



ENGINEERS  
AUSTRALIA



AUSTRALIAN  
CONSTRUCTORS  
ASSOCIATION

# Construction Engineer Learning and Development Guide

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GUIDE TO ENGINEERING COMPETENCY  
IN THE CONSTRUCTION SECTOR

NOVEMBER 2021

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This guide has been developed with the significant contribution of the following Australian Constructors Association member representatives.

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# About Engineers Australia and Australian Constructors Association



**ENGINEERS  
AUSTRALIA**

## Engineers Australia

With more than 100,000 individual members, Engineers Australia is the profession's peak body. We are the voice of the profession and exist to advance the science and practice of engineering for the benefit of the community.

Founded in 1919 as the Institution of Engineers Australia, our work has underpinned the progress of our nation for more than a century.

We support engineers in the pivotal role they play in shaping the future of Australia, creating safe, successful and sustainable communities.

Engineers Australia is resourced and strategically positioned to achieve its purpose by:

- Educating its members and the community
- Facilitating the exchange of ideas and information
- Encouraging the development of knowledge and competency
- Setting and maintaining high professional standards for its members
- Informing community leaders and decision-makers

This proposal encompasses Engineers Australia's long standing credibility, both nationally and internationally, as both jurisdictional authority and thought-leader in the development and delivery of professional capability frameworks and education.

Engineers Australia's professional competency frameworks have been refined over thirty years to keep pace with advances in higher education, industry training reforms and a global push by employers to focus on applied experience, standards of performance and employability rather than simply academic qualifications.



**AUSTRALIAN  
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ASSOCIATION**

## Australian Constructors Association

The Australian Constructors Association represents leading construction and infrastructure contracting companies.

We collaborate extensively across the sector and represent the views of industry leaders to help shape government policies to ensure Australian communities receive high-performing assets and services from the infrastructure, building, resources and energy industries.

Our goal is to create a more sustainable construction industry for the benefit of all.

We believe that a sustainable construction industry is built on the three key pillars of equitable and aligned commercial frameworks, a positive industry culture, and sufficient capability, capacity and skills to execute the projects it is called upon to deliver.

# Introduction

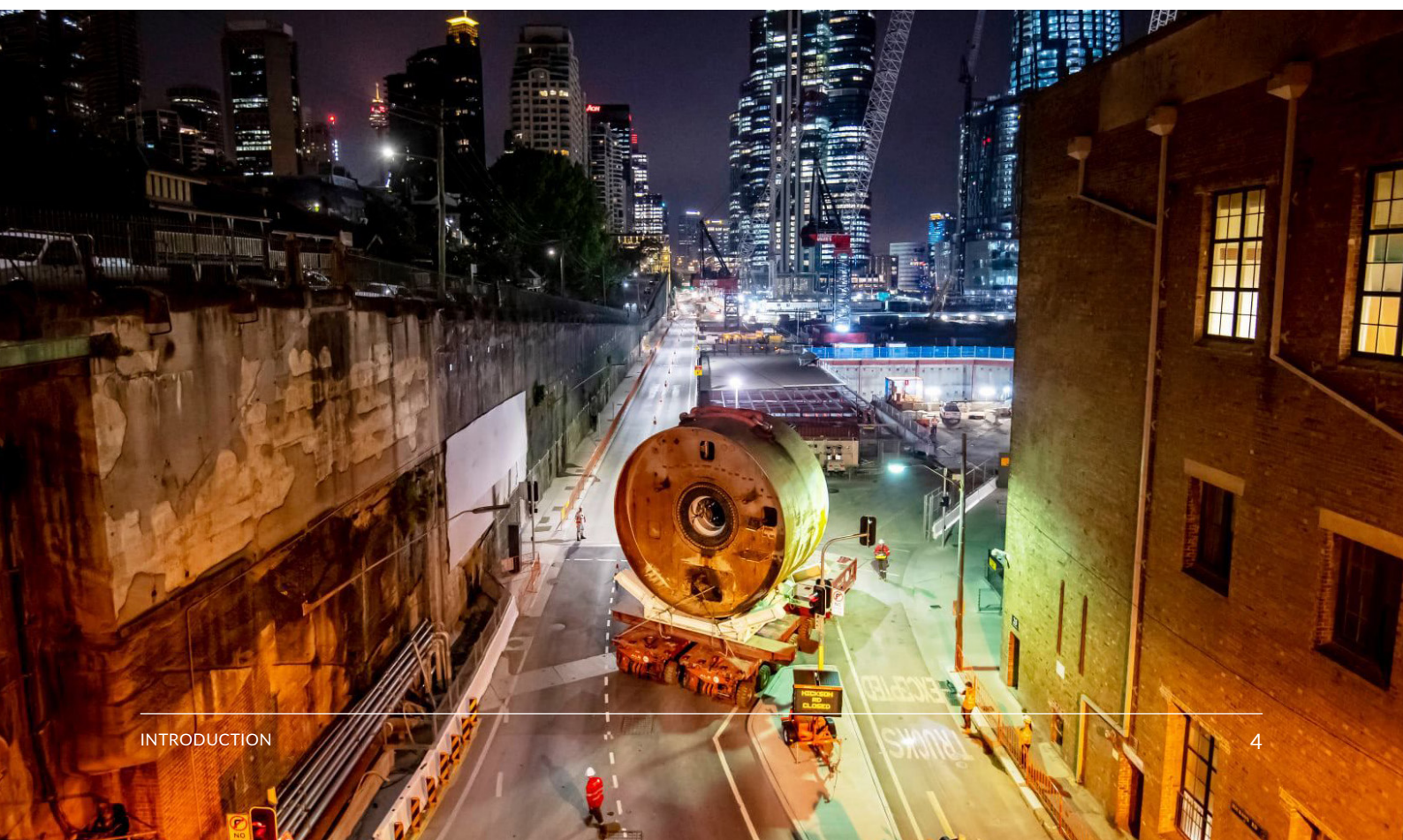
This guide has been developed by the Australian Constructors Association in partnership with Engineers Australia for Construction Engineers as a guide to career stages and competency requirements that support career progression.

It may be used by individuals to:

- Assess their current competencies against industry benchmarks
- Develop a professional development plan
- Select training courses and learning opportunities
- Use as a tool to help in conversations with their manager
- Begin preparation for Registration or Chartered applications

Employers and managers can use this guide to:

- Assess current competency and capability of individuals and a team
- Prepare learning interventions
- Select training providers
- Customise learning content for the construction industry
- Adapt or incorporate these competencies into their current framework and practices

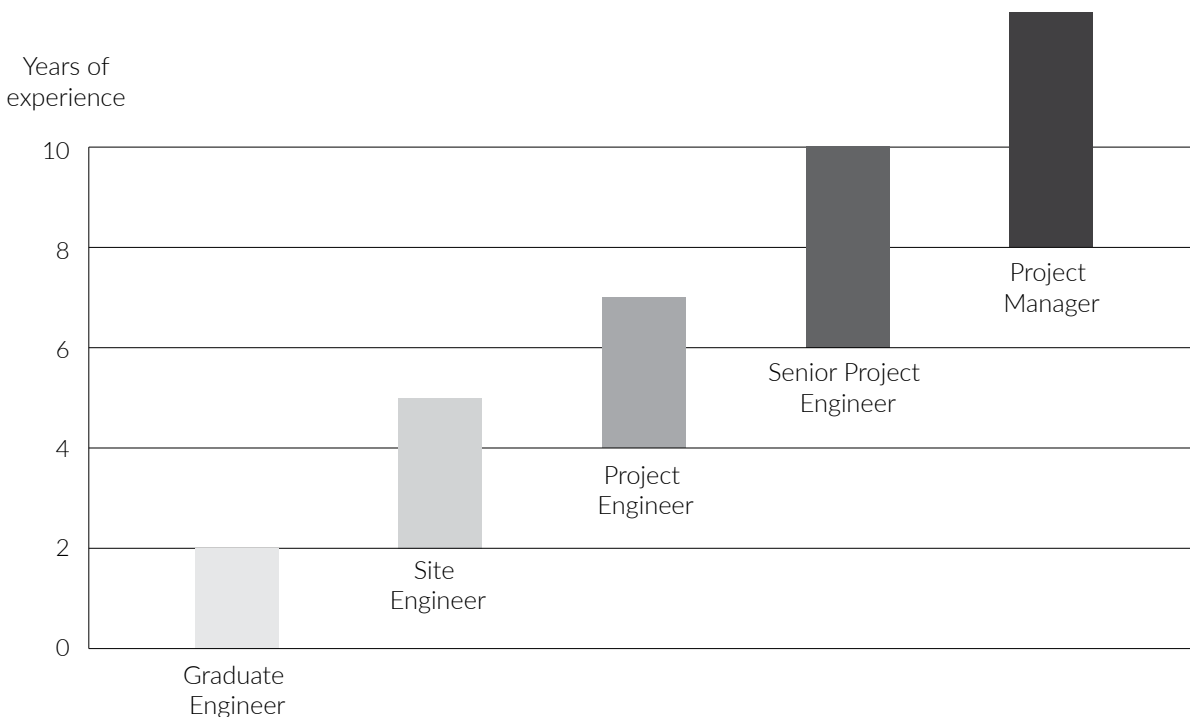


# Career stage

The experience bands described below are indicative of the typical experience required to develop the skills and knowledge required to perform effectively in the role and to upskill sufficiently to progress to the next level.

These descriptions and titles are not mandatory nor are they universal. Individual organisations may have different titles. They are provided here as a reference and a guide for users and employers.

It should be noted that external bodies (such as Engineers Australia) would include the term ‘construction’ to all of these titles. That is, Construction Project Engineer, however in the context of this document this sector specific nomination has not been included.



# Competencies for construction engineers

The following competencies have been developed to support the construction industry and engineers working within it. They are not meant to be prescriptive nor are they exhaustive.

These competencies are to be used as guides and examples of the typical skills and knowledge required to progress your career.

Organisations are expected to use these to benchmark existing competencies, supplement existing frameworks and provide additional guidance to engineers.

Competency title	Winning and delivering projects	Page
Manage tenders and bids	Prepare, evaluate and coordinate tenders and bids for contracted work within formal tendering processes.	07
Develop project methods	Develop a methodology for the effective execution of a project.	08
Contract management	Manage contract obligations and performance requirements.	08
Manage project cost	Forecast and control project quantities, costs and expenditure.	09
Manage project schedule	Monitor and manage project schedule and time requirements.	09
Manage construction engineering activities	Control project engineering activities throughout the project lifecycle.	10
Apply digital tools	Use digital tools to support construction engineering work.	10
Improve project outcomes	Identify improvements and evaluate project outcomes.	10
<b>Governance and responsibility</b>		
Work safely	Work within and support a safe working environment.	11
Manage environmental requirements	Ensure that environmental protections requirements are met for project work.	11
Promote sustainability	Provide for the sustainability of the project using environmental, social and economic measures.	12
Control project quality	Manage and control quality aspects for project deliverables.	12
<b>Personal and professional competence</b>		
Manage stakeholders	Manage stakeholder interests and deal ethically and fairly with stakeholder groups.	13
Communicate effectively	Communicate information and ideas clearly and effectively in a workplace setting.	13
Professionalism	Demonstrate competent performance in the role and develop effective work practices.	14

# Descriptors of competencies required

## WINNING PROJECTS

Competency title	Definition	Graduate Engineer	Site Engineer	Project Engineer	Senior Project Engineer	Project Manager
<b>Manage tenders and bids</b>	Prepare, evaluate and coordinate tenders and bids for contracted work within formal tender processes	<p>Contribute towards a bid and tendering processes</p> <p>Contribute to the communication of tender information</p>	<p>Review the design and accurately produce a quantity take-off</p> <p>Prepare work packages and send out for pricing</p> <p>Develop a plan (quantities, materials, program) of how to build a scope of works</p> <p>Read and understand the Tender Advice Notices (TANs) and the impact it has to scope of works</p>	<p>Estimate a scope of works for a project or deliverable</p> <p>Develop project delivery options, review and evaluate different options and make judgement on best value outcome</p> <p>Develop a program for the scope of works including staging</p> <p>Ensure designs are produced on time and align with the construction methodology</p> <p>Participate in identifying and classifying risks associated with health and safety, quality, environment, community or commercial for a construction project tender/bid</p> <p>Prepare submission documentation that clearly addresses project or client requirements</p>	<p>Develop presentations as part of client interactive workshops</p> <p>Formulate strategic questions that exposes valuable information in formulating a bid</p> <p>Incorporate client's objectives with tender offer</p> <p>Evaluate risks and opportunities, and incorporate into overall price estimate</p> <p>Develop a set-up and delivery plan for the project incorporating staffing and labour histograms and pricing</p>	<p>Analyse new opportunities that align with the organisational business strategy</p> <p>Analyse and evaluate direct costs to ensure they are accurate and achievable</p> <p>Contribute to commercial risk analysis and develop the strategy for mitigation</p> <p>Facilitate transitions between pre-contract stage to project delivery</p>

