



ENGINEERS
AUSTRALIA



CELEBRATING
OUR CENTENARY

Building Stronger Foundations

Response to the NSW Discussion Paper

July 2019

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1. Introduction

1.1 About Engineers Australia

Engineers Australia is the peak member-based professional association for engineers. Established in 1919, Engineers Australia is in its centenary year and is constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community. We have around 100,000 members, including about 25,000 in NSW.

Engineers Australia maintains national professional standards, benchmarked against international norms. We do this through accreditation of undergraduate university engineering programs, and management of Australia's largest voluntary register for engineers, the National Engineering Register (NER).

Given the broad membership coverage and knowledge we have of the engineering profession, Engineers Australia is well placed to provide well-informed views to the Government on how a registration scheme can operate. For example, we developed the NER in 2015, are an approved assessment entity for the QLD Government's registration scheme and have been instrumental in the development of the Victorian Government's Professional Engineers Registration Bill 2019 (which is before Parliament).

1.1.1 Our own consultation

In Section 1.2, we explain that the scope of this submission is largely restricted to the question of registration for engineers.

Registration is a long-standing and high priority issue for Engineers Australia. It is often raised with members through e-Newsletters, social media, our monthly magazine "create", and many engagements in mainstream media. It is therefore a topic of which Engineer Australia members are well-aware.

To prepare this submission, Engineers Australia sent an email to all NSW-based members, alerting them to the NSW Government process and inviting them to either provide a response directly to the government, or to submit views for consideration by Engineers Australia. The email provided recipients with six full working days in which to make a response.

Analysis of the email data shows that it was opened by more than half of all recipients, and that about 9% of all recipients went so far as to click on the links contained in the email alert. (By way of comparison, the respective industry averages are 20% and 3%.)

Of the responses received from the general membership through this consultation mechanism, 91.5% expressed specific support for the introduction of a registration scheme for professional engineers. Just 3.4% expressed opposition. A further 5.1% were silent on the matter.

In addition to this process to consult with the general membership, views were also sought from several specialist groups or committees within the membership: the leadership committees of our NSW-related divisions, the Structural College, Mechanical College and the Society for Fire Safety. All provided strong support for the introduction of compulsory registration of engineers.

1.2 Scope of this submission

The Building Ministers Forum (BMF) report, *Building Confidence*, offers a rare opportunity to deliver a program of reform to fix a broken system. Engineers Australia recommends that all jurisdictions implement all recommendations of that report.

Recommendations 1-3 are of particular importance to Engineers Australia and provide the context for our comments in response to the *Building Stronger Foundations* Discussion Paper. Note that this submission relates to the work of engineers and comments are therefore not intended (unless specifically indicated) as a comment on reform for other professions and building sector practitioners.

Engineers are essential to the building industry, and all the NSW Government's proposed reforms will have an effect. Engineers Australia's expertise is in the field of setting and maintaining professional standards, so this submission will focus on key reform number 2: "*Introducing a new registration scheme for currently unregistered designers and commercial builders who intend to make declarations.*"

The other key reform proposals will be addressed, though in less detail.

This submission is in several sections:

- **Section 2:** Introduction to the benefits of registering engineers in general
- **Section 3:** Analysis of the need for a broad scope for registration of engineers
- **Section 4:** Advice on the essential elements of a registration scheme
- **Section 5:** Answers to specific questions about registration raised in the Discussion Paper
- **Section 6:** Advice on other reforms raised in the Discussion Paper.

1.3 Key recommendations

The below is a list of key recommendations. Each is easily attainable in the context of current efforts to reform the building and construction sector, will make a big step towards regaining public confidence, and enable the Government to take reforms further when the time is right:

1. The proposed new registration scheme for currently unregistered engineers should be aligned with the system already in operation in QLD and is proposed for Victoria in the Professional Engineers Registration Bill 2019. This will ensure mutual recognition of registration across borders. *The profession advises that this is a critical element for success.*
2. The proposed new registration scheme for currently unregistered engineers should be applied to all who provide professional engineering services (other than those working under the supervision of a registered engineer) in the building sector. *This is what the public expects.*
3. The legislative mechanisms created to fulfil the short-term goal of engineer registration in the building sector should be designed to enable later expansion of the scope of registration to all engineering occupations in all industries. *This is what is needed to one day attain a bigger vision for public safety and consumer confidence in engineering services.*

1.4 Further consultation

The Government's invitation to stakeholders to continue working with the Department of Finance, Services and Innovation on the development of proposals for building sector reform is appreciated. Engineers Australia would welcome the opportunity to work closely with the Department on the registration of engineers and looks forward to detailed discussions about this submission and eventual legislation over the coming weeks and months.

1.4.1 Contact details

To discuss the contents of this submission further please contact Jonathan Russell, National Manager for Public Affairs, on (02) 6270 6565 or at JRussell@engineersaustralia.org.au.

2. Benefits of compulsory registration of engineers

The community trusts engineering without realising it. The buildings we live in. The cars we drive. The devices we use every day. We trust that they are safe and will work as they are designed to. Rarely do we realise that the world we inhabit was created by engineers.

When trust is unconscious, it's even more important to protect the integrity of engineering practice.

Use of the title 'engineer' is unrestricted and is likely to remain so because it has become a generic term. In the absence of regulation for engineering in NSW, anyone can purport to be an engineer and provide engineering services without appropriate competencies and with disregard to standards.

Engineering services are vital to state and national economic prosperity and social well-being, yet there is no uniform regulatory regime covering engineering practitioners in Australia. Instead, it is ad hoc and largely voluntary.

