, it is increasingly important users maintain awareness of ancillary compliance and changing statutory requirements on use of that technology, such as those being introduced by the Civil Aviation Safety Authority around the flying of drones. Similarly, building surveyors need to understand the National Construction Code (NCC) and operate within given compliance and regulatory systems, set to change following recent building performance failures (Opal Tower 2018, Neo200 in 2019).

**Licensing.** Cadastral surveyor licensing for graduates is only available through a tertiary qualification. Curtin University offer a 4-year Bachelor of Surveying, accredited by the Chartered Institution of Civil Engineering Surveyors (ICES) with graduates eligible for licensing by the Land Surveyors Licensing Board of Western Australia. Curtin also offer a 3-year Bachelor of Science (Mine and Engineering Surveying Major) which meets the education requirements of the Department of Mines, Industry Regulation and Safety (DMIRS) for certification as an underground or open-pit mine supervisor or as an open-cut mine manager. The first two years are taught in Perth, while the final year is taught at the WA School of Mines in Kalgoorlie. There is also a push by Building Designers Australia WA for the introduction of licensing within the building design industry as is the case in other states. This move, however, has not had any support from Government.

**Review of the Mines Safety and Inspection Regulations 1995.** The current regulations provide for a TAFE pathway to becoming an Authorised Mine Surveyor (nominal 3-year training program – Advanced Diploma in Surveying). In Western Australia, DMIRS overlays rigour for surveyor graduates entering the industry via a VET qualification. This is unique to WA and has been instrumental in ensuring that sufficient mine surveying graduates are entering the industry. While the Australian Institute of Mine Surveyors (national body) are pushing for academic degrees (particularly in response to discussions around mutual recognition of mine surveying authorisation) the removal of this pathway would have a profound effect on the continued supply of new entrants to industry in WA. The local industry association, Surveying and Spatial Sciences Institute, is opposed to any change to the Act or Regulations that would remove the VET pathway in the State as it would have a negative impact on the number of students entering all VET surveying programs which support both mining and infrastructure activity.

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## Industry Workforce Priorities

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**Building Automation.** BIM's integrated capacity exemplifies the emergent streamlining and convergence of industries in property services. Adoption of such technologies will require a breadth of skills to support technical knowledge. The main workforce priority for the building design industry is ensuring new and existing workers are skilled in the use of BIM and other building automation software. This has seen training providers offering night time short courses to assist with those already working in the industry to up skill. This is likely to increase as the use of these programs and other technology (such as 3D modelling) continue to rise.

**Evolving Construction Methods.** As the needs of clients change and new methods of construction are introduced that offer cheaper, quicker or more environmentally friendly options, industry must ensure they are keeping current to meet the needs of a diverse client base. To remain competitive and responsive companies need to understand alternative and pre-fabricated construction methods and ensure their staff have the skills to implement practices accordingly.

**Big Data.** The surveying and spatial sciences industry continues to embrace new technologies to assist with complex tasks. Sophistication of both hardware and software enable collection and storage of an immense amount of data. Those in industry are tasked with the management and analysis of that data, requiring greater IT capability, critical thinking and problem solving. The ability to manipulate data, distil information, analyse applicability and determine cross-sector relevance require skills beyond the mechanics of data collection.



**Training.** It is important to ensure an adequate pipeline of surveyors continues as mining, infrastructure and construction projects ramp up. While anecdotally there are instances of study being undertaken via a work-based training pathway, the majority of surveyors entering the industry in WA do so via an institutional pathway. Challenges for TAFE as a training provider are: access to lecturing staff, restricted by remuneration; resource allocation for upgrades aligned to contemporary technology; declined student numbers; dated qualifications not reflecting current practice nor technological advancements. Potential cessation of vocational delivery through South Regional TAFE and limited work-based training options may impact supply in the region, particularly if study options are limited to full-time courses offered by North Metropolitan TAFE at their East Perth campus. The local industry association is concerned that regional people interested in entering the industry may be excluded due to access, while existing workers such as surveying assistants wishing to up-skill and complete the Certificate III may be restricted due to limited delivery options. Reportedly, mining companies in the Goldfields region focus on local employment rather than engaging FIFO workers. Discussions with the Resources Industry Training Council (RITC) signalled that the WA School of Mines is reviewing their program for an articulated pathway with Curtin University. While this may alleviate future supply restrictions, the barrier to entry through TAFE would still exist for students wishing to undertake vocational study.

**Training Package Changes.** Artibus Innovation have identified a number of projects in their review of the CPP Property Services Training Package and their initial scoping of industry needs. A Surveying and Spatial Sciences Industry Technical Advisory (TAC) Group will guide the update of surveying and spatial units and qualifications. Proposed work will incorporate current technologies used for measuring and capturing data and address the skills and knowledge required to interpret, analyse and manage the data collected. Packaging rules will be updated to better align with occupational outcomes.<sup>18</sup> It is important the TAC Group has appropriate WA representation to ensure our unique operating mining conditions are captured when determining relevance of qualifications. Despite low enrolment numbers, the Advanced Diploma in Surveying continues to provide a critical pipeline of mining surveyors to meet cyclical demand. Discussions with RITC indicate the industry is in a project expansion phase. Current commodity prices, production and exploration growth are driving a recovery in resources. Looking ahead, WA will be buoyed by a number of new resource projects.<sup>19</sup> It is anticipated this will drive demand for surveyors by late 2019 and early 2020. Artibus is also looking at developing a new Certificate II in Property Pathways to attract and support new entrants to the property industry by providing a streamed training pathway to its sub-sectors and enhance articulation into high level vocational qualifications.<sup>20</sup>

**Compliance and Regulatory Systems.** Recent issues of building failure due to use of non-conforming materials and building products have highlighted shortcomings in the implementation of the National Construction Code (NCC). A report<sup>21</sup> assessing current compliance and regulatory systems has made a number of recommendations around legislative and regulatory reform. A number of these reference career paths, integrity, code of conduct for building surveyors and the role of building surveyors in enforcement. In line with this, Artibus has proposed the development of a Certificate IV in Built Environment Auditing to respond to compliance and reporting requirements through the development of base core compliance audit skills.<sup>22</sup>

**BIM for Property Management.** Adoption of Building Information Modelling to the property services industry, its evolving integration of capabilities across many subsectors and anticipated explosion of its application (including large government construction projects following Queensland's lead into the future) are driving a need for VET qualifications in this space. 2019-20 will see the development of a suite of qualifications in Building Information Modelling (BIM) for property spanning the CPP and other building related training packages with credit arrangements to tertiary institutions with existing qualifications.<sup>23</sup>

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<sup>18</sup> Artibus Innovation, [Property Services IRC Skills Forecast and Proposed Schedule of Work](#), 12 March 2019.

<sup>19</sup> Bankwest for Business, [Bankwest Future of Business: Focus on Mining Services 2019 release](#).

<sup>20</sup> Artibus Innovation, [Property Services IRC Skills Forecast and Proposed Schedule of Work](#), 12 March 2019.

<sup>21</sup> [Building Confidence – Improving the effectiveness of compliance and enforcement systems for the building and construction industry across Australia](#), February 2018.

<sup>22</sup> Artibus Innovation, [Property Services IRC Skills Forecast and Proposed Schedule of Work](#), 12 March 2019.

<sup>23</sup> Ibid.