## DELIVERING PROJECTS

Competency title	Definition	Graduate Engineer	Site Engineer	Project Engineer	Senior Project Engineer	Project Manager
<b>Develop project methods</b>	Develop methodology for the effective execution of a project	<p>Follow a developed methodology to coordinate construction work</p> <p>Identify engineering principles used in construction</p>	<p>Identify scope items or areas that require more detail and write appropriate requests for information (RFIs)</p> <p>Formulate a methodology plan with the site team using knowledge of engineering principles and practices</p> <p>Identify design management requirements including TANs</p>	<p>Create (or review) a crane lifting plan including any temporary works associated with ground conditions and lifting beams</p> <p>Develop drawings or sketches which illustrate the steps or methods required to complete a task</p> <p>Review designs and input into efficient construction methods</p>	<p>Write a construction method statement (CMS) as part of a technical submission</p> <p>Engage relevant teams and experts on methods to plan construction of an element of works</p> <p>Identify all temporary works and responsibilities for designing, checking, inspecting and maintaining</p> <p>Ensure development of less experienced engineers is actively undertaken</p> <p>Participate in industry knowledge transfer events</p> <p>Actively seek and engage with new innovative contractors</p>	<p>Articulate a construction methodology and plan as part of a technical submission to asset owners</p> <p>Ensure design meets the budget and constructability requirements</p> <p>Initiate identification of risk in design which could be eliminated, mitigated or managed during construction</p> <p>Manage quantity tracking throughout the design phase to enable accurate tracking of budget costs</p>
<b>Contract management</b>	Manage contract obligations and performance requirements	<p>Identify different contract types, such as short form and major contract/deeds</p> <p>Develop understanding of contract terms and functions</p>	<p>Identify various sections and appendices within subcontracts and be able to retrieve information used to manage the subcontractors</p> <p>Review tender submissions and ensure comparable prices are being reviewed</p> <p>Use fundamental contractor negotiation techniques</p> <p>Identify and use contractual terms that apply to the construction industry</p> <p>Identify procurement processes and have an awareness of procurement requirements for suppliers of goods and services</p>	<p>Demonstrate awareness of the rights and obligations of various entities within a contract, including individual's roles and responsibilities and how this relates to other entities</p> <p>Use contract clauses and conditions to progress claims, extension of time (EOT), liquidated damages, variations and close out</p> <p>Use basic commercial rights under the contract to identify and raise issues quickly and avoid time bars</p> <p>Develop a scope of work to procure subcontractors</p> <p>Identify appropriate suppliers and companies to execute works</p> <p>Follow established procedures for procurement of goods and services</p>	<p>Identify, analyse and resolve disputed items according to contract requirements</p> <p>Identify key suppliers, longer lead items and analyse impact on schedule</p> <p>Ensure completion documentation is received from subcontractors so the Head Contract can also be closed out</p> <p>Assess and return retention values with consideration to any warranties</p> <p>Ensure completion of project scope for handover and close out the project</p>	<p>Ensure project team are aware of their contractual rights and obligations</p> <p>Demonstrate confident management of the contract to optimise return</p> <p>Develop a project start-up plan</p> <p>Ensure the use of an ethical procurement strategy in order to meet contractual Key Performance Indicators (KPIs)</p>



## DELIVERING PROJECTS (CONTINUED)

Competency title	Definition	Graduate Engineer	Site Engineer	Project Engineer	Senior Project Engineer	Project Manager
<b>Manage project cost</b>	Manage and track project costs and forecast and manage project budgets	Understand importance of project cost codes and correctly allocate site costs to appropriate codes	<p>Identify and monitor costs in order to manage budgets and assess productivities</p> <p>Identify the difference between direct costs and indirect costs</p> <p>Read forecast sheets and identify available budget</p> <p>Use key units of measure associated with cost forecasting to feed into earn value calculations</p>	<p>Review project budget and break up the elements</p> <p>Complete quantity take-offs, forecast and track the total cost of scope</p> <p>Calculate the cost of undertaking a task and evaluate against the resultant benefits</p> <p>Evaluate different options to achieve project outcomes and determine most beneficial solution</p>	<p>Analyse the cost position of a scope of works and assess risks, opportunities and contingency</p> <p>Analyse project progress and actual costs and compare with forecasted progress and costs</p> <p>Identify and analyse emerging trends based on progress or performance and make adjustments on future works based on analysis</p>	<p>Utilise understanding of revenue claimed vs. costs spent</p> <p>Identify entitlements under the contract and issue claims</p> <p>Analyse risks in the project forecast and appropriately allocate global project risks and contingency</p> <p>Analyse and forecast all indirect costs</p> <p>Evaluate rise/fall calculations provided in contracts applicable to market conditions</p> <p>Evaluate escalation impacts to contracts and budgets (particularly labour)</p>
<b>Manage project schedule</b>	Monitor and manage project schedule and time requirements	<p>Identify project schedule</p> <p>Read and use project schedules to guide own work</p>	<p>Accurately plan and program activities over a 3-4 week lookahead program</p> <p>Review works complete/not complete in the lookahead plan and allocate a cause category to any incomplete works</p> <p>Review and assess progress against planned activities</p>	<p>Analyse the project schedule to determine which tasks have float and which are on the critical path, and the sequence of works to build the scope</p> <p>Develop a scope of works in a logical work breakdown structure to be able to plan lower level activities which will require monitoring</p> <p>Assess design packages between multiple projects/ sub-projects and track progress</p>	<p>Manage resources, risks and scope along critical path to ensure delays do not affect the project</p> <p>Allocate and manage time (schedule) risk and contingencies appropriately to project</p> <p>Analyse the logistics of procuring and delivering site items and managing constraints</p> <p>Manage critical path items and adjust resources or sequencing in order to mitigate delays or gain float</p> <p>Set key dates for program review and analyse progress</p> <p>Develop key milestones to align team to a common goal</p>	<p>Manage cost plans and project cash flow effectively</p> <p>Manage EOT where required under the contract entitlements</p> <p>Develop a contract program that identifies all obligations under the contract to ensure that any delays are accurately captured and claims assessed</p>

## DELIVERING PROJECTS (CONTINUED)

Competency title	Definition	Graduate Engineer	Site Engineer	Project Engineer	Senior Project Engineer	Project Manager
<b>Manage construction engineering activities</b>	Control project engineering activities throughout the project lifecycle	<p>Coordinate works on site in conjunction with site staff</p> <p>Arrange for delivery of materials to align with site requirements</p>	<p>Identify scope items and out of scope activities or requirements</p> <p>Apply knowledge of engineering principles and practices to site works and project activities</p> <p>Apply design management requirements, including TANs</p> <p>Develop specialised knowledge of construction e.g. high-rise, tunnelling, etc.</p>	<p>Apply a crane lifting plan including any temporary works associated with ground conditions and lifting beams</p> <p>Apply planned steps or methods required to complete a project task</p> <p>Apply designs and input into efficient construction methods</p> <p>Apply specialised knowledge of construction techniques e.g. high-rise, tunnelling etc.</p>	<p>Ensure construction method statements provided as part of a technical submission are implemented</p> <p>Engage relevant teams on methods to construct an element of works</p> <p>Ensure all temporary works and responsibilities for designing, checking, inspecting and maintaining are followed</p> <p>Document any re-planning and ensure everyone involved has an awareness of the current plan</p>	<p>Develop and maintain systematic collaboration across teams and ensure feedback is provided in a timely manner</p> <p>Ensure construction meets the budget and constructability requirements</p> <p>Manage identified risks throughout construction</p> <p>Manage quantity tracking throughout the construction phase to enable accurate tracking of budget costs</p>
<b>Apply digital tools</b>	Use digital tools to support construction engineering work	<p>Learn and understand digital tools used within the industry</p> <p>Encourage the up-take of digital tools and help the wider team understand benefits to the project</p>	<p>Use geographic information system (GIS) tools to plan works or review designs</p> <p>Use industry tools to perform design reviews</p> <p>Operate Building Information Modelling (BIM) viewer to review models</p> <p>Use interactive technologies on site such as augmented reality (AR) programs on a device or AR goggles</p>	<p>Use digital models to provide better spatial awareness to aid in the planning and development of methods of construction, logistics and staging</p> <p>Use digital and spatial models to assist in detecting and resolving clashes before construction commences</p> <p>Use digital software to aid in quantity take-offs</p>	<p>Use digital models to assist in the planning and coordination of overall site activities</p> <p>Identify utilities above/below ground and live or redundant services</p>	<p>Champion digital record keeping</p> <p>Actively drive adoption of innovative technology on a project site</p>
<b>Improve project outcomes</b>	Identify improvements and evaluate project outcomes	Develop site awareness	<p>Identify changes of project conditions, including site conditions, design, and variations</p> <p>Suggest alternative courses of action and work with changes to projects</p>	<p>Use established controls for design and construction/ change management and decision modelling</p> <p>Conduct critical analysis of current facts, data, and research on a specific issue, evaluate information and applying judgement</p> <p>Appropriately challenge decisions on design or strategy and support position with appropriate information</p>	<p>Contribute to innovation and improvement of work practices</p> <p>Conduct action reviews and capture evidence of assessment and continuous improvement</p> <p>Incorporate recommendations and learning into future projects</p>	<p>Deliver key messages of corporate change to project teams</p> <p>Showing leadership and empathy to support teams through difficult periods</p>

## GOVERNANCE AND RESPONSIBILITY

Competency title	Definition	Graduate Engineer	Site Engineer	Project Engineer	Senior Project Engineer	Project Manager
<b>Work safely</b>	Work within and support a safe working environment	Identify hazards, raise them, and take appropriate action to mitigate	<p>Develop safety risk assessments and manage high risk activities with regard to the scope and method of construction</p> <p>Work in accordance with organisational work health and safety policy and requirements</p> <p>Access resources to establish and maintain compliance i.e. Safe Work Australia or national/state-based regulators</p> <p>Plan and execute activities in compliance with Work Health and Safety (WHS) or Occupational Health and Safety (OHS) Act and Regulation/s</p> <p>Onboard subcontractors in accordance with organisational requirements</p>	<p>Contribute to Safety in Design (SiD) activities and reviews for safer construction outcomes</p> <p>Select contractors and manage onboarding and safety briefings</p> <p>Identify hazards and put controls in place to mitigate risks present</p>	<p>Manage and review incident investigations</p> <p>Ensure organisational policies, procedures and rules are followed by the project team</p> <p>Identify high risk works and ensure works are planned appropriately to ensure they are safely executed</p> <p>Present an incident investigation or outcome to a team</p>	<p>Champion a safety culture across all project activities</p> <p>Assess data and trends to identify areas of improvement</p> <p>Ensure project compliance to WHS/OHS Act and Codes of Practice</p> <p>Demonstrate leadership and management of critical incidents</p> <p>Drive continuous improvement across all safety requirements and performance</p>
<b>Manage environmental requirements</b>	Understand how works impact the environment and use appropriate controls to minimise harm	Identify and comply with the environmental requirements when undertaking works	<p>Practice accurate tracing of contaminated material</p> <p>Develop progressive environmental control plans with regards to the scope being undertaken</p> <p>Define the aspects and impacts of planned works and identify mitigations measures</p> <p>Identify potential heritage impacts, verification and reporting</p> <p>Review the Environmental Work Method Statement (EWMS) and apply controls to appropriately manage nuisance impacts e.g. dust, noise, vibration or odour</p>	<p>Integrate approvals and permit requirements into planning and execution, and identify any program impact</p> <p>Have an awareness of the relevant environmental legislation (state, local or federal)</p> <p>Interpret environmental requirements for a project using relevant project plans, approvals or assessments</p> <p>Apply understanding of waste legislation to manage movement of waste material</p>	<p>Develop emergency response measures for managing an environmental incident</p> <p>Ensure project reporting requirements are met and compliance with approvals is maintained</p> <p>Develop a project Construction Environment Management Plan (CEMP), or equivalent, and ensure activities are completed in accordance with the plan</p> <p>Manage interactions with key stakeholders, regulatory or government agencies e.g. fisheries, to ensure relevant obligations are met</p>	<p>Ensure the team are undertaking works in accordance with relevant legislation and regulatory permitting/planning approvals</p> <p>Create reports to prove compliance to conditions and legislation</p> <p>Initiate consistency assessments (or equivalent planning approval changes) if the project is operating outside of its environmental conditions of approval</p>