This point was highlighted by the NSW Minister for Better Regulation and Innovation, Hon Kevin Anderson MP, when he was reported as saying: **"I can't believe that in this state engineers don't have to be registered."**¹

Engineers Australia does not promote registration as a 'silver bullet' to all ills of industry. Registration is the first recommendation of the BMF's Shergold & Weir report, and of the NSW Government's Opal Tower report, because it is the first step; it creates a system to recognise people likely to perform competently, and a mechanism to exclude those found to be unsuitable to work as an engineer.

It was noted in section 1.1.1 that 3.4% of members who provided feedback to Engineers Australia for this submission oppose registration of engineers. Amongst those members, they identified factors such as builder operations and the regulation of approvals processes as more important. Engineers Australia agrees that those also require attention but promotes registration as an important component of system-wide reform as envisioned by the BMF Shergold & Weir report—a view that is supported by at least 91.5% of all members who provided us with information for this submission.

Primarily, compulsory registration of all engineers will enable significant enhancement of public safety and consumer protection. More broadly, there are five key benefits of a registration system for engineers:

2.1 Industry and consumer information

Engineering services are purchased by governments, large and small business, and individual consumers. In the absence of a common standard for ordinary engineering practitioners, consumers are limited in terms of the extent they can measure the professionalism of an engineer they wish to engage.

A registration scheme will aid the market by providing advice to consumers on the competence and experience levels of engineering practitioners. This enables consumers to make more informed decisions and reduces the common tendency to choose services based on price alone.

By way of comparison, it should be noted that doctors, lawyers and architects all have to be licenced/registered to practice but, as things stand, engineers do not.

2.2 Reducing risks to public health, safety and welfare

The greatest risk to consumers of engineering services in the current registration environment—where there is little or no regulation of the engineering profession—comes from engineering practitioners attempting to undertake

¹ Elias Visontay, "Minister to reform building industry", *The Australian*, June 24, 2019. Available at: <https://www.theaustralian.com.au/nation/minister-to-reform-building-industry/news-story/7eafbf904b49b1c2293a2bec6549f098>. Accessed 21 July 2019.

work without adequate skills or competencies. Registration helps to ensure that only those with suitable baseline qualifications (that is, an appropriately recognised engineering degree), enough relevant experience, and a proven commitment to ongoing training and development can provide engineering services.

Risks to the public resulting from the provision of engineering services by unqualified or incompetent persons have three elements:

- Health: through such things as badly designed or 'sick' buildings (poor air-conditioning, rising damp, low natural light levels). Beyond the building sector, health effects can include things such as contaminated drinking water and other environmental incidents.
- Safety: through the collapse or other significant failure of buildings such as was seen in the Opal and Mascot Towers of Sydney in 2018-2019. Safety issues can also arise beyond the building sector with infrastructure failures (for example, bridges) or through the failure of hazardous services such as gas, electricity or mechanical works.
- Economic: involving financial costs such as design and construction costs, litigation expenses, lost production and rectification costs. The economic costs associated with the Opal and Mascot Towers offer relevant contemporary case studies.

Requiring engineering practitioners who offer services that place public safety, health and welfare at risk to be registered can minimise these risks. It does this by, as described above, creating a system to recognise people likely to perform competently, and a mechanism to exclude those found to be unsuitable to work as an engineer.

2.3 Professional recognition

Businesses and the community expect a certain set of standards and skills from engineering practitioners. As with other professionals, engineering practitioners have a high degree of responsibility and liability imposed on them by courts and regulators. A statutory registration scheme would identify those persons whose academic qualifications, cumulative and current experience, competencies and commitment to ethical conduct and continuing professional development are the standard expected of the ordinary skilled person exercising and professing to have that skill.

This point was highlighted in the independent expert report into Opal Tower, commissioned by the NSW Government, which recommended, "[t]he creation of a government Registered Engineers database developed in partnership with an appropriate professional body."²

In addition, regulators can create a register to signal that registrants, in the provision of engineering and engineering-related services, can maintain and have the benefit of professional indemnity (PI) insurance in the event that a professional services provider fails to discharge his/her duties properly.

2.4 Enhanced international mobility and trade in engineering services

In many countries, engineering is seen as an essential profession whose practitioners should be recognised and registered. Standards of practice that are recognised by government have the potential to improve overseas trade and are essential for trading in accordance with the World Trade Organisation trade and services obligations, and under bilateral trade agreements.

A statutory compulsory registration scheme for all engineers in NSW can provide a competitive edge for a state that is seeking to export services to the global market.

² John Carter, Mark Hoffman and Stephen Foster, *Opal Tower Investigation Final Report*, 19 February 2019. Available at: <https://www.planning.nsw.gov.au/-/media/Files/DPE/Reports/opal-tower-investigation-final-report-2018-02-22.pdf?la=en>. Accessed 21 July 2019.

2.5 Legislative efficiency

A statutory registration scheme with requirements that match those of other jurisdictions creates legislative efficiency. It is a means of ensuring that both a common standard for engineering practice is in place in all states and territories and that engineers do not have to comply with the different requirements in each jurisdiction.

2.5.1 Assessing authorities

In QLD, the government recognises independent assessing authorities to conduct the initial checks of applicants for registration. Using assessing authorities, such as Engineers Australia, can help simplify compliance requirements and avoid red tape. It offers a mechanism for assessing the qualifications and experience requirements of a statutory register, with a letter of assessment that is issued once but can be used in all jurisdictions that require registration of engineers. The assessment provided by Engineers Australia can nominate an individual's areas of practice, which is especially useful for jurisdictions that require engineers to be registered for work in selected industries or engineering occupations.