## GOVERNANCE AND RESPONSIBILITY (CONTINUED)

Competency title	Definition	Graduate Engineer	Site Engineer	Project Engineer	Senior Project Engineer	Project Manager
<b>Promote sustainability</b>	Provide for the sustainability of the project using environmental, social and economic measures	Identify the whole-of-life aspects of infrastructure being delivered	<p>Identify how the infrastructure being delivered can impact on the quality of life within the community</p> <p>Identify United Nations' Sustainable Development Goals and how they relate to construction work</p> <p>Identify the environmental impact of the infrastructure being delivered e.g. carbon footprint, pollution (water, light, air, etc), dust suppression, existing contamination disposal</p>	<p>Conduct option assessments and project appraisals to consider economic, social and environmental impacts or benefits</p> <p>Provide input into sustainability assessment schemes to achieve project sustainability objectives and targets</p>	<p>Demonstrate decision-making informed by planned sustainability outcomes</p> <p>Integrate sustainability procurement requirements within commercial terms for subcontractors and suppliers</p> <p>Communicate the project's sustainability objectives and targets, and coordinate input into sustainability assessment schemes</p> <p>Analyse sustainability assessments and whole-of-life assessments and use information in project planning</p> <p>Incorporate supplier diversity practices through the use of social enterprises and Indigenous engagement</p>	<p>Proactively contribute to the development and communication of the project's sustainability targets and strategy and facilitate contributions into sustainability assessment schemes as required</p> <p>Conduct project appraisals and consider economic, social and environmental impacts or benefits</p> <p>Develop sustainability reporting across a project or programme</p>
<b>Control project quality</b>	Manage and control quality aspects for project deliverables	<p>Identify project specifications and draft inspection and test plans (ITPs) to ensure verification of compliance with the contract</p> <p>Create verification checklists and demonstrate understanding of how they are relevant to delivery and the process control procedure they relate to</p> <p>Track test results and compile compliance registers</p>	<p>Raise hold points and witness points, and develop work lots in a timely manner</p> <p>Undertake testing requirements in order to verify that the works comply to the specifications and the contract</p> <p>Identify when works have not complied with the contract or other testing obligations and identify non-conformance or rectification requirements</p>	<p>Track productivities and maintain accurate records of lot quantities for works undertaken</p> <p>Prepare annotated as-constructed drawings and/or redline mark-up drawings</p> <p>Identify requirements of the Quality Management System (QMS) and relevant site quality management plan and implement accordingly</p> <p>Prepare and issue RFIs</p> <p>Coordinate the conformance of lots raised</p>	<p>Prepare a commissioning plan to ensure testing and verification performance requirements are validated prior to commissioning of the asset</p> <p>Develop training manuals and warranties</p> <p>Plan for completion and handover by developing a completions plan</p> <p>Mitigate and reduce re-work through management and control of project quality</p>	<p>Assess the project's conformance against the organisation's QMS</p> <p>Promote timely completion of quality documentation following the works</p> <p>Set the quality metrics and targets on the project or apply the organisational minimum standards</p>

## PERSONAL AND PROFESSIONAL COMPETENCE

Competency title	Definition	Graduate Engineer	Site Engineer	Project Engineer	Senior Project Engineer	Project Manager
<b>Manage stakeholders</b>	Manage stakeholder interests and deal ethically and fairly with stakeholder groups	Identify relevant stakeholders for construction projects	<p>Maintain an awareness of the role of unions and right of entry requirements, workplace agreements, and any site conditions relevant to direct workforce and subcontractors</p> <p>Establish trustworthy relationships</p> <p>Identify key stakeholders who have an interest in the work scope and manage the relationship</p> <p>Plan works which impact or influence external stakeholders ahead of time</p> <p>Communicate effectively when there are issues on the job site</p>	<p>Contribute to the development of a stakeholder engagement plan (or equivalent) and support its implementation</p> <p>Identify and actively manage key stakeholders and maintain professionalism at all times</p> <p>Arrange regular briefings to keep internal and external stakeholders informed</p> <p>Seek feedback to improve relationships</p> <p>Respond to questions in a timely manner</p> <p>Attend community forums and present on scope with appropriate language</p>	<p>Professionally manage enquiries and complaints from stakeholders to resolve issues</p> <p>Maintain a positive and healthy relationship with the client</p> <p>Develop a stakeholder engagement plan (or equivalent)</p> <p>Escalate issues when required to relevant manager or team</p> <p>Share milestone achievements and project progress with internal and external stakeholders</p>	<p>Respond to questions from the media appropriately to enhance company reputation</p> <p>Develop a strategic plan to deliver works that are aligned with client objectives</p> <p>Identify and align common objectives with the project</p> <p>Present project messaging to key stakeholders to positively position the project</p> <p>Effectively manage union officials by setting up and managing agreements</p>
<b>Communicate effectively</b>	Communicate information and ideas clearly and effectively in a workplace setting	<p>Participate in routine workplace communications</p> <p>Send and receive clear messages</p>	<p>Participate in meetings by raising issues, documenting actions and responding appropriately</p> <p>Compile information to ensure scope is clearly identified and nothing is omitted</p> <p>Create appropriate communication and present it to a group of people</p> <p>Draw on information, consolidate data and create reports to show progress in a simple and succinct way</p> <p>Consider alternative perspectives</p> <p>Recognise both good and constructive feedback and provide it to others</p>	<p>Prepare and run a prestart</p> <p>Present a SWMS to group of people</p> <p>Develop and communicate construction methodologies</p> <p>Lead and chair meetings</p> <p>Progress reporting/team update</p> <p>Produce simple reports</p> <p>Respond to an issue without preparation</p> <p>Consider alternative perspectives</p> <p>Summarise technical information so that all audiences can understand</p> <p>Provide direct reports with direction through effective communication</p>	<p>Effectively listen to and understand issues</p> <p>Give and receive feedback</p> <p>Articulate a clear message at pre-start or toolbox</p> <p>Recognise when a conversation needs to be had and how to prepare for it</p> <p>Initiate difficult conversations and hold people accountable for work performance</p> <p>Listen effectively and be able to resolve any disputes before they escalate</p> <p>Manage contract commercial departures and negotiate an outcome</p> <p>Create appropriate documents and presentation material for the audience</p>	<p>Use feedback to improve performance across a project team</p> <p>Prepare and compile various reports including audit, status, progress and review documents</p> <p>Prepare high quality written communication for internal and external audiences</p> <p>Prepare relevant presentation material and present in an effective way to various stakeholder groups</p> <p>Use a structured format for meetings to achieve effective outcomes</p>

## PERSONAL AND PROFESSIONAL COMPETENCE (CONTINUED)

Competency title	Definition	Graduate Engineer	Site Engineer	Project Engineer	Senior Project Engineer	Project Manager
<b>Professionalism</b>	Demonstrate competent performance in the role and develop effective work practices	Produce accurate records capturing daily site activities	<p>Prioritise work tasks</p> <p>Develop own personal development plan</p> <p>Collate evidence of project progress and submit documents as required</p> <p>Take responsibility for the successful execution of scope through development of discrete packages of work</p> <p>Communicate requirements to all relevant parties</p>	<p>Use delegation to effectively achieve project outcomes</p> <p>Manage own career development and maintain professional development</p> <p>Guide direct reports and provide opportunities for upskilling</p> <p>Use resource planning tools effectively and coordinate materials and personnel</p> <p>Identify team dynamics and work with their strengths to get the best behaviours</p> <p>Undertake frontline leadership training</p>	<p>Deal effectively with conflict within teams</p> <p>Set clear long-term and short-term goals and align the team with the delivery strategy</p> <p>Manage team through learning stages when setting tasks</p> <p>Use various leadership styles to accommodate different team members</p> <p>Use forecasting to allocate resources appropriately</p> <p>Develop a map of team competencies and skills gaps</p>	<p>Manage onboarding of new team members</p> <p>Interview and secure key talent</p> <p>Develop and use histograms for personnel resource planning</p> <p>Coordinate and advise priorities for multiple teams across a project</p> <p>Maintain visible leadership, site presence and site awareness</p> <p>Set and create a positive team culture</p> <p>Maintain overall accountability for project outcomes including project plans, business protocols and compliance obligations</p>

# Construction engineering professional development plan

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The following pages include the description of competency for each of the career stages with key topic areas that can be used to inform course selection, coaching and experience opportunities. These are not prescriptive and are not exhaustive. Individual circumstances may affect the choice of professional development activities.





## SITE ENGINEER

Note, in this professional development plan competencies for a Graduate have been incorporated into the requirements of a Site Engineer.

	Competency indicators	Key topics and relevance
<b>Manage tenders and bids</b>	<p>Contribute towards a bid and tendering process</p> <p>Contribute to the communication of tender information</p> <p>Review the design and accurately produce a quantity take-off</p> <p>Prepare work packages and send out for pricing</p> <p>Develop a plan (quantities, materials, program) of how to build a scope of works</p> <p>Read and understand TANs and the impact it has to scope of works</p>	<p><b>Quantity take-off</b></p> <p>A quantity take-off forms part of the direct cost breakup when developing an overall price for submitting a tender.</p> <p><b>Market pricing/scope writing</b></p> <p>Market prices may vary for many possible reasons, for example due to location of the project. Using relevant and applicable rates and taking note of assumptions in the tender is important to ensure there is sufficient budget to deliver the job.</p> <p><b>Construction methodology</b></p> <p>It is important for construction engineers to communicate with estimators to ensure shared understanding of how the team will build the scope of works so it can be priced correctly.</p> <p><b>Tender advice notices</b></p> <p>Design consultants will issue TANs during a Design and Construct tender to provide guidance to tenderers.</p>
<b>Develop project methods</b>	<p>Follow a developed methodology to coordinate construction work</p> <p>Formulate a methodology plan with the site team using knowledge of engineering principles and practices</p> <p>Identify scope items or areas that require more detail and write appropriate RFIs</p> <p>Identify design management requirements, including TANs</p>	<p><b>Writing and managing information requests (RFIs)</b></p> <p>Methodologies, materials, and scope are always changing and there will always be a need to clarify information or check if changes are acceptable.</p> <p><b>TAN reviews/design coordination</b></p> <p>Management of a design consultant has similarities to managing a subcontractor. Being able to ensure designs are delivered on time and with adequate detail is vital to project success.</p>



## SITE ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Contract management</b>	<p>Identify different contract types, such as short form and major contract/deeds</p> <p>Develop understanding of contract terms and functions</p> <p>Identify various sections and appendices within subcontracts and be able to retrieve information used to manage subcontractors</p> <p>Review tender submissions and ensure comparable prices are being reviewed</p> <p>Use fundamental contractor negotiation techniques</p> <p>Identify and use contractual terms that apply to the construction industry</p> <p>Identify procurement processes and have an awareness of procurement requirements for suppliers of goods and services</p>	<p><b>Contractor business models (short form vs major contract/deeds)</b></p> <p>Understanding the contract that you are working with is important to ensure you are completing works appropriately and recovering on works that are variations or out of scope.</p> <p><b>Comparison analysis</b></p> <p>It is important to review tender submissions from suppliers and subcontractors to ensure the entire scope has been captured and the submissions are risk adjusted for better comparison.</p> <p>Contractor negotiation techniques may be used as part of a tender procurement process.</p> <p><b>Commercial terms</b></p> <p>Site Engineers must have an understanding of commercial terms and obligations that apply to the construction industry and subcontracts (e.g. Security of Payment Act and Building Code).</p>
<b>Manage project cost</b>	<p>Understand importance of project cost codes and correctly allocate site costs to appropriate codes</p> <p>Identify and monitor costs in order to manage budgets and assess productivities</p> <p>Identify the difference between direct costs and indirect costs</p> <p>Read forecast sheets and identify available budget</p> <p>Use key units of measure associated with cost forecasting to feed into earned value calculations</p>	<p><b>Cost control and tracking</b></p> <p>It is important to understand how much something is costing you so you can track if you are remaining on budget.</p> <p><b>Direct and indirect cost</b></p> <p>Direct costs are costs built up to undertake a specific scope of works (concrete, reinforcement, plant, subcontract).</p> <p>Indirect costs can be fixed, variable or recurring and typically include costs not directly related to specific tasks (e.g. staff, rent, mobile phones, applications, sheds).</p> <p><b>Reviewing forecast sheets</b></p> <p>By working out the forecast allowance a Site Engineer should be able to derive projected crew sizes or quantities required.</p> <p><b>Earned value calculations</b></p> <p>Reviewing whether cost spent on works is correct for the amount of work completed provides early indicators for overspending of budgets or time.</p>
<b>Manage project schedule</b>	<p>Identify project schedule</p> <p>Read and use project schedules to guide own work</p> <p>Accurately plan and program activities over a 3-4 week lookahead program</p> <p>Review works complete/not complete in the lookahead plan and allocate a cause category to any incomplete works</p> <p>Review and assess progress against planned activities</p>	<p><b>Lookahead planning (e.g. 3-4 weeks)</b></p> <p>In order to meet the overall program, a Site Engineer must be achieving completion of planned daily activities and scope of works.</p> <p><b>Last planner</b></p> <p>On some sites, last planner technique is used to review works complete/not complete and generates a quantitative analysis to any incomplete works. It allows the project team to identify focus areas to mitigate further delays due to interfaces with other trades or disciplines.</p> <p><b>Monitoring and controlling activities</b></p> <p>Reviewing and assessing progress ensures overall targets in the program are met and that you will meet productivities and budgets.</p>

**SITE ENGINEER (CONTINUED)**

	Competency indicators	Key topics and relevance
<b>Manage construction engineering activities</b>	<p>Coordinate works on site in conjunction with site staff</p> <p>Arrange for delivery of materials to align with site requirements</p> <p>Identify scope items and out of scope activities or requirements</p> <p>Apply knowledge of engineering principles and practices to site works and project activities</p> <p>Apply design management requirements, including TANs</p> <p>Develop specialised knowledge of construction area e.g. high-rise, tunnelling, etc.</p>	<p><b>Site awareness</b></p> <p>Understanding of day-to-day activities on site is needed in order to be able to coordinate works in conjunction with site staff, and for delivered of materials to align with site requirements.</p> <p><b>Study of specialist construction area</b></p> <p>Construction engineers are required to provide guidance and direction on site and therefore need a competent understanding of the specialist area of works being performed.</p> <p>For Site Engineers, competency can be gained through training in your field of practice.</p>
<b>Improve project outcomes</b>	<p>Develop site awareness</p> <p>Identify changes of project conditions, including site conditions, design, and variations</p> <p>Suggest alternative courses of action and work with changes to projects</p>	<p><b>Site awareness</b></p> <p>Having a competent understanding the day-to-day activities on site is needed in order to be able to identify site changes.</p> <p><b>Change management</b></p> <p>Change occurs often on site. Being able to identify changes to scope or the surrounding environment is important for capturing any opportunities or variations, and for identifying additional information required from designers.</p> <p><b>Conceptual thinking and innovation</b></p> <p>Creativity and innovation represent a core competency in successful organisations that can anticipate and meet strategic challenges including change, advancing technology, an increasingly diverse workforce and constant budget constraints.</p> <p>Using ones' skills, knowledge and experience to search for and explore options in a systematic way helps thinking move past conventional boundaries to address the complex causes, not just symptoms of problems, and to imagine and pose improvements.</p>
<b>Apply digital tools</b>	<p>Learn and understand digital tools used within the industry</p> <p>Encourage the up-take of digital tools and help the wider team understand benefits to the project</p> <p>Use GIS tools to plan works or review designs</p> <p>Use industry tools to perform design reviews</p> <p>Operate a BIM viewer to review models</p> <p>Use interactive technologies on site such as AR programs on a device or AR goggles</p>	<p><b>GIS utilisation</b></p> <p>Use of GIS tools can be a powerful way for a site engineer to develop spatial awareness through real positioning of a design.</p> <p>Data can also be recorded on site and applied back to the GIS software for record purposes or coordination.</p> <p><b>Digital design reviews</b></p> <p>By using a coordination tool (e.g. Bluebeam), multiple people can review documents at once and a combined summary of notes can be efficiently generated without duplication of effort.</p> <p><b>Basic BIM modelling and training</b></p> <p>BIM is a 3D (or more dimensional) model of the design. Software like Ravitzo or Navisworks allows a more in-depth review of the future job scope. Being able to navigate and work within this software provides an additional viewpoint to the end product.</p> <p>Adopting these technologies on site can allow teams to picture the end product in the field.</p>

## SITE ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Work safely</b>	<p>Identify hazards, raise them, and take appropriate action to mitigate</p> <p>Develop safety risk assessments and manage high risk activities with regard to the scope and method of construction</p> <p>Work in accordance with organisational work health and safety policy and requirements</p> <p>Access suitable resources to establish and maintain compliance i.e. Safe Work Australia or national/state-based regulators</p> <p>Plan and execute construction activities in compliance with WHS/Occupational Health and Safety (OHS) Act and Regulation/s</p> <p>Onboard subcontractors in accordance with organisational requirements</p>	<p><b>Hazard identification and management</b></p> <p>Construction sites change daily and new hazards come up that need to be identified, addressed and managed.</p> <p><b>Creating risk assessments</b></p> <p>SWMS are required as part of legislation for prescribed high risk works, but also reduces risk in the industry. All works need to be planned with a risk assessment performed prior to commencement.</p> <p><b>Company policy and procedures</b></p> <p>Knowing, complying and promoting your companies policies and procedures creates shared understanding of safety requirements.</p> <p><b>Understanding the role of regulators</b></p> <p>Regulators ensure laws are complied with, incidents are investigated, and advice is provided on safety in the workplace.</p> <p><b>WHS/OHS (Act and Regulation/s)</b></p> <p>Site Engineers should develop a working knowledge of relevant laws and regulations.</p> <p><b>Safety in procurement</b></p> <p>Engaging competent subcontractors to complete works ensures your project will meet WHS requirements.</p>
<b>Control project quality</b>	<p>Identify project specifications and develop ITPs to ensure verification of compliance with the contract</p> <p>Create verification checklists and demonstrate understanding of how they are relevant to delivery and process control procedure they relate to</p> <p>Track test results and compile compliance registers</p> <p>Raise hold points and witness points, and develop work lots in a timely manner</p> <p>Undertake testing requirements in order to verify that the works comply to the specifications and the contract.</p> <p>Identify when works have not complied with the contract or other testing obligations and identify non-conformance or rectification requirements</p>	<p><b>Use of certified systems</b></p> <p>Understand the International Organisation for Standardization ISO 9001 Quality Management obligations for your company and project.</p> <p><b>ITPs</b></p> <p>Develop ITPs and verification checklists that are relevant to the scope of your works and ensure they are reviewed by senior engineers.</p> <p><b>Hold points/work lots</b></p> <p>Following the requirements of the contract or relevant specification and allowing the client (or verifier) to witness nominated hold points during the works.</p> <p>Lots are the mechanism for compiling completed work. It forms part of the supporting documentation to demonstrate execution of the works and ITP.</p> <p><b>Non-conformance process and obligations</b></p> <p>Construction contracts require the main contractor to have a system of recognising, identifying and reporting on non-conforming works. This will also include learning from those errors and developing further processes to prevent re-occurrence.</p> <p><b>Primary testing</b></p> <p>Testing and verification of the product (e.g. geotech or concrete tests) is critical to the handover of documentation and payment for works complete.</p>

## SITE ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Manage environmental requirements</b>	<p>Identify and comply with the environmental requirements when undertaking works</p> <p>Practise accurate tracing of contaminated material</p> <p>Developing progressive environmental control plans with regards to the scope being undertaken</p> <p>Identifying potential heritage impacts, verification and reporting</p> <p>Review the EWMS and apply controls to appropriately manage nuisance impacts e.g. dust, noise, vibration or odour</p>	<p><b>Monitoring and implementing environmental controls</b></p> <p>Identifying aspects and impacts, and monitoring the performance of environmental controls.</p> <p><b>Contamination tracking</b></p> <p>Legislation requires you to track contaminated material and dispose of it lawfully.</p> <p><b>Erosion and sediment control techniques</b></p> <p>Planning works to minimise the amount of erosion and sediment loss through effective controls.</p> <p><b>Heritage</b></p> <p>Construction projects may disturb Indigenous and European heritage artefacts that need to be managed in accordance with legislation.</p>
<b>Promote sustainability</b>	<p>Identify the whole-of-life aspects of infrastructure being delivered</p> <p>Identify how the infrastructure being delivered can impact on the quality of life within the community</p> <p>Identify UN's Sustainable Development Goals and how they relate to construction work</p> <p>Identify the environmental impact of the infrastructure being delivered e.g. carbon footprint, pollution (water, light, air, etc.), dust suppression, existing contamination disposal</p>	<p><b>Sustainability objectives and targets</b></p> <p>Site Engineers need awareness of the project's sustainability objectives and targets and understanding of sustainability assessment schemes used by the industry. Some government contracts stipulate the requirement to meet a certain sustainability rating.</p> <p><b>Economic</b></p> <p>Understand the whole-of-life aspects of infrastructure being delivered - TOTEX = CAPEX (Capital Expenditure) + OPEX (Operational Expenditure over life of asset).</p> <p><b>Social impact</b></p> <p>Understand UN's Sustainable Development Goals and how they relate to infrastructure being delivered. Site Engineers should also demonstrate understanding of how construction can impact quality of life within the community.</p> <p><b>Environmental impact</b></p> <p>Understanding of the environmental impact of the infrastructure being delivered e.g. carbon footprint, pollution (water, light, air, etc.), dust suppression, existing contamination disposal and ways to pursue reduced impact.</p>
<b>Professionalism</b>	<p>Produce accurate records capturing daily site activities</p> <p>Prioritise work tasks</p> <p>Develop own personal development plan</p> <p>Collate evidence of project progress and submit documents as required</p> <p>Take responsibility for the successful execution of scope through development of discrete packages of work</p> <p>Communicate requirements to all relevant parties</p>	<p><b>Time management</b></p> <p>Organising your workload sets priority and effective use of time.</p> <p><b>Self development and career</b></p> <p>In order to develop your career, use a personal development plan to identify your weaknesses and ways to enhance your strengths.</p> <p><b>Coordinate, collate and track site information</b></p> <p>It is important to track the daily progress of works, including how many workers/plant are on site and records of deliveries for accurate recording of costs, adjudication of subcontractor claims and client progress claims. It can also be useful in communicating information between teams, e.g. shift handover reports between a day and night shift team.</p> <p><b>Management of discrete packages of works</b></p> <p>Construction projects will always break down the scope into smaller discrete elements of work that are planned and executed.</p> <p><b>Speak up when things are not right or incorrect on site</b></p> <p>Be empowered to speak up against incorrect works, unsafe practices or unfavourable results.</p>

## SITE ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Communicate effectively</b>	<p>Participate in routine workplace communications</p> <p>Send and receive clear messages</p> <p>Participate in meetings by raising issues, documenting actions and responding appropriately</p> <p>Compile information to ensure the scope is clearly identified and nothing is omitted</p> <p>Create appropriate communication and present it to a group of people</p> <p>Draw on information, consolidate data and create reports to show progress in a simple and succinct way</p> <p>Consider alternative perspectives in order to collate and appropriately answer</p> <p>Recognise both good and constructive feedback and provide it to others</p>	<p><b>Participate in meetings and take effective minutes</b></p> <p>It is important to effectively participate in meetings, document the actions appropriately, and make sure that actions are being addressed progressively.</p> <p><b>Writes technical briefings</b></p> <p>It is important that you are able to summarise technical information for the purpose of briefing various stakeholders.</p> <p><b>Carries out short presentations</b></p> <p>Construction requires briefing others on the works scope using short presentations.</p> <p><b>Consults and reports on progress</b></p> <p>Identifying what is required to be reported on, by when, and how is it important, to ensure people are kept informed of the progress of your works.</p> <p><b>Listens and understands others</b></p> <p>Use effective listening skills in order to understand what others are saying and consider alternative perspectives.</p> <p><b>Seeks feedback</b></p> <p>Feedback provides clarity on the performance of a task, including the need to correct or to keep on the right track. It is also just as important to provide positive feedback to reinforce good work.</p>
<b>Manage stakeholders</b>	<p>Identify relevant stakeholders for construction projects</p> <p>Maintain an awareness of the role of unions, right of entry requirements, workplace agreements and any site conditions relevant to direct workforce and subcontractors.</p> <p>Establish trustworthy relationships</p> <p>Identify key stakeholders who have an interest in the work scope and manage the relationship</p> <p>Plan works which impact or influence external stakeholders ahead of time</p> <p>Communicate effectively when there are issues on the job site</p>	<p><b>Industrial relations</b></p> <p>Right of entry refers to Commonwealth workplace laws which regulate the rights of organisation employees and their elected officers (such as trade union officials) to enter premises. The site team need to be clear on the process and responsibilities of these officials to enter the site.</p> <p>A Site Engineer may educate site teams of what minimum standards are to be met for requirements of the workforce (e.g. amenities or access and egress minimum standards etc.).</p> <p><b>Understanding stakeholders</b></p> <p>Identifying key stakeholders associated with an interest in the scope of work helps to effectively manage any interfaces.</p> <p><b>Communicating works information</b></p> <p>By planning works which impact stakeholders ahead of time, it allows sufficient notice to be provided or consultation to occur e.g. for out of hours notifications etc.</p> <p>Knowing who you need to keep informed when carrying out your scope of works is important to ensure that the expectations are clearly met, and issues can be resolved in a timely manner.</p>



## PROJECT ENGINEER

	Competency indicators	Key topics and relevance
<b>Manage tenders and bids</b>	<p>Estimate a scope of works for a project or deliverable</p> <p>Develop project delivery options, review and evaluate different options and make judgement on best value outcome</p> <p>Develop a program for the scope of works including staging</p> <p>Ensure designs are produced on time and align with the construction methodology</p> <p>Participate in identifying and classifying risks associated with health and safety, quality, environment, community or commercial for a construction project tender/bid</p> <p>Prepare submission documentation that clearly addresses project or client requirements</p>	<p><b>Estimation</b></p> <p>This forms the basis of the budget when the project is converted.</p> <p><b>Value engineering</b></p> <p>The ability to identify different scenarios at a high level and determine which one is worth pursuing.</p> <p><b>Tender program development</b></p> <p>Developing a program and staging at tender assists in developing understanding of the overall project scope.</p> <p><b>Design management</b></p> <p>Working closely with designers and making sure design milestones are completed on time allows the tender process to continue developing documents and pricing the scope.</p> <p><b>Risks in procurement</b></p> <p>Identifying and classifying risks during tender is usually lead by subject matter experts experienced in risks from these areas. A Project Engineer needs to ensure adequate budget is allowed for in the tender submission.</p> <p><b>Writing submission documentation</b></p> <p>Clients will assess you on your written submission, so it is important that you can explain what your offer entails and how it meets client requirements.</p>