3. Scope of registration

Engineers Australia recommends that all engineers in all areas of practice and operating in all industries are registered to practice (unless working under the supervision of a registered engineer).

This comprehensive approach has existed in Queensland where a compulsory register of engineers has been in place since 1930 and is being considered for implementation in Victoria through the Professional Engineers Registration Bill 2019.

For NSW, Engineers Australia accepts that the immediate concern is engineering services in the building sector. The recommended scope of registration in that sector is explored at Section 3.1.

Importantly, Section 3.2 provides advice on why short-term solutions that target the building sector should be designed to enable future realisation of a vision for comprehensive registration of engineers, such as is required in Queensland. The reality is that engineering pervades all industries and all industries are at risk of associated failures—not just the building industry. Unless there is compulsory registration of all engineers, engineering failure across all industries will continue to pose a risk to community safety and consumer protection.

3.1 Building sector

Recommendation 1 of *Building Confidence* is that each jurisdiction require the registration of engineers involved in the design, construction and maintenance of buildings. The report's detailed commentary to accompany that recommendation does not give any indication that the scope of registration should be restricted; it instead reads as a recommendation that calls for all engineers operating in the building sector to be registered.

Polling conducted by Engineers Australia, nationally and in NSW, shows that broad-based registration of engineers has very high levels of public support across all demographics. The poll of 1,222 people aged 18 years and older was conducted on 18-23 July.³ It asked:

"Now a question about engineers in Australia. Engineers are involved in a range of things such as designing and building residential towers, making public infrastructure like bridges and roads, or delivering manufacturing and high-tech innovation. Do you think engineers in Australia should, or should not have to be registered in order to practice, in the same way as other professions such as architects, doctors and lawyers?"

Nationally, 88% of respondents answered that, "Yes, engineers should have to be registered." Just 4% answered "No, should not have to be registered" and 8% answered "No opinion / can't say."

NSW respondents showed even higher levels of support: 91% support, 3% oppose and 6% can't say.

Public support for broad-based and compulsory registration of engineers is incredibly high. When the results are broken down to various demographics, support never gets below 82%. If the NSW government legislates for a broad-based statutory register for engineers, it will have the support of city and rural voters, those on high and low incomes, men and women, and people of all age groups.

Indeed, as mentioned above, following the Mascot Towers situation becoming public, the NSW Minister for Better Regulation and Innovation was reported as saying that he couldn't believe that there was no requirement for engineers in NSW to be registered.⁴

³ The poll was conducted for Engineers Australia by OmniPoll. The poll was conducted nationally among 1,222 people aged 18 years and over. Respondents were drawn from the online consumer panel managed by Lightspeed Research, OmniPoll's online partner. Sample quotas were set for each state, city and regional area, along with sex and age. To help reflect the overall population distribution, results were post-weighted to Australian Bureau of Statistics data on age, sex, area and highest schooling.

⁴ See footnote 1.

Despite these widely-held expectations, the Discussion Paper indicates that the registration scheme will only apply to those “who intend to make declarations.” That is, to only apply to those who will be designated as “‘building designers’...who provide final designs and/or specifications of elements of buildings to declare that the building plans specify a building which will comply with building regulations, including the BCA (Building Code of Australia).”

If registration requirements are limited to only a sub-category of engineers, to be known as ‘building designer’, then the benefits of a broad registration scheme will not be realised, community expectations will not be met, and public safety and consumer confidence will continue to be compromised.

A restricted registration scheme would be a missed opportunity and misapply the intent and vision articulated in Recommendation 1 of the BMF Building Confidence report.

Recommendation: It is recommended that the proposed new registration scheme for currently unregistered engineers is applied to all who provide professional engineering services (other than those working under the supervision of a registered engineer) in the building sector.

3.2 A bigger vision

At the time of the 2016 census, 107,993 engineers resided in NSW. Of these, 60,197 (55.7% of the total) were in engineering occupations and therefore likely to be providing engineering services of some kind.

3.2.1 Engineering occupations

Engineers Australia analysis of the 358 four-digit industries in the Australian Bureau of Statistics (ABS) Australian and New Zealand Standard Classification of Occupations (ANZSCO) has identified 51 engineering occupations.

The BMF *Building Confidence* report recommends that seven engineering occupations are registered. They are certainly appropriate for the building sector, but they are just the tip of the iceberg when it comes to the types of roles that engineers fill.

The long-term vision of the NSW Government for registration of engineers should therefore extend beyond the engineering occupations that are specific to the building sector.

3.2.2 Engineering industries

Using nation-wide 2016 census statistics as a guide, it is estimated that 9.3% of NSW-based engineers are working in the construction industry (which includes both building-related and ‘heavy and civil engineering’ construction). Similarly, 15.0% are estimated to be working in the Professional, Scientific and Technical Services industry (not including computer systems design sub-sector), a large number of whom will be supporting the building sector.

It is evident from these statistics that the building sector is a significant user of engineering services but is by no means the only—or even dominant—sector in which engineers work. An estimated 75.7% work in industries that have little relationship with the building sector.

Engineers provide engineering services in all industries and, through analysis of ABS census data, Engineers Australia has developed the concept of “core industries” for engineering. A “core industry” is an industry in which the proportion of engineers in the industry employed in engineering occupations is higher than the national average. Expressed more simply, core industries employ lots of engineers who provide engineering services.