## PROJECT ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Develop project methods</b>	<p>Create (or review) a crane lifting plan including any temporary works associated with ground conditions and lifting beams</p> <p>Develop drawings or sketches which illustrate the steps or methods required to complete a task</p> <p>Review designs and input into efficient construction methods</p>	<p><b>Cranes and lifting</b></p> <p>Cranes are used widely on construction projects and are associated with high risk activities that have potential to seriously hurt someone. Understanding what is required when lifting and moving items around the construction site is important.</p> <p><b>Methods planning (developing staging plans/erection plans)</b></p> <p>Developing drawings or sketches helps to define the steps or methods to complete a task. This may include staged drawings for erecting a bridge, developing traffic stages for road alignments or site access.</p> <p><b>Constructability reviews</b></p> <p>It is important that construction engineers are able to review and have input into a design to make sure that what is being specified is able to be constructed.</p>
<b>Contract management</b>	<p>Demonstrate awareness of the rights and obligations of various entities within a contract, including individual's roles and responsibilities and how this relates to other entities</p> <p>Use contract clauses and conditions to progress claims, EOT, liquidated damages, variations and close out</p> <p>Use basic commercial rights under the contract to identify and raise issues quickly and avoid time bars</p> <p>Develop a scope of work to procure subcontractors</p> <p>Identify appropriate suppliers and companies to execute works</p> <p>Follow established procedures for procurement of goods and services</p>	<p><b>Development of scope of works documentation</b></p> <p>There are many different interfaces in construction, especially between trades. Understanding the full scope of works and getting accurate prices helps eliminate variations and gaps in costs.</p> <p><b>Awareness of contract law</b></p> <p>The form of contract will inform an engineer about their role and responsibility on a project. It will also be specific about entitlements or departures in performing a scope. Being able to identify these and report back to senior team members will ensure risks and opportunities are managed appropriately.</p> <p><b>Contractor selection and tenders process management</b></p> <p>The market will demand different prices and a competitive tender process will determine value-for-money.</p> <p><b>Subcontract management</b></p> <p>Understanding of how to manage a subcontractor also includes knowledge of contract clauses and conditions for progress claims, EOTs, liquidated damages, variations and close out.</p> <p><b>Head Contract management principles</b></p> <p>Head Contracts have defined timeframes for notification. Identifying issues early will ensure that timely formal correspondence can be issued and the client can assist in mitigating their costs.</p> <p><b>Obligation matrix - contractual responsibilities</b></p> <p>Compiling all obligations into a simplified matrix is a helpful tool to clarify responsibilities and ensure compliance.</p>
<b>Manage project cost</b>	<p>Review project budget, break up the elements</p> <p>Complete quantity take-offs, forecast and track the total cost of scope</p> <p>Calculate the cost of undertaking a task and evaluate against the resultant benefits</p> <p>Evaluate different options to achieve project outcomes and determine most beneficial solution</p>	<p><b>Cost forecasting</b></p> <p>Engineers are required to create a cost forecast for all aspects of the works. This is used to plan resources and productivities required to perform the works. It is also a important tool to communicate the financial position of the project to the commercial team and project leaders.</p> <p><b>Benefit/cost analysis</b></p> <p>Being able to analyse a proposal by calculating the impact of undertaking a task against the resultant benefits. In some cases, cost may outweigh the benefit and in others circumstances, the cost may be acceptable for the benefit (e.g. time, cost, customer satisfaction or future work).</p> <p><b>Value engineering</b></p> <p>Identifying various options and scenarios for delivering the works to derive the best solution for the project.</p>

## PROJECT ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Manage project schedule</b>	<p>Analyse the project schedule to determine which tasks have float and which are on the critical path, and the sequence of works to build the scope</p> <p>Develop a scope of works in a logical work breakdown structure to be able to plan lower level activities which will require monitoring</p> <p>Assess design packages between multiple projects/sub-projects and track progress</p>	<p><b>Understand critical path and general sequence of works</b></p> <p>It is important to understand the critical path so that your resources are focused in the right areas. Once the critical path moves the overall time-related costs are also affected.</p> <p><b>Development of work breakdown structure</b></p> <p>Using a logical way to develop work breakdown structures enables critical focus on the right scope of works and activities.</p> <p><b>Design programming and coordination</b></p> <p>Programming and knowing when design is available enables procurement and other detailed resource planning to commence. It also allows for better coordination and tracking of design between multiple projects or sub-projects.</p>
<b>Manage construction engineering activities</b>	<p>Apply a crane lifting plan including any temporary works associated with ground conditions and lifting beams</p> <p>Apply planned steps or methods required to complete a project task</p> <p>Apply designs and input into efficient construction methods</p> <p>Apply specialised knowledge of construction techniques e.g. high-rise, tunnelling, etc.</p>	<p><b>Cranes and lifting</b></p> <p>A Project Engineer should understand more complex lifting studies, such as works requiring a higher percentage of the crane's lifting capacity to be used. It could also involve a complex lifting sequence (e.g. dual lift/surrounding utilities etc.).</p> <p><b>Methods planning (developing staging plans/erection plans)</b></p> <p>Using a CMS for developing the stages or steps (quantities, materials, program) of how to build a scope of works. This is an important planning tool to outline methodology for the works.</p> <p><b>Constructability reviews</b></p> <p>Project Engineers can apply specialised knowledge to constructability reviews of design to ensure what is being specified is achievable and economical. Constructability reviews may also identify opportunities or innovations in design or for construction.</p>
<b>Improve project outcomes</b>	<p>Use established controls for design and construction/change management and decision modelling</p> <p>Conduct critical analysis of facts, data and research on a specific issue, evaluating information and applying judgement</p> <p>Appropriately challenge decisions on design or strategy and support position with appropriate information</p>	<p><b>Change management controls</b></p> <p>Scope changes and scope growth can disrupt the project and may impact on time, cost, and quality.</p> <p>Broadly, the later in the development of the project that changes occur, the greater those impacts are likely to be. The way decisions are made on projects must be structured, ordered, and controlled, and should reflect activities that are being undertaken at that stage. By adopting a process of progressively reviewing and approving aspects of the project, it moves forward in a controlled way.</p> <p><b>Development of sound decision-making</b></p> <p>A position paper can serve to transfer knowledge and understanding of a particular topic, provide information to aid in deciding, or present a professional perspective. Often, a position paper explains the results or conclusions resulting from an organised committee, research collaboration, or design and development effort.</p> <p><b>Engineering judgement</b></p> <p>The ability to weigh up the evidence and come up with the right answer is a key component of this role. Judgement applies to both the methodology that the engineer uses as well as to the evidence that is produced.</p>



## PROJECT ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Apply digital tools</b>	<p>Use digital models to provide better spatial awareness to aid in the planning and development of methods of construction, logistics and staging</p> <p>Use digital and spatial models to assist in detecting and resolving clashes before construction commences</p> <p>Use digital software to aid in quantity take-offs</p>	<p><b>Using models for methodology/staging</b></p> <p>Digital models provide better special awareness to aid in the planning and development of methods of construction, logistics and staging. Models can be used as virtual testing grounds to confirm methodology and staging before construction begins.</p> <p><b>Clash detection</b></p> <p>Identifying a clash on site once the work has commenced can lead to significant delays in resolving and then procuring or amending the scope. Knowing the location of potential clashes prior to commencing construction means the costs to resolve the clash are significantly less.</p> <p><b>Quantity take-offs</b></p> <p>Using digital software for quantity take-offs can increase the reliability of information and enable the efficient completion of this task. Some software is able to retrieve this information from digital models.</p>
<b>Work safely</b>	<p>Contribute to SiD activities and reviews for safer construction outcomes</p> <p>Select contractors and manage on-boarding and safety briefings</p> <p>Identify hazards and put controls in place to mitigate risks present</p>	<p><b>Safety in Design</b></p> <p>Understanding SiD obligations and transfer of risk from design phase through to construction.</p> <p><b>On-boarding subcontractors</b></p> <p>It is important that competent subcontractors undertake works on construction projects. Project Engineers may be required to complete safety on-boarding procedures for subcontractors on site.</p> <p><b>Identifying and mitigating key risks in delivery</b></p> <p>Construction project are high risk environments that are always changing. It is important to understand how you are going to construct your scope, identify risks and put controls in place to mitigate them.</p>
<b>Control project quality</b>	<p>Track productivities and maintain accurate records of lot quantities for works undertaken</p> <p>Prepare annotated as-constructed drawings and/or redline mark-up drawings</p> <p>Identify requirements of the QMS and relevant site quality management plan, and implement accordingly</p> <p>Prepare and issue RFIs</p> <p>Coordinate the conformance of lots raised</p>	<p><b>Close out/as-constructed/redline markup drawings</b></p> <p>It is important to periodically track any changes to the design so that accurate as- constructed documentation can be issued at completion.</p> <p><b>Manage QMS</b></p> <p>Construction contractors usually have an accredited QMS that requires compliance. A Project Engineer may need to oversee subcontractor performance audits and identify system improvements.</p> <p><b>Writing RFIs</b></p> <p>An RFI is a formal clarification or change of design, issued to a designer. A Project Engineer may need to formulate questions and write informed RFIs to clarify information or request a change.</p>

## PROJECT ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Manage environmental requirements</b>	<p>Integrate approvals and permit requirements into planning and execution, and identify any program impact</p> <p>Have awareness of the relevant environmental legislation (state, local or federal)</p> <p>Interpret environmental requirements for a project using relevant project plans, approvals or assessments</p> <p>Apply understanding of waste legislation to manage movement of waste material</p>	<p><b>Understanding approval pathways and documentation</b></p> <p>Interpreting environmental requirements using project plans, approvals or assessments ensures approval or consultation timeframes are understood in advance. Sources of information may include CEMP, Environmental Impact Statement, Review of Environmental Factors Documents, Environmental Protection Licences or State Significant Infrastructure approvals.</p> <p><b>Waste management</b></p> <p>Apply understanding of waste legislation to manage movement of waste material between sites and licensed facilities.</p> <p><b>Legislative understanding</b></p> <p>Through various forms of environmental legislation (such as the Protection of the Environment Operations Act, NSW), obligations and responsibilities are imposed on construction companies. It is important to understand and adhere to these as you may be subject to individual and company fines.</p>
<b>Promote sustainability</b>	<p>Conduct options assessment and project appraisals to consider economic, social and environmental impacts or benefits</p> <p>Provide input into sustainability assessment schemes to achieve project sustainability objectives and targets</p>	<p><b>Options assessment/project appraisal</b></p> <p>Options assessment and project appraisals should consider economic, social and environmental impacts or benefits.</p> <p>Being able to make decisions on choice of materials, construction methodology and procurement models that are not purely based on cost and time is critical for creating sustainable solutions.</p> <p><b>Sustainability rating schemes</b></p> <p>Be aware of the project's sustainability objectives and targets and provide input into sustainability assessment schemes such as Infrastructure Sustainability Council's Infrastructure Sustainability Rating Scheme or Green Star.</p> <p>Construction contracts will sometimes set sustainability ratings that need to be met as a requirement to achieve Practical Completion. It is important to make decisions early on in the optioneering and concept stage of the project to capitalise on sustainable outcomes.</p>
<b>Professionalism</b>	<p>Use delegation to effectively achieve project outcomes</p> <p>Manage own career development and maintain professional development</p> <p>Guide direct reports and provide opportunities for upskilling</p> <p>Use resource planning tools effectively and coordinate materials and personnel</p> <p>Identify team dynamics and work with their strengths to get the best behaviours</p> <p>Undertake frontline leadership training</p>	<p><b>Managing teams and effective delegation</b></p> <p>Delegation is an important skill to acquire at this level.</p> <p><b>Continued professional development</b></p> <p>Looking at opportunities to develop yourself and others.</p> <p><b>Resource planning</b></p> <p>Making sure that you have the right resources and the number of resources identified to successfully execute your scope of works.</p> <p><b>Setting team culture</b></p> <p>You will work with a multitude of people from an array of areas in construction, each job will pull together a different team of people. To ensure you get the best for the project and the team, you will need to adjust and set the culture as the team changes.</p> <p><b>Frontline leadership</b></p> <p>Frontline leadership training is often provided in organisations to assist and equip managers with the knowledge to effectively manage and support their teams.</p>

## PROJECT ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Communicate effectively</b>	<p>Prepare and run a pre-start or toolbox</p> <p>Present a SWMS to group of people</p> <p>Develop and communicate construction methodologies</p> <p>Lead and chair meetings</p> <p>Complete progress reporting by producing simple reports and team updates</p> <p>Respond on an issue without preparation</p> <p>Consider alternative perspectives</p> <p>Summarise technical information so that all audiences can understand</p> <p>Provide direct reports with direction through effective communication</p>	<p><b>Progress reporting/team updates</b></p> <p>Having open communications is important to align your team, discuss any interface issues, and making sure everyone understands what scope you are doing and when.</p> <p>Construction projects have structured reporting requirements and a Project Engineer is required to have awareness of these and compile the information needed to submit reports on time.</p> <p><b>Professional communication</b></p> <p>Professional communication is the ability to hold a conversation that is factual and answers the question directly, honestly and succinctly. This involves having the ability to present a professional presentation e.g. presenting a SWMS, running a pre-start or developing and communicating a construction methodology.</p> <p><b>Summarising technical information</b></p> <p>Construction projects have several documents that need to be read in conjunction with each other in order to comply with the requirements. For example, drawings, must be read with specifications and sometimes design documents. Being able to read all documents and summarise the requirements into simpler forms is key to making sure people at the right levels understand what is required of them.</p> <p><b>Manage a group of direct reports</b></p> <p>Being able to look far enough ahead and keep a team of direct reports actively busy and on track through effective communication and upskilling opportunities.</p>
<b>Manage stakeholders</b>	<p>Contribute to the development of a stakeholder engagement plan (or equivalent) and support its implementation</p> <p>Identify and actively manage key stakeholders and maintain professionalism at all times</p> <p>Arrange regular briefings to keep internal and external stakeholders informed</p> <p>Seek feedback to improve relationships</p> <p>Respond to questions in a timely manner</p> <p>Attend community forums and present on scope with appropriate language</p>	<p><b>Developing an understanding of stakeholder engagement</b></p> <p>Contributing to the development of a stakeholder engagement plan ensures shared understanding of key messages, stakeholder issues and interest, and timelines for any stakeholder engagement or communication activities that are aligned to the construction program.</p> <p><b>Stakeholder management</b></p> <p>Keeping people informed of the project progress eliminates misinformation. Being on the front foot and advising stakeholders in advance helps to control accurate project messaging. Providing timely and accurate responses to questions is an important part of effective enquiries and complaints management.</p> <p>A Project Engineer should always consider what impact their work may have on stakeholders.</p> <p><b>Community</b></p> <p>Construction projects can impact community amenity. The local community is usually a major key stakeholder and keeping them informed of the status of the project is critical for ensuring they are up-to-date and engaged.</p> <p><b>Keeping stakeholders informed</b></p> <p>Understanding who may hold an interest in the project and the communication methods to keep them informed is an important aspect of stakeholder management. Stakeholders can be internal or external third parties e.g. utility authorities, government agencies, residents, businesses and other user groups.</p>



## SENIOR PROJECT ENGINEER

	Competency indicators	Key topics and relevance
<b>Manage tenders and bids</b>	<p>Develop presentations as part of client interactive workshops</p> <p>Formulate strategic questions that exposes valuable information in formulating a bid</p> <p>Incorporate client's objectives with tender offer</p> <p>Evaluate risks and opportunities, and incorporate into overall price estimate</p> <p>Develop a set-up and delivery plan for the project incorporating staffing and labour histograms and pricing</p>	<p><b>Interactive presentations</b></p> <p>It is important to be able to present or pitch an idea to a client, judge their reaction and then move forward with a decision.</p> <p><b>Establishing client key drivers</b></p> <p>Strategic questions during tendering can expose valuable information and assist in establishing the client's objectives.</p> <p><b>Risks and opportunity</b></p> <p>A tender is complex, usually completed in constrained time frames and in most cases priced on a concept design. Understanding risks and opportunities assists in allocating adequate budget.</p> <p><b>Staff, cost and pricing models</b></p> <p>It is important to align indirect costs with the program to ensure sufficient budget to establish and maintain the project with the allocated people, plant and facilities for the expected duration.</p>

## SENIOR PROJECT ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Develop project methods</b>	<p>Write a CMS as part of a technical submission</p> <p>Engage relevant teams and experts on methods to plan construction of an element of works</p> <p>Identify all temporary works and responsibilities for designing, checking, inspecting and maintaining</p> <p>Ensure development of less experienced engineers is actively undertaken</p> <p>Participate in industry knowledge transfer events</p> <p>Actively seek and engage with new innovative contractors</p>	<p><b>Method statement</b></p> <p>A CMS is an important tool to set the plan for the works.</p> <p><b>Constructability reviews and designing to cost plan</b></p> <p>Being involved in constructability reviews early ensures design solutions are delivered to the cost plan and constructability requirements are incorporated.</p> <p><b>Temporary works accountability</b></p> <p>Temporary works are equally important as permanent works as it poses similar high risks. Temporary works requires discipline in the way it is developed, checked and maintained.</p> <p><b>Knowledge transfer and technical coaching</b></p> <p>Being able to upskill and coach the team not only motivates engineers but also increases capability to deliver complex works.</p> <p><b>Research best practice methods in industry</b></p> <p>Technology is constantly evolving and identifying new opportunities in the market may provide returns for delivery.</p>
<b>Contract management</b>	<p>Identify, analyse and resolve disputed items according to contract requirements</p> <p>Identify key suppliers, longer lead items and analyse impact on schedule</p> <p>Ensure completion documentation is received from subcontractors so the Head Contract can also be closed out</p> <p>Assess and return retention values with consideration to any warranties</p> <p>Ensure completion of project scope for handover and close out the project</p>	<p><b>Contract dispute resolution and negotiation</b></p> <p>Contractual disputes may arise and need to be resolved. Develop the skill to negotiate to find a mutually beneficial outcome.</p> <p><b>Supply chain management</b></p> <p>The volume of construction projects being delivered can cause pressure on the supply chain. Understanding market conditions enables key decisions to be made on availability of labour, materials, and other supply items required to deliver the project.</p> <p><b>Subcontract close out</b></p> <p>Ensuring you receive all documentation from subcontractors enables you to submit the required information to the client so you can achieve completion.</p> <p><b>Commissioning/warranty/hand over and defects</b></p> <p>Construction projects require warranties and asset registers to be filled out and quality assurance verification documents to be submitted to ensure the scope has been built in accordance with the contract requirements.</p>
<b>Manage project cost</b>	<p>Analyse the cost position of a scope of works and assess risks, opportunities, and contingency to the scope of works</p> <p>Analyse project progress and actual costs and compare with forecast progress and costs</p> <p>Identify and analyse emerging trends based on progress or performance and make adjustments on future works based on analysis</p>	<p><b>Risk and contingency management</b></p> <p>It is important to have an understanding of the accurate cost of the works, and have the ability to apply a calculated risk/opportunity or contingency that may eventuate. By identifying these items, it will assist in mitigating risks and maximising opportunities.</p> <p><b>Earned value management</b></p> <p>By reviewing the ratios derived from effective earned value management, better understanding of the commercial position of a project is known. A Senior Project Engineer generates the units to ensure the ratios provide usable information.</p> <p><b>Trend analysis</b></p> <p>Identifying emerging trends based on progress or performance can assist in making timely adjustments on future works to mitigate or rectify.</p>

## SENIOR PROJECT ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Manage project schedule</b>	<p>Manage resources, risks and scope along critical path to ensure delays do not affect the project</p> <p>Allocate and managing time (schedule) risk and contingencies appropriately to project</p> <p>Analyse the logistics of procuring and delivering site items and managing constraints</p> <p>Manage critical path items and adjust resources or front areas to mitigate delays or gain float</p> <p>Set key dates for program review and analyse progress</p> <p>Develop key milestones to align team to a common goal</p>	<p><b>Critical path management</b></p> <p>Knowledge and management of own critical path and knowledge and support of the site or overall critical path.</p> <p><b>Contingency and program risk planning</b></p> <p>It is important to understand the amount of contingency and risk in the program so that you can understand the impact time on indirect costs.</p> <p><b>Long lead time procurement and high risk constraints</b></p> <p>Items may take longer to produce off-site (sometimes overseas) or due to supply chain constraints in periods of high demand. Knowing lead times for procuring for these items ensures the project is not delayed.</p> <p><b>Float management</b></p> <p>Construction sites are typically a multidisciplinary environment where complex coordination is required. Managing delays and float is key to the overall success of the project.</p> <p><b>Critical review of programs (including EOT or delays)</b></p> <p>Projects and initial plans will change and ongoing coordination is required to assess change and adapt with revised strategies.</p> <p><b>Setting milestones</b></p> <p>Breaking down steps and items to achieve milestones and communicating them to the team ensures alignment on priorities.</p>
<b>Manage construction engineering activities</b>	<p>Ensure construction method statements provided as part of a technical submission are implemented</p> <p>Engage relevant teams and experts on methods to plan construction of an element of works</p> <p>Engage relevant teams on methods to construct an element of works</p> <p>Ensure all temporary works and responsibilities for designing, checking, inspecting and maintaining are followed</p> <p>Document any re-planning and ensure everyone involved has an awareness of the current plan</p>	<p><b>Responsibility for constructability reviews</b></p> <p>Coordinate constructability reviews between relevant teams and experts to determine how to construct an element of works.</p> <p><b>Temporary works accountability</b></p> <p>Identify all temporary works and determine responsibilities for designing, checking, inspecting and maintaining.</p> <p><b>Change management</b></p> <p>Change occurs often on site. This might be because of environmental, ground conditions, or simply a better way of doing things. Making sure everyone is working on the current scope is important.</p> <p><b>Knowledge transfer to junior team members</b></p> <p>Ensure junior team members have opportunities to learn through experience and knowledge transfer.</p>
<b>Improve project outcomes</b>	<p>Contribute to innovation and improvement of work practices</p> <p>Conduct action reviews and capture evidence of assessment and continuous improvement</p> <p>Incorporate recommendations and learning into future projects</p>	<p><b>Courageous thinking</b></p> <p>Using the skills and experience of a Senior Project Engineer, ideas and concepts (the norm) must be challenged regularly to ensure there is no better method or product in which to complete tasks.</p> <p><b>Action reviews</b></p> <p>What went well and what could we do better?</p> <p>A simple, but powerful method for rapid post-project assessment and identifying successful strategies and opportunities for continuous improvement .</p> <p><b>Implementing lessons learnt</b></p> <p>Construction projects provide a source of expert know-how and organisational knowledge, but lessons-learned and knowledge from site may not be systematically incorporated into subsequent projects. Adopting a learning culture ensures lessons learnt are shared for future projects.</p>

## SENIOR PROJECT ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Apply digital tools</b>	<p>Use digital models to assist in the planning and coordination of overall site activities</p> <p>Identify utilities above/below ground, including live or redundant services</p>	<p><b>Site-wide application of model</b></p> <p>Develop an understanding of the various digital engineering tools including usage, benefits and limitations.</p> <p><b>Site-wide combined utility drawings (AS:5488)</b></p> <p>Construction projects may need to relocate, remove or protect utilities, old and new. It is important to understand where these utilities are and what is live and what is redundant to assist in managing the risks of working in and around them.</p> <p><b>Record capture</b></p> <p>Documenting what was constructed is important to then be able to hand the asset over to the client. Digital tools may assist in record keeping.</p>
<b>Work safely</b>	<p>Manage and review incident investigation</p> <p>Present an incident investigation or outcome to a team</p> <p>Ensure organisational policies, procedures and rules are followed by the project team</p> <p>Identify high risk works and ensure works are planned appropriately to ensure they are safely executed</p>	<p><b>Incident investigation</b></p> <p>Being able to objectively investigate and assess evidence derived from an investigation is important for identifying the root cause of an incident.</p> <p><b>Administering company standards within team</b></p> <p>Making sure that the entire team promoting a culture of high safety performance and utilising the organisational frameworks.</p> <p><b>High risk works forward planning</b></p> <p>It is important to start planning discussions around high risk works early to ensure works are planned and executed in a safe manner.</p> <p><b>Delivering safety messages to team</b></p> <p>Keeping people informed of safety outcomes or upcoming high risks works is important to make sure everyone is on the same page with regards to safety.</p>
<b>Control project quality</b>	<p>Prepare a commissioning plan to ensure testing and verification performance requirements are validated prior to commissioning of the asset</p> <p>Develop training manuals and warranties</p> <p>Plan for completion and handover by developing a completions plan</p> <p>Mitigate and reduce re-work through management and control of project quality</p>	<p><b>Project commissioning</b></p> <p>Some construction projects involve building individual components that are all interconnected to form an operating asset e.g., a sewage treatment plant or a new rail transport, substation. These assets require a commissioning and testing plan, including warranties, training, and handover prior to operation.</p> <p><b>Practical completion and hand over</b></p> <p>Construction contracts have specific handover requirements that must be completed before Practical Completion can be granted.</p> <p><b>Mitigating re-work</b></p> <p>The act of re-doing or correcting work that was not done correctly the first time is re-work and mitigation is usually through quality management. Minimising re-work is important as it can affect a project's productivity and profitability.</p>