There are seven such industries:

1. Professional, scientific and technical services
2. Mining
3. Electricity, gas, water and waste services
4. Information, media and telecommunications
5. Construction
6. Public administration and safety
7. Manufacturing.

Even 'non-core industries' employ many engineers who provide engineering services. For some, the percentage providing engineering services is very low. For example, just 4.3% of engineers in the Accommodation and Food Services industry are in engineering roles. In the Education and Training industry, 53.6% of engineers are in engineering roles, but more likely to be teaching discreet subjects—such as maths—than providing engineering services.

But for some non-core industries, there is still a large number of people providing engineering services for which registration would be appropriate. For example, in the Transport, Postal and Warehousing industry 53.3% of employed engineers are in engineering roles and, given the industry, are quite likely to be providing engineering services.

The above discussion highlights the ubiquity of engineers across industries. The NSW Government vision for registration of engineers should therefore extend beyond the building sector. If it doesn't, community safety and consumer protection will continue to be compromised.

3.2.3 The Queensland and Victorian models

The compulsory registration system in place in QLD since 1930 reflects the fact that there is a very large number of engineering occupations, and that engineers work across all industries. In QLD, anyone providing a professional engineering service in Queensland or for Queensland must be registered as a Registered Professional Engineer of Queensland (RPEQ), or work under the supervision of an RPEQ. That system helps maintain standards in the profession and upholds public confidence in the services provided by engineers.⁵

Victoria has a well-established system for requiring engineers who occupy four key areas of practice in the building sector to be registered, and is currently expanding the scope of registration to cover five engineering areas of practice, and to include services in any industry. The Professional Engineers Registration Bill 2019 is awaiting debate in the upper house.

Recommendation: It is recommended that the legislative mechanisms created to fulfil the short-term goal of engineer registration in the building sector is designed to enable later expansion of the scope of registration to all engineering occupations in all industries.

Recommendation: It is recommended that the proposed new registration scheme for currently unregistered engineers be aligned with the system already in operation in QLD and is proposed for Victoria in the Professional Engineers Registration Bill 2019. This will ensure mutual recognition of registration across borders.

⁵ See, *Applying for Registration – Explanatory Notes*, Board of Professional Engineers Queensland, Version 2 Approved 19 June 2019. Available at: <https://www.bpeq.qld.gov.au/images/documents/forms/1900625%20Application%20for%20Registration%20Version%204.pdf>. Accessed 4 July 2019.

4. Essential elements of a statutory registration scheme

All registration systems have the same basic characteristics in that standards must be set, courses accredited, candidates examined or assessed, and a register maintained. Performance must be monitored, and failures disciplined. A register has greater effect if supported by licensing arms of government.

Engineers Australia supports a co-regulatory model of registration involving statutory bodies and professional associations undertaking various roles. The co-regulatory model provides greater assurance of the competency of registered engineering practitioners and reduces the risk of physical and financial harm to consumers. This approach allows industry and the professional association to control the qualifications and competency standard applied to a practitioner, but allows government to oversee the assessment and monitoring system and standards applied to practitioners through the approval process.

A guiding principle of the voluntary registration model introduced by Engineers Australia (the NER), is to increase the professionalism of the broadest possible cohort of practising engineers. Under a co-regulatory approach, Engineers Australia believes that the legislation governing the delivery of engineering services in NSW ought to:

- Contain restrictions on who may deliver engineering services
- Restrict the 'registered' title to those who are on an engineering register
- Register engineers in the broadest possible areas of engineering practice and not by industry. The onus is on each registered engineering practitioner to only undertake work that he or she is competent to undertake. In QLD, for example, 26 areas of practice are currently recognised.
- Base registration on a competency assessment by approved assessment entities
- Include a mandatory continuing professional development regime for ongoing registration

Regulators may also wish to require registrants to have the benefit of professional indemnity insurance.

4.1 Engineers Australia's National Engineering Register

The National Engineering Register (NER) was introduced by Engineers Australia in 2015 and is recommended as the model for introducing a co-regulatory system of registration for engineers.

The NER is the largest publicly searchable register in the country with 21,363 people registered as of July 2019. It delivers a uniform national benchmark of professionalism in the broadest areas of engineering practice, both general and special, in both the private and public sectors.

The NER covers each of the three occupational categories of professional engineer, engineering technologist and engineering associate (described below at section 4.2).

It is possible for both members and non-members of Engineers Australia to be registered on the NER. It improves professional recognition and public trust of engineers in Australia because all registrants on the NER meet the standard of professionalism expected of any professional:

- a recognised qualification benchmarked to international education standards
- a minimum level of professional practice
- currency of continuing professional development
- a commitment to ethical practice
- an annual certificate of registration.

The benefit of Professional Indemnity (PI) insurance is also currently a requirement for NER status. The annual registration certificate issued to registrants on the NER demonstrates their currency and continued commitment to the serious obligations of professional practice.

In the context of these building sector reforms, it is important to note that while the NER has made important advancements towards achieving its objectives, it is not a substitute for compulsory registration of engineers.

Because it is not compulsory for an engineer to be registered on the NER, an engineer looking to avoid scrutiny/regulation can simply not sign up to it. Of the roughly 60,197 engineers working in NSW, only 5,248 are on the NER (about 8.7%).⁶ The bottom line is that someone can still call themselves an engineer without having to be registered on the NER.

This information is shared because many members who contacted Engineers Australia for this submission, and many who make comments via Engineers Australia social media activity on registration, either support the calling up of the NER in legislation in all jurisdictions, or erroneously believe that it already is. The NER is, after all, a *national* engineering register.

For clarity, Engineers Australia believes that the NER provides a good *model* for the NSW Government, and that bodies like Engineers Australia are best-placed to assess the qualifications and experience of applicants to a statutory register. However, we do not ask for the NER to be called up in legislation. There are three reasons for this:

1. The role of regulator belongs to Government. Unlike professional bodies, governments have the resources and legal power to conduct comprehensive investigations of the kind outlined in the discussion paper, and to enforce sanctions. If Engineers Australia was to take on this role, we could be accused of having a conflict of interest.
2. Engineers Australia recognises that the government is unlikely to support monopoly control of a public registration system, albeit by a not-for-profit professional association.
3. Engineers Australia views registration of engineers as a fundamental priority for the profession and seeks to avoid any inference of a profit motive in its advocacy.

Driving our work is the fact that Engineers Australia is constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community.

4.2 Three categories of engineer

There are three categories of engineer recognised as providing engineering services in Australia. There is merit in including all three on the proposed NSW register for engineers, though at present only those who provide *professional* engineering services are required to be registered in Queensland and Victoria.

Engineers Australia therefore recommends that the requirement for registration of engineers in NSW be applied to professional engineers as a minimum.

It must become illegal for a person to call themselves a professional engineer unless they are competent, as recognised by them being listed on a compulsory register of professional engineers.

Similarly, it is important to ensure that those who provide engineering services to the level described below for “Engineering Technologist” and “Engineering Associate” are not unintentionally excluded from the building sector (or any other sector). The main thing is to ensure that “professional engineering services” are only provided by “professional engineers”, but that the other levels of engineering service can continue to be provided by engineering technologists and associates.

4.2.1 Professional Engineer

Professional Engineers apply lifelong learning, critical perception and engineering judgement to the performance of engineering services. They challenge current thinking and conceptualise alternative approaches, often engaging in research and development of new engineering principles, technologies and materials.

Professional Engineers require at least the equivalent of the competencies in a four-year full-time bachelor degree in engineering.

⁶ The 60,197 figure is based on Engineers Australia analysis of the 2016 census and includes all engineers (professional engineers plus far lesser numbers of engineering technologists and engineering associates) who were in the labour force and working in engineering occupations. The NER figure stated is accurate for July 2019.

4.2.2 Engineering Technologist

Engineering Technologists exercise ingenuity, originality and understanding in adapting and applying technologies, developing related new technologies or applying scientific knowledge within their specialised environment.

Engineering Technologists require at least the equivalent of the competencies in a three-year full-time bachelor degree in engineering.

4.2.3 Engineering Associate

Engineering Associates apply detailed knowledge of standards and codes of practice to selecting, specifying, installing, commissioning, monitoring, maintaining, repairing and modifying complex assets such as structures, plant, equipment, components and systems.

Engineering Associates require at least the equivalent of the competencies in a two-year full-time associate degree in engineering or a two-year full-time advanced diploma in engineering from a university or TAFE college.

4.3 Insurance

The crisis in the insurance market for the building sector cannot be ignored and the focus that all governments have on resolving the issues that have led to it is endorsed by Engineers Australia.

All engineers, registered or not, should have appropriate insurance cover. This can be achieved either with a personal insurance contract, or by virtue of coverage through an employer's insurance contract.

Liability for poor quality work does not diminish in the absence of registration. What compulsory registration can achieve is a mechanism for ensuring that only those with appropriate insurance coverage are able to practice.

In particular, Professional Indemnity (PI) insurance enables registered professional engineers to provide their services without fear of financial ruin that may arise from a successful law suit to recover the cost of work that has gone wrong.

Engineers Australia recommends that the government make PI insurance a condition of registration (see Section 5).

5. Responses to specific questions on registration

Section 5 provides responses to questions 17-25 of the *Building Stronger Foundations* discussion paper. Much of the background to these responses is available in Sections 2-4 of the submission.

17. Are existing licensing regimes appropriate to be accepted as registration for some builders and building designers, such as architects, for the new scheme?

In NSW, there is no system for statutory registration of professional engineers. As such, a new mechanism to register engineers must be created. The Queensland model for registration is recommended for NSW.

18. What occupations or specific activities are involved in 'building design' and should be in scope for the registration scheme?

Engineers Australia recommends a long-term goal for all engineers in all areas of practice and operating in all industries to be registered to practice (unless working under the supervision of a registered engineer).

That comprehensive vision has existed in Queensland since 1930 and is being proposed in Victoria through the Professional Engineers Registration Bill 2019.

For NSW, Engineers Australia accepts that the immediate concern is engineering services in the building sector. The list of engineering practitioners provided at Recommendation 1 of the BMF Building Confidence report represents the minimum to be registered:

- Civil engineer
- Structural engineer
- Hydraulic engineer
- Mechanical engineer
- Geotechnical engineer
- Fire safety engineer
- Fire protection system engineer

Engineers Australia recommends that anyone providing engineering services in the areas of practice listed above should be registered, unless if working under the supervision of a registered engineer.

19. What should be the minimum requirements for a registration scheme?

Engineers Australia supports the basic minimum requirements suggested under the "General requirements for registration" heading on pages 20-21 of the Discussion Paper.