## SENIOR PROJECT ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Manage environmental requirements</b>	<p>Develop emergency response measures for managing an environmental incident</p> <p>Ensure project reporting requirements are met and compliance with approvals is maintained</p> <p>Develop a project CEMP (or equivalent) and ensure activities are completed in accordance with the plan</p> <p>Manage interactions with key stakeholders, regulatory or government agencies e.g. fisheries, to ensure relevant obligations are met</p>	<p><b>Incident preparedness and management</b></p> <p>Being prepared for managing an environmental incident is important to ensure the response is timely and environmental harm is minimised.</p> <p><b>Compliance and reporting to legislation</b></p> <p>Each construction project, depending on its size will be governed by planning assessments which require compliance reporting. Understanding the requirements of planning approvals is important to make sure that reports are appropriately prepared and submitted on time.</p> <p><b>Administering the CEMP</b></p> <p>Each CEMP is uniquely developed for a construction project and it shows how the organisation will adhere to the environmental requirements through process and procedures.</p> <p><b>High risk stakeholder management</b></p> <p>Depending on the location of the construction project there may be other key stakeholders, regulators or government agencies that may have further requirements. Engagement with these stakeholders can identify and confirm relevant obligations.</p>
<b>Promote sustainability</b>	<p>Demonstrate decision making informed by planned sustainable outcomes</p> <p>Integrate sustainability procurement requirements within commercial terms for subcontractors and suppliers</p> <p>Communicate the project's sustainability objectives and targets, and coordinate input into sustainability assessment schemes</p> <p>Analyse sustainability assessments and whole-of-life assessments and use information in project planning</p> <p>Incorporate supplier diversity practices through the use of social enterprise and Indigenous engagement</p>	<p><b>Decision-making informed by sustainable outcomes</b></p> <p>A Senior Project Engineer makes key decisions that impact project outcomes in relation to suppliers, product selection and methodology. Sustainability outcomes should be actively considered as part of decision-making.</p> <p><b>Achieving sustainability targets through procurement and delivery</b></p> <p>Understanding sustainability targets helps ensure opportunities to contribute to achieving targets during procurement and delivery are not missed. In procurement, this may involve including non-price assessment criteria. For example, there might be opportunity to use recycled/rain water in site ablutions or use recycled aggregates for imported fill etc.</p> <p><b>Sustainability assessments</b></p> <p>Proactively contribute to the communication of the project's sustainability objectives and targets to create shared understanding and ownership. Senior Project Engineers may be required to coordinate contributions and evidence for sustainability assessments.</p> <p><b>Sustainable contracts and supplier diversity</b></p> <p>Adopting a procurement strategy that considers sustainable contracting principles and opportunities for supplier diversity (e.g. social enterprise, small-medium business, local and Indigenous business enterprises) can provide positive legacy outcomes for communities.</p>



## SENIOR PROJECT ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Professionalism</b>	<p>Deal effectively with conflict within working teams</p> <p>Set clear long-term and short-term goals and align the team with the delivery strategy</p> <p>Manage team through learning stages when setting tasks</p> <p>Use various leadership styles to accommodate different team members</p> <p>Use forecasting to allocate resources appropriately</p> <p>Develop a map of team competencies and skills gaps</p>	<p><b>Conflict resolution</b></p> <p>Disputes may arise where people will have differing views on a situation. Being able to resolve conflict is important so that the team and project can move forward.</p> <p><b>Team time management</b></p> <p>Managing large teams is challenging and you must ensure that you are setting goals and disciplined meetings to ensure your team is completing tasks on time whilst allowing for autonomy.</p> <p><b>Coaching and management</b></p> <p>Individuals go through different stages of learning and understanding a Senior Project Engineer must recognise these stages and respond accordingly using coaching and management styles. Some people respond well to management being direct, others the opposite. Being able to understand your team when managing people will ensure the best results from them.</p> <p><b>Forward planning</b></p> <p>Project timelines move along quickly and different scopes will require specialty expertise or experience. Being able to plan ahead for these skills is important for allocating the right resources.</p> <p><b>Mapping of team and individual competency to project needs</b></p> <p>By identifying knowledge and skills gaps of a team for the project allows training plans to be in place for development.</p>
<b>Communicate effectively</b>	<p>Effectively listen to understand issues</p> <p>Give and receive feedback</p> <p>Articulate a clear message at pre-start or toolbox</p> <p>Recognise when a conversation needs to be had and how to prepare for it</p> <p>Initiate difficult conversations and hold people accountable for work performance</p> <p>Effectively listen to and resolve any disputes before they escalate</p> <p>Manage contract commercial departures and negotiate an outcome</p> <p>Create appropriate documents and presentation material for the audience</p>	<p><b>Communicating with teams</b></p> <p>Knowing how much communication is required and when to give feedback is important to keeping a team engaged and performing well. Using effective listening techniques helps to understand issues, give clarity of messages or feedback.</p> <p><b>Difficult conversations</b></p> <p>Recognise when a conversation needs to be had and how to prepare for it is an important aspect for resolving conflict, managing performance and understanding alternative perspectives.</p> <p><b>Understanding audiences</b></p> <p>Preparing information relevant to your audience is important for effective communication. It can help you to articulate a clear message to the workforce at pre-start or toolbox, in presentations to the client, or during commercial negotiations.</p>

## SENIOR PROJECT ENGINEER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Manage stakeholders</b>	<p>Professionally manage enquiries and complaints from stakeholders to resolve issues</p> <p>Maintain a positive and healthy relationship with the client</p> <p>Develop a stakeholder engagement plan (or equivalent)</p> <p>Escalate issues when required to relevant manager or team</p> <p>Share milestone achievements and project progress with internal and external stakeholders</p>	<p><b>Enquiries and complaints management</b></p> <p>Construction work affects many people directly and indirectly. When managing enquiries and complaints, being able to respond quickly and appropriately is important to making sure that they are managed effectively and resolved without escalation.</p> <p><b>Client relationships</b></p> <p>The client the most important external stakeholder for a project and being able to successfully manage a healthy relationship with the client is important to project success.</p> <p><b>Identifying key stakeholders and managing their expectations</b></p> <p>Developing a plan to identify stakeholder interests and preferred methods of communicating can help ensure expectations are being met.</p> <p><b>Escalate appropriately</b></p> <p>Being able to understand when and how to escalate issues will ensure conflicts are resolved promptly.</p> <p><b>Updates on key project milestones and achievements</b></p> <p>Celebrating key milestones and achievements is important to show stakeholders the progress that is being made.</p>



## PROJECT MANAGER

	Competency indicators	Key topics and relevance
<b>Manage tenders and bids</b>	<p>Analyse new opportunities that align with the organisational business strategy</p> <p>Analyse and evaluate direct costs to ensure they are accurate and achievable</p> <p>Contribute to commercial risk analysis and develop the strategy for mitigation</p> <p>Facilitate transitions between pre-contract stage to project delivery</p>	<p><b>Winning new work</b></p> <p>Identifying new business opportunities which are aligned to the organisational business strategy helps secure a sustainable pipeline of new work. Assessing and challenging direct costs during a tender ensures pricing is competitive as well as sufficient to complete the scope of work.</p> <p><b>Commercial risk</b></p> <p>Understanding and identifying commercial risks at tender allows for a Project Manager to seek counsel and make decisions on these risks and how they will be managed. The tender team may also set a revenue strategy through early identified variations.</p> <p><b>Handover</b></p> <p>Transition between the tender team to delivery team needs to be robust so lessons learnt from the tender are shared, and knowledge of what has been priced is communicated. It is also important to share risk and opportunity analysis from the tender so these can be managed by the delivery team.</p>
<b>Develop project methods</b>	<p>Articulate a construction methodology and plan as part of a technical submission to asset owners</p> <p>Ensure design meets the budget and constructability requirements</p> <p>Initiate identification of risk in design which could be eliminated, mitigated or managed during construction</p> <p>Manage quantity tracking throughout the design phase to enable accurate tracking of budget costs</p>	<p><b>Overall technical responsibility for project</b></p> <p>Construction projects are dynamic and may involve a large number of people all working on site, or remotely. Informed decisions are imperative in order to prevent delays and locking in the right methodology for construction that meets the projects objectives.</p> <p><b>Design solutions to cost plan</b></p> <p>It is imperative that costs are always checked against the design to make sure it is kept within budget.</p> <p><b>Technical risks and opportunities</b></p> <p>Technical risks could be a part of design (Safety in Design), procurement (choosing the right method) and delivery of a project.</p>

## PROJECT MANAGER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Contract management</b>	<p>Ensure project team are aware of their contractual rights and obligations</p> <p>Demonstrate confident management of the contract to optimise return</p> <p>Develop a project start-up plan</p> <p>Ensure the use of an ethical procurement strategy in order to meet contractual KPIs</p>	<p><b>Commercial acumen training</b></p> <p>Commercial awareness training for teams can help to ensure engineers exercise good judgement and are not completing works outside of their scope or responsibility.</p> <p><b>Project initiation</b></p> <p>When establishing a project, identifying resources, finding a compound, managing procurement, program, project plans, governance and systems set-up all forms part of a project initiation process.</p> <p><b>Contract management</b></p> <p>The Project Manager oversees contract creation, execution and management, ensuring compliance with the applicable legislation or building code.</p> <p><b>Ethical procurement</b></p> <p>Many contracts now include KPIs to encourage ethical procurement. This may include local, Indigenous or female participation targets for a project. Strategies for achieving these targets must be considered early in project initiation.</p>
<b>Manage project cost</b>	<p>Utilise understanding of revenue claimed vs. costs spent</p> <p>Identify entitlements under the contract and issue claims</p> <p>Analyse risks in the project forecast and appropriately allocate global project risks and contingency</p> <p>Analyse and forecast all indirect costs</p> <p>Evaluate rise/fall calculations provided in contracts applicable to market conditions</p> <p>Evaluate escalation impacts to contracts and budgets (particularly labour)</p>	<p><b>Project revenue and client claims</b></p> <p>Understanding cashflow and how revenue is claimed vs. costs spent is fundamental for identifying entitlement under the contract and issuing client claims.</p> <p><b>Project level risk and contingency management</b></p> <p>A risk and opportunity tool can be used to identify and appropriately allocate contingency for global project risks such as inclement weather.</p> <p><b>Indirect forecasts</b></p> <p>Indirect costs can be fixed, variable or recurring. Accurate forecasting in consideration of project duration and staff histograms can help determine any impact to gross profit.</p> <p><b>Rise/fall and escalation</b></p> <p>A rise and fall clause in contracts clearly defines how fluctuations in the cost of labour, materials or other external market influences are treated. Project Managers must be aware of how escalation of costs impacts the contract and budget.</p>
<b>Manage project schedule</b>	<p>Manage cost plans and project cash flow effectively</p> <p>Manage EOT where required under the contract entitlements</p> <p>Develop a contract program that identifies all obligations under the contract to ensure that any delays are accurately captured and claims assessed</p>	<p><b>Cost planning and cash flow</b></p> <p>Understanding how much you will spend and when you will spend during a project is important for ensuring the positive position of the project. Management of project claims vs. expenditure is important to achieve this.</p> <p><b>Managing EOTs</b></p> <p>Construction projects may be subject to liquidated damages if they are not delivered on time. Identifying time entitlements and submitting claims can allocate additional time and reduce the risk of damages.</p> <p><b>Managing contractual program</b></p> <p>Construction contracts may have specific requirements on managing program and time. Keeping the client informed about progress, delays and changes is important.</p>

## PROJECT MANAGER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Manage construction engineering activities</b>	<p>Develop and maintain systematic collaboration across teams and ensure feedback is provided in a timely manner</p> <p>Ensure construction meets the budget and constructability requirements</p> <p>Initiate identification of risk in design which could be eliminated, mitigated or managed during construction</p> <p>Manage quantity tracking throughout the construction phase to enable accurate tracking of budget costs</p>	<p><b>Overall technical responsibility for project</b></p> <p>It is important to have systems in place to make sure collaboration between teams exists and questions from site are answered quickly and accurately.</p> <p><b>Design construction solutions to cost plan</b></p> <p>Ensuring construction meets the budget and constructability requirements is important for maintaining project budget.</p> <p><b>Technical risks and opportunities</b></p> <p>Risks identified during design require active management during the construction phase. A Project Manager assumes overall responsibility for mitigation and management of risk.</p> <p><b>Scope growth</b></p> <p>Working within the design quantities submitted at tender is critical to the success of the project. In some cases you need to ensure the client and other stakeholders are not increasing scope without variations. In other cases you must allow for innovations to deliver the scope in a more cost-effective or efficient way.</p>
<b>Improve project outcomes</b>	<p>Delivering key messages of corporate change to project teams</p> <p>Showing leadership and empathy to support teams through difficult periods</p>	<p><b>Change management</b></p> <p>Change management refers to the preparation and support that is required in the process of organisational change. During construction projects, the team is likely to go through significant change at different stages of construction.</p> <p>The Project Manager is expected to lead the project team through these changes and ensure calm and support is provided throughout.</p>
<b>Apply digital tools</b>	<p>Champion digital recordkeeping</p> <p>Actively drive adoption of innovative technology on a project site</p>	<p><b>Digital transformation</b></p> <p>The Project Manager should be a champion for the digital transformation on site, including digital record keeping.</p> <p><b>Cultural champion for digital systems</b></p> <p>Digital innovation has great opportunity for use in construction. A Project Manager should be an advocate for these changes on site.</p>
<b>Work safely</b>	<p>Champion a safety culture across all project activities</p> <p>Assess data and trends to identify areas of improvement</p> <p>Ensure project compliance to WHS/OHS Act and Regulation/s, and Codes of Practice</p> <p>Demonstrate leadership and management of critical incidents</p> <p>Drive continuous improvement across all safety requirements and performance</p>	<p><b>Culture champion/developing safety culture</b></p> <p>The importance you place on safety will be reflected in your team. Having the ability to lead by example will develop a great safety culture on the project.</p> <p><b>Data and trend analysis</b></p> <p>Reviewing safety trends and data (e.g. lead and lag indicators) can be useful to inform the Project Manager on how safety performance on the project is tracking.</p> <p><b>General compliance</b></p> <p>The Project Manager has to ensure the project is complying with relevant laws and regulations.</p> <p><b>Emergency response/crisis management</b></p> <p>Project Managers hold a critical role in emergency responses and crisis management. This may also involve responding to the incident and undertaking reporting.</p> <p><b>Continuous improvement</b></p> <p>Project Managers need to be aware of developments in the industry, including nationally or internationally, to identify areas of improvement or new ways to keep people safe and to improve the mental health and wellbeing of construction workers.</p>