In addition to those general requirements, there are others specific to professional engineers. All registrants on the compulsory professional engineers' register should meet the following minimum requirements:

- a professional engineering qualification benchmarked to international education standards via the Washington Accord or equivalent (see response to question 22 for more detail on this criteria, and information about the Washington Accord)
- a minimum of five years of professional practice relevant to the registered area of practice
- currency of continuing professional development of 150 hours over a three-year period
- a commitment to ethical practice
- an annual certificate of registration.

Regulators should also seek to require applicants to have the benefit of Professional Indemnity (PI) insurance, and may also require applicants to be of good character.

20. What form of insurance should be mandatory for 'building designers'? Why?

All registered professional engineers should have access to professional indemnity (PI) insurance. This can be achieved either with a personal insurance contract, or by virtue of coverage through an employer's insurance contract.

PI insurance enables registered professional engineers to provide their services without fear of financial ruin that may arise from a successful law suit to recover the cost of work that has gone wrong.

21. What kinds of minimum requirements should be prescribed for the insurance policy (for example, value, length of cover, etc.)?

Professional indemnity insurance should be valid for the entire period of registration and provide protection for perhaps 10 years after the completion of relevant engineering services.

22. What skills should be mandatory for 'building designers'?

Professional Engineers require at least the equivalent of the competencies in a four-year full-time bachelor degree in engineering.

As such, a professional engineer subject to compulsory registration in NSW should hold an engineering degree that is either:

- A four-year engineering degree earned at an Australian educational institution that has been accredited by Engineers Australia
- A degree earned at an overseas education institution that has been accredited by a signatory to the Washington Accord (*see note below*).
- An engineering degree from any other educational institution that has been independently assessed by Engineers Australia as producing a graduate with at least the equivalent of the competencies in a four-year full-time bachelor degree in engineering.

To meet changing demands it may in the future be possible for an applicant with a non-engineering degree, but with suitable practical experience, to be independently assessed and verified to be considered as having the equivalent to a four-year engineering degree.

For clarity, as noted in response to Question 19, all registrants on the professional engineers' register should meet the following minimum requirements:

- a professional engineering qualification benchmarked to international education standards via the Washington Accord or equivalent
- a minimum of five years of professional practice relevant to the registered area of practice
- currency of continuing professional development of 150 hours over a three-year period
- a commitment to ethical practice
- an annual certificate of registration.

Regulators should also seek to require applicants to have the benefit of Professional Indemnity (PI) insurance.

Note: The Washington Accord is an international agreement between bodies responsible for accrediting engineering degree programmes. More information about the Washington Accord is available online, at: <http://www.ieagreemements.org/accords/washington>.

23. Should specific qualification(s) be required?

No. Engineers Australia recommends that a co-regulatory scheme be created that includes independent assessment of an applicant's qualification and competency claims to determine if they meet the requirements for registration within a particular area of practice. As in Queensland, relevant organisations can be accredited to provide assessment services. Engineers Australia is one such organisation, along with eight others.

If compulsory registration of engineers is introduced in NSW, Engineers Australia would seek to become an assessment entity. However, we note that it should not be compulsory for someone to be a member of Engineers Australia to be listed on the government's register of engineers.

24. Should there be other pre-requisites for registration?

If the criteria described against questions 19 and 22 are met, the registration scheme will be robust. Also, the system introduced by NSW must be aligned with QLD and the proposed Victorian system to ensure mutual recognition across borders. In feedback received from Engineers Australia members, this is a factor that is almost always raised as an essential characteristic of registration.

25. What powers should be provided to the regulator to support and enforce compliance by registered 'building designers'?

Engineers Australia supports the position proposed in the Discussion Paper, "that the regulator is given powers similar to those granted to other regulators who administer licensing schemes."

6. Other issues

Section 6 provides responses to issues raised in Parts 3 and 5 of the discussion paper.

6.1 Introducing 'building designers' into NSW legislation

This submission does not attempt to go into the detail of questions 1-16, but some themes have emerged through our own member consultation that are likely to aid the NSW Government's development of building sector reforms.

That comment notwithstanding, please see section 6.2 for a detailed perspective from the Engineers Australia Society of Fire Safety.

6.1.1 The notion of a 'building designer'

Engineers Australia supports the proposal to require designs and constructed buildings to be certified as meeting the requirements of the Building Code of Australia and that those responsible for those designs and construction activity should make such certifications.

We caution, however, against making the definition of a 'building designer' too narrow. Essentially, any engineer involved in the design or construction of a building has a proportionate part to play in the overall design and construction.

6.1.2 Building information database

Regarding Shergold and Weir report recommendation 12, and the NSW Government's response to it, Engineers Australia structural engineer member experts have advised that the plans in any database must be more extensive than is currently the case. Structural, precast, shop drawings, and as-built drawings must all be included.

Currently it may include basic structural drawings at best, without the precast, piling, post tension design drawings etc, which are all important in assessing a building later. The Opal Tower report highlighted the current issue in attempting to locate all relevant structural drawings. The currently required drawings are incomplete without the additional subcontracted works included. It is also important that the database be monitored and anyone found to be noncompliant (i.e. not lodging complete documents) be penalised. This issue only ever becomes apparent when it is too late (such as having an issue like Opal Tower or Mascot Towers). The Shergold & Weir recommendation has been made for very good reason and should be addressed in its entirety.

6.1.3 Third-party review

Regarding Shergold and Weir report recommendation 17, and the NSW Government's response to it, Engineers Australia's structural engineering community welcomes audits by the proposed Building Commissioner, but also believe that importance level 3, 4 and 5 (as defined in Australian Standard AS1170.0 table 3.2) should have a mandatory independent peer assessment to ensure issues can be resolved prior to construction. It is felt that councils should be able to insist on an independent review within their Development Approvals for unusual projects (such as heritage etc). This is a similar system to that used in Victoria.

A real-life example for the need for such reform was provided by the Engineers Australia Structural College. Details that could lead to identification of the specific project have been removed.

In 2019, in NSW, a seven storey multi-unit residential tower was designed by an Australian engineering firm. A potential issue was highlighted by the post tensioning contractor, so the developer then chose (that is, volunteered) to have an independent review. Major flaws were revealed in the design and new design engineers had to quickly remediate the already constructed basement and redesign all remaining structure.

If this project had the post tensioning designed by the main design engineer (i.e. no other set of technical eyes on the job), there would have been a much lower chance of discovering the issue prior to failure. The developer could have chosen not to have the engineering design reviewed; if that had been the case, it could have resulted in a structural failure and, therefore, a risk to the safety and wellbeing of persons within the structure or in the vicinity.

It is not considered appropriate that random audits by a Building Commissioner be the mechanism for preventing structural design issues in large structures. It is too small in reach and too late to prevent the construction of inadequately designed structures.

Victorian structural engineering counterparts have a system of independent verification. Residents of NSW should have the same levels of protection.

The attributed level of risk taken on by reviewers needs to be determined for insurance purposes to ensure small review fees are not overshadowed by huge liability.

6.1.4 On-site inspections

Regarding Shergold and Weir report recommendation 18, and the NSW Government's response to it, advice from Engineers Australia members is that this should not be considered complete. The mandatory inspections for a certifier are limited to a small percentage of areas. The response to this from the NSW government should include a mandatory list of inspection points for certifying structural engineers (i.e. an engineer cannot sign off a building structure unless they have inspected X, Y and Z). This is currently open to interpretation and there are recorded cases of engineers certifying buildings when they have had provided limited supervision of the construction.

The notion of third-party reviews was a theme that ran through much of the commentary provided by members to Engineers Australia for this submission. In all cases it was strongly supported.

Clerk of works

The Clerk of Works role that existed decades ago, and its re-application to the modern building sector, is worthy of consideration.

The primary role of a Clerk of Works is to check the work of others. They check that what is designed is built, that the products nominated by the designer are not substituted for inappropriate alternatives, and that Australian Standards and the Building Code of Australia are followed.

A Clerk of Works is on-site every day. This is in contrast to certifiers who typically attend site for just a few days across a project's life. It would be in addition to improvements in third-party inspections at critical stages of the construction process—something that is also sorely needed.

The Clerk of Works role has the potential to resolve many of the worst problems that arise in the translation of a design into a standing structure. The certification system would continue but, with a Clerk of Works involved, confidence in the information that feeds into a certifiers work can be returned.

To be successful, the Clerk of Works would need to be engaged independently from the project owner. The proposed Building Commissioner could manage the appointment of Clerks of Work. The money to fund their work can be provided by the project owner, but via the Building Commissioner. This arrangement will help ensure that the Clerk of Works can operate without undue influence from project owners.

6.1.5 CROSS

"CROSS-AUS" is the "Confidential Reporting on Structural Safety – Australasia." As described on its website, it is "a confidential reporting scheme to capture and share lessons learned from structural safety issues which might not otherwise have had public recognition, with the aim of preventing future failures." It is a system created in the United Kingdom, and recently introduced to Australia.

It is not managed by Engineers Australia, but is highly recommended as an educational tool for all structural engineers in Australia. For more information, visit <https://www.cross-aus.org.au/>. Further advice from Engineers Australia's structural engineering members may also be available.

6.2 Advice from a fire safety perspective

Engineers Australia represents people working in all fields of engineering. Our organisational structure includes several "Colleges" and "Technical Societies" which act to, amongst other things, enable members to advance the science and practice of engineering within specific areas of practice and industries.

One such group is the Society of Fire Safety (SFS). The SFS, through consultation with our members who specialise in fire safety engineering, has developed a set of responses to questions 1-16.

It should be noted that our members do not work in a vacuum; they are also participants in industry, academia, government and elsewhere. As such, it is to be expected that some of the comments developed by the SFS may also appear in other submissions made to the NSW government by private individuals or private companies.

1. What kinds of plans should be signed off and declared by a statutory declaration?

The SFS believe this should include as a minimum plans covering designs that could result in catastrophic failures, e.g. structural collapse or immediate life safety threats, e.g. fire safety. This includes:

- Structural design
- Fire services (automatic fire detection, sprinklers, fire hydrants etc)
- Building services design forming part of the Essential Services (smoke hazard management system, emergency lighting, exit signs, backup power supply for fire safety systems etc).

The plans should be those for construction, and as-built.

2. Could plans be statutorily declared at the CC/CDC stages? If not, why not?

Yes, the plans can be declared. This could be done by the designers and is a useful mechanism by which the certifier can then use these declarations for the purposes of issuing a CC (Construction Certificate) and CDC (Complying Development Certificate). Plans will however change after this initial issue, particularly under D&C (Design & Construct) contract arrangement. As such, these declarations will not necessarily provide any certainty with regard the final as built condition.

As-built certification can only be provided by the contractor/builder along with the designers and sub consultants who have been involved through the construction phase.

3. To what extent should changes to plans be submitted to the regulator?

Changes that are related to elements that would result in disproportionate / catastrophic consequences including:

- Structural design
- Fire safety and fire services
- Essential services design.