**PROJECT MANAGER (CONTINUED)**

	Competency indicators	Key topics and relevance
<b>Control project quality</b>	<p>Assess the project's conformance against the organisation's QMS</p> <p>Promote timely completion of quality documentation following the works</p> <p>Set the quality metrics and targets on the project or apply the organisational minimum standards</p>	<p><b>Quality assurance lead assessor</b></p> <p>Most construction scope is delivered by contractors under an accredited quality system. A Project Manager may be required to undertake some form of auditing to assess conformance against the QMS.</p> <p><b>Quality culture champion</b></p> <p>The Project Manager acts as lead champion for a positive quality culture on site.</p> <p><b>Setting quality targets and metrics</b></p> <p>Setting quality targets or using metrics are useful to track progress and hold the team accountable to continue to open and close out quality documentation.</p>
<b>Manage environmental requirements</b>	<p>Ensure the team are undertaking scope in accordance with relevant legislation and regulatory permitting/planning approvals</p> <p>Create reports to prove compliance to conditions and legislation</p> <p>Initiate consistency assessments (or equivalent) if the project is operating outside of its environmental conditions of approval</p>	<p><b>Managing, authorising and reporting obligations of CEMP or other licences</b></p> <p>Projects will always have reporting obligations to authorities which will need to be completed and submitted to verify compliance. In addition, each project will have its own unique contractual compliance requirements that also need to be adhered to.</p> <p><b>Consistency assessments</b></p> <p>When working outside of the approved conditions a consistency assessment (or equivalent) may be used to verify that the extent of environmental impact.</p>
<b>Promote sustainability</b>	<p>Proactively contribute to the development and communication of the project's sustainability objectives and targets, and facilitate contributions into sustainability assessment schemes as required</p> <p>Conduct project appraisals and consider economic, social and environmental impacts or benefits</p> <p>Develop sustainability reporting across a project or programme</p>	<p><b>Sustainability targets</b></p> <p>Be aware of the United Nations' Sustainability Development Goals and making sure project delivery supports and promotes delivery in accordance with these where possible.</p> <p><b>Option assessments/project appraisals</b></p> <p>Option assessment and project appraisals should consider economic, social and environmental impacts or benefits. Tools such as sustainability assessments and whole-of-life assessments should also be considered.</p> <p><b>Sustainability reporting</b></p> <p>A Project Manager may be required to provide reporting and statistics for internal and external sustainability reports.</p> <p>Some construction contracts will have sustainability reporting requirements that will need to be completed in addition to any organisational reporting against company targets that also need to be met and reported on.</p>

## PROJECT MANAGER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Professionalism</b>	<p>Manage onboarding of new team members</p> <p>Interview and secure key talent</p> <p>Develop and use histograms for personnel resource planning</p> <p>Coordinate and advise priorities for multiple teams across a project</p> <p>Maintain visible leadership, site presence and site awareness</p> <p>Set and create a positive team culture</p> <p>Maintain overall accountability for project outcomes including project plans, business protocols and compliance obligations</p>	<p><b>People and capability management</b></p> <p>Project Managers are responsible for securing key talent for specialist skills or critical roles by selecting the right candidate.</p> <p>This includes also managing staff utilisation, performance management, demobilisation, onboarding, termination and promotions.</p> <p><b>Planning of staff resources (histograms)</b></p> <p>A histogram of roles on a project with estimated start and finish times can be useful for determining a resources budget and effectively managing changing requirements throughout a project.</p> <p><b>Team leadership</b></p> <p>Different disciplines will likely have differing priorities and goals, so a Project Manager needs to be providing guidance on these decisions.</p> <p><b>Visible leadership</b></p> <p>The Project Manager needs to demonstrate visible leadership and be able to interact with site teams to get a better understanding of issues. Culture is vital to a successful delivery of a project and the Project Manager is the most influential person to setting culture on a project.</p> <p><b>Overall accountability to project planning</b></p> <p>The Project Manager needs to be accountable for the overall delivery of a project, including the relevant reporting and compliance obligations</p>
<b>Communicate effectively</b>	<p>Use feedback to improve performance across a project team</p> <p>Prepare and compile various reports including audit, status, progress and review style</p> <p>Prepare high quality written communication for internal and external audiences</p> <p>Prepare relevant presentation material and present in an effective way to various stakeholder groups</p> <p>Use a structured format for meetings to achieve effective outcomes</p>	<p><b>Managing project teams through effective communication</b></p> <p>Regular communication and feedback with teams sets clear direction and can improve performance.</p> <p><b>Preparing and compiling reports</b></p> <p>Construction businesses will have a number of status reporting requirements for internal reporting of construction project. A Project Manager is required to provide sufficient detail on all aspects of a project to brief senior leaders. Construction projects may also be evaluated through project performance reports and audits. A Project Manager needs to review and evaluate any findings and respond to comments.</p> <p><b>Client and subcontractor communication</b></p> <p>A Project Manager has responsibilities for managing formal correspondence regarding the contract with the client or subcontractors. Being able to write effective correspondence is important to place your position contractually.</p> <p><b>Corporate reviews</b></p> <p>All organisations will require a team to prepare for audits and reviews. You will need to have the ability to distribute tasks and make sure the team has prepared the documents required for assessment. It is also important to action any deficiencies or recommendations for improvement to ensure compliance to company policies, contract, or legislation.</p> <p><b>Run effective client and team meetings</b></p> <p>Effective meetings demonstrate professionalism and develops trusting relationships which can assist in resolving project related issues and avoid disputes and delays.</p> <p><b>Can respond to unrehearsed comments</b></p> <p>Construction Project Managers may find themselves in front of the community, or media, or elected officials that may ask questions that you may need to answer without preparation.</p>

## PROJECT MANAGER (CONTINUED)

	Competency indicators	Key topics and relevance
<b>Manage stakeholders</b>	<p>Respond and answer questions from the media appropriately to enhance company reputation</p> <p>Develop a strategic plan to deliver works that are aligned with client objectives</p> <p>Identify and align common objectives with the project</p> <p>Present key project messaging to key stakeholders to positively position the project</p> <p>Effectively manage union officials setting up and managing agreements</p>	<p><b>Media and public relations</b></p> <p>As a Project Manager there may be occasions where you will need to respond to media, or promote your project to the media or community and enhance the project, client and company's reputation.</p> <p><b>Understanding key drivers of stakeholders</b></p> <p>By understanding the client objectives and key drivers better relationships may be gained. Third party stakeholders may also influence outcomes of a project. Being able to understand and align these stakeholder drivers is an important skill for managing expectations.</p> <p><b>Communicating with key stakeholders</b></p> <p>Project Managers may be required to manage high-risk relationships with key stakeholders at various levels, including community members, government officials, elected representatives and client executives.</p> <p>Understanding the stakeholder environment is an important aspect of managing these relationships and keeping them informed about the project.</p> <p><b>Industrial relations</b></p> <p>A significant sector of the construction workforce falls under workplace agreements. Knowing the IR laws, and being able to navigate the risks involved, and the rights and obligations of the workforce, organisations and unions, is mandatory so that you can comply with the relevant laws.</p>



# Alignment with Chartered and registration

The Chartered assessment process is an independent assessment of the competence of an engineer. The table below can be used as guidance and should not be taken as prescriptive. Note: Not all elements of the Chartered competency are aligned here, individuals would likely find evidence after an appropriate amount of experience. Typically, the competencies for Chartered would be demonstrated at the experienced Project Engineer or Senior Project Engineer level.

**(National Engineering Register competencies are orange)**

	Chartered Elements of Competency															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Manage tenders and bids			■			■		■	■	■			■		■	
Develop project methods				■			■		■	■		■	■	■	■	
Contract management							■	■			■					
Manage project cost									■							
Manage project schedule									■	■						
Manage construction engineering activities		■	■	■	■	■	■		■		■	■	■		■	
Improve project outcomes				■					■							■
Apply digital tools									■							
Work safely				■		■	■							■		
Control project quality									■							
Manage environmental requirements				■	■	■	■		■							
Promote sustainability				■				■								
Professionalism		■														
Communicate effectively	■				■			■								
Manage stakeholders					■			■								

1. Deal with ethical issues
2. Practise competently
3. Responsibility for engineering activities
4. Develop safe and sustainable solutions
5. Engage with the relevant community and stakeholders
6. Identify, assess and manage risks
7. Meet legal and regulatory requirements
8. Communication
9. Performance
10. Taking action
11. Judgement
12. Advanced engineering knowledge
13. Local engineering knowledge
14. Problem analysis
15. Creativity and innovation
16. Evaluation

# Chartered Elements of Competence

The following table describes the Chartered Elements of Competence.

Note: Elements 1, 2, 4, 6 and 13 are used for registration applications (Shown as orange).

Element	Title	What this means in practice
1	Deal with ethical issues	That you anticipate the consequences of your intended action or inaction and understand how the consequences are managed collectively by your organisation, project or team; and that you demonstrate an ability to identify ethical issues when they arise and to act appropriately.
2	Practise competently	That you assess, acquire and apply the competencies and resources appropriate to engineering activities.
3	Responsibility for engineering activities	That you display a personal sense of responsibility for your work; and that you clearly acknowledge your own contributions and the contributions from others and distinguish contributions you may have made as a result of discussions or collaboration with other people.
4	Develop safe and sustainable solutions	That you apply and implement current workplace health and safety requirements. That you identify the economic, social and environmental impacts of engineering activities, and that you anticipate and manage the short and long-term effects of engineering activities.
5	Engage with the relevant community and stakeholders	That you identify stakeholders, individuals or groups of people who could be affected by the short, medium and long-term outcomes of engineering activities, or could exert influence over the engineered outcomes, including the local and wider community; and that you identify stakeholder interests, values, requirements and expectations using the terminology of the stakeholder through consultation and accurate listening; and that you work ethically to influence perceptions and expectations of stakeholders and negotiate acceptable outcomes in the best overall interest of relevant communities.
6	Identify, assess and manage risks	That you develop and operate within a hazard and risk framework appropriate to engineering activities.
7	Meet legal and regulatory requirements	That you should be able to demonstrate an understanding of the laws, regulations, codes and other instruments which you are legally bound to apply, and apply these in your work.
8	Communication	That you can communicate in a variety of different ways to collaborate with other people, including accurate listening, reading and comprehension, based on dialogue when appropriate; and that you can speak and write, taking into account the knowledge, expectations, requirements, interests, terminology and language of the intended audience.
9	Performance	That you demonstrate an ability to apply appropriate tools or processes to achieve corporate objectives while accounting for personal obligations to the profession.
10	Taking action	That you initiate, plan, lead or manage engineering activities.
11	Judgement	That you exercise sound judgement in engineering activities.

Element	Title	What this means in practice
12	<b>Advanced engineering knowledge</b>	That you comprehend and apply advanced theory-based understanding of engineering fundamentals to predict the effect of engineering activities.
13	<b>Local engineering knowledge</b>	That you acquire and apply local engineering knowledge; and that, where appropriate, you apply engineering knowledge contributed by other people including suppliers, consultants, contractors and independent experts.
14	<b>Problem analysis</b>	That you define, investigate and analyse engineering problems and opportunities.
15	<b>Creativity and innovation</b>	That you develop creative and innovative solutions to engineering problems.
16	<b>Evaluation</b>	That you evaluate the outcomes and impacts of engineering activities.



# Acronyms defined

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<b>AR</b>	Augmented reality
<b>BIM</b>	Building Information Modelling
<b>CAPEX</b>	Capital expenditure
<b>CEMP</b>	Construction Environmental Management Plan (or Environmental Management Plan)
<b>CMS</b>	Construction Method Statement
<b>EOT</b>	Extension of Time
<b>EWMS</b>	Environmental Work Method Statement
<b>GIS</b>	Geographic Information System
<b>IR</b>	Industrial relations
<b>ISC</b>	Infrastructure Sustainability Council
<b>ISO</b>	International Organisation for Standardization
<b>ITP</b>	Inspection and Test Plan
<b>KPI</b>	Key Performance Indicator
<b>OPEX</b>	Operational expenditure
<b>QMS</b>	Quality Management System
<b>RFI</b>	Request for Information
<b>SiD</b>	Safety in Design
<b>SWMS</b>	Safe Work Method Statement
<b>TAN</b>	Tender Advice Notice
<b>TOTEX</b>	Total expenditure
<b>WHS/OHS</b>	Work health and safety / occupational health and safety



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