Changes to design will happen continuously through the construction process, particularly when considering a D&C contract. It would be impractical to require statutory declarations for every variation.

Minor changes (cosmetic changes or those determined by the Principal Certifying Authority) should not require submission to the regulator. All the changes to the building when constructed should be captured, with the as-built documentations submitted.

4. Should a statutory declaration accompany all variations to plans or only major variations?

Only major changes related to the critical elements discussed in Question 3.

5. Are there any obstacles that would prevent a person from submitting a statutory declaration for variations? If so, what are those obstacles?

Only major changes related to the critical elements discussed in Question 3.

6. What other options could be workable if there are variations to plans?

No comment made.

7. How could the modifications process be made simpler and more robust?

Increased requirements for thorough construction inspections by all disciplines. This should include more specific requirements for attendance on site. For example for fire engineers there is a requirement to 'sign off' at the end of the construction process but it is not clear whether this requires on site review, therefore implementation of this requirement will vary in extent between individuals. Other disciplines have even less or non-existent defined site monitoring requirements.

8. How should plans be provided to, or accessed by, the Building Commissioner?

The SFS believe a standardised digitally based submission template including the preparation, storage and cataloguing of the design information should be provided. A consistent digital data standard will ensure ease of comparison, management and auditing of the projects as necessary.

Further, the BIM (Building Information Modelling) Model should be submitted to the Building Commissioner on completion of the construction. A federated and consistent BIM Model is a step into the future of how cities and buildings can be managed.

9. What types of documents should 'building designers' provide to the Building Commissioner?

This includes design drawings, design reports and design specification, followed similarly by the as-built documentations when a project is completed. The submission should include a full digital model / BIM model as noted in Question 8.

A BCA compliance report should also be provided by an independent consultant.

10. In what circumstances would it be difficult to document performance solutions and their compliance with the BCA?

Competency is the first key, which does not mean that a competent engineer must know everything. However the engineer must be able to consult with the design team, obtain the relevant information and formulate an appropriate design that interfaces with the overall project.

The documentation of Performance Solutions in itself should not present any issues on the assumption that there is a method by which 'competent' persons can be identified to produce the solutions. The challenge lies in the competence of the certifier to review and confirm that these comply with the Performance Requirements of the BCA.

A system of peer review / independent verification may be necessary in cases where the Performance Solution covers a subject area outside of the skillset of the certifier.

11. Would a performance solution report be valuable as part of this process? If not, why not?

Yes, but the value of a performance solution is often dependent on the design process. Good performance solutions are tailored building solutions that have been repeatedly proven highly valuable to the development and, most importantly, essential to achieve a sufficient level to comply with the BCA.

To ensure a baseline quality is met, a checklist outlining the process and key items expected in a performance solution report should be mandated.

12. Are there any other methods of documenting performance solutions and their compliance that should be considered?

For very low risk buildings, simpler forms of performance solution reports may be adopted by fire safety engineers. However in all cases it must be shown that the performance requirements have been satisfied.

13. What would the process for declaring that a building complies with its plans look like?

The SFS see the process as:

The builder provides an overall declaration that a building has been constructed in accordance with the design. For a large construction project where multiple sub-contractors are on site, all the sub-contractors are to provide a declaration to the main builder. The reform will need to introduce a clear chain of responsibility. Although the builder engages the sub-contractors, ultimately the main builder as the entity with the control and responsibility should have the final accountability.

The designers are to carry out sample inspections and witness tests to check the builders carried out the work in accordance to the design. The designers then provide a declaration confirming based on the sample inspections, the designers have not identified any major deviations from the design. Given the commercial arrangement whereby designers cannot always be onsite, there needs to be a legislative recognition on the limitations of the declaration that can be provided by the designers.

In higher risk projects (projects deemed higher risk will require due consideration and consultation), a peer review or independent verifier could be mandated to provide additional assurance.

14. What kind of role should builders play in declaring final building work?

The builder is responsible to declare that the construction work has been carried out in accordance with the design. In instances where the builder engages sub-contractors to carry out the work, the final accountability should remain with the builder. This is to minimise the scenario where the liability is passed onto the sub-contractor who has no control over the overall project, or the builder sub-contracting out and discharging the liability to another party.

The sign off process by builders should include inputs from appropriately qualified registered engineers.

15. Which builders involved in building work should be responsible for signing off on buildings?

All builders including subcontractors carrying out the work, e.g. in a large Design and Construct (D&C) project. However as mentioned in Q14, the main builder should have the final accountability. Therefore, it is important to ensure there is a robust legislative framework on the chain of responsibility, and the liability between the builder and the sub-contractors / designers should be managed contractually between them and the builder.

16. Are there any circumstances which would make it difficult for builders to declare that buildings are constructed in accordance with their plans? If so, what are those circumstances?

One scenario is when a builder is responsible for refurbishing / extending an existing building where there would be untouched and unaffected elements in the building. In this instance, the extent to which the builder is responsible for the building needs to be determined.

Separately, the need for the builder to make such a declaration will increase the risk to the builder, thereby adding costs to the project. Therefore, it is critical to adopt a risk-based approach in assessing the extent of a declaration and/or peer reviewing / independent verification required.

6.3 Duty of care of building practitioners

Engineers Australia's area of expertise is in professional standards and registration. While Engineers Australia supports in principle the NSW Government's position that owners should have clear rights to pursue compensation where a building practitioner has been negligent, it is not otherwise presently in a position to provide feedback regarding the proposed duty of care of building practitioners.



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