Mining and Automotive Skills Alliance

Vocational Degree Phase 2

Final Report

January 2026

Contents

Mining and Automotive Skills Alliance

Acknowledgement of Country

In delivering this research, we acknowledge the Traditional Custodians of the lands on which we live and work.

We acknowledge Traditional Custodians of Country throughout Australia and their connections to land, sea, and community.

Featured Image: Ptilotus Exaltatus

Mining and Automotive Skills Alliance

Executive Summary

Overview of Project Purpose, Objectives, and Scope

Australia's industrial sectors are undergoing rapid transformation driven by automation, electrification, digital systems, and the national shift towards net zero. These transitions are reshaping the profile of technical work and creating demand for applied professional roles that integrate advanced problem solving, systems thinking, and workplace capability. At the same time, the tertiary education system continues to operate as a binary model, with limited pathways that combine the strengths of vocational education and higher education. The result is a persistent workforce capability gap often described as the "missing middle", where employers struggle to source staff with the integrated applied expertise required for modern operations.

This final report presents the outcomes of Phase 2 of the Mining and Automotive Skills Alliance (AUSMASA) Vocational Degree Project, which has refined, validated, and substantiated the case for introducing a Vocational Degree in Reliability Engineering. This work builds on the detailed research, extensive stakeholder engagement, and evidence collected in Phase 1. Together, these phases confirm both the workforce need and the feasibility of creating an industry led, work integrated qualification that is capable of awarding an Australian Qualifications Framework (AQF) Level 7 outcome through a vocationally grounded model.

The project is a 3-phase project as illustrated in Figure 1.

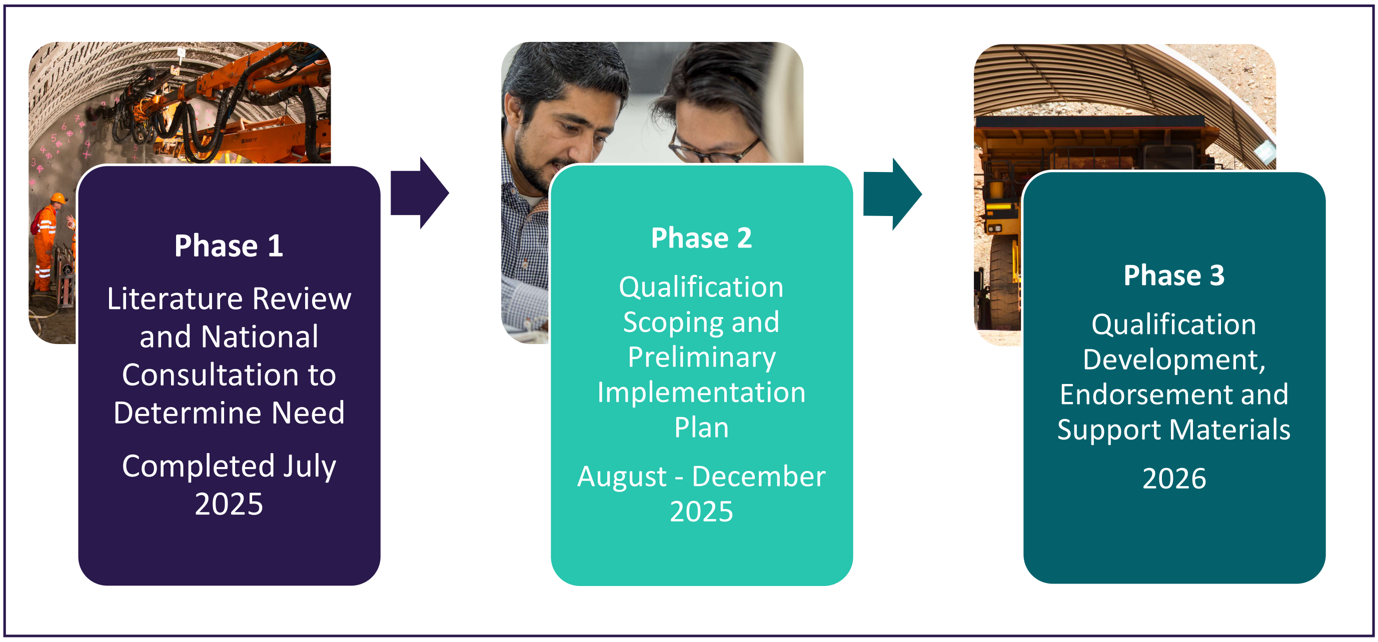


Figure 1: The Vocational Degree Project Phases

The Case for Reform and the Need for a New AQF Level 7 Pathway

Phase 1 confirmed that neither existing VET qualifications nor university degrees sufficiently prepare graduates for the applied, interdisciplinary work now required in mining and automotive. Diploma and Advanced Diploma qualifications are structurally limited in their capacity to deliver higher order cognitive skills, systems integration, digital diagnostics, and the autonomy required in mid-level engineering roles. University engineering degrees are highly theoretical, often disconnected from operational realities, and insufficiently focused on applied reliability practice.

At the same time, technological change and national priorities are increasing demand for advanced technical capability. The Working Future White Paper reinforced that occupations central to the clean energy workforce must grow significantly to meet national targets, including roles with expertise in electrification, hydrogen, automation, and digital systems. National strategies for hydrogen, electric vehicles, batteries, and critical minerals also highlight the need for applied reliability, testing, and asset integrity skills across multiple industries.

These pressures converge most sharply in mining, where the reliability and testing function is essential to safe, productive, and environmentally responsible operations. Employers consistently report difficulty sourcing candidates who can integrate mechanical, electrical, digital, and data domains, work autonomously in operational settings, interpret complex datasets, and apply structured investigative approaches to asset performance. The role is too complex for Certificate IV or Diploma level training yet too applied and operationally embedded for conventional engineering degrees.

Confirmation of Discipline Focus: The Reliability and Testing Engineer

Phase 1 identified the Reliability and Testing Engineer as the strongest candidate for a pilot AQF 7 vocational degree. Through further consultation and technical analysis in Phase 2, this conclusion has been reinforced and formally validated. Stakeholders including Tier 1 mining companies, professional bodies, TAFE Centres of Excellence, OEMs, and unions consistently confirmed the following:

- The role represents a clear gap in the existing qualification landscape.
- Employers rely heavily on internal training, OEM short courses, or overseas recruitment to meet current demand.
- The role is central to national priorities in automation, clean energy, and critical minerals.
- The function requires broad technical knowledge, advanced diagnostic capability, autonomous judgement, and system wide thinking.

Phase 2 produced a detailed functional analysis that describes eleven core functions spanning reliability engineering, asset strategy, data collection and analysis, test planning, systems integration, continuous improvement, standards and compliance, and cross disciplinary collaboration. These functions directly align with the knowledge, skills, and application descriptors for AQF Level 7 and clearly demonstrate the professional scope of the role.

Graduate Outcomes Framework and AQF 7 Alignment

A comprehensive graduate outcomes framework has been developed and validated through consultation with the Discipline Panel, industry experts, and Engineers Australia. The framework confirms that the proposed vocational degree will produce graduates who can:

Integrate theoretical and technical knowledge across mechanical, electrical, digital, and data domains.

- Analyse complex and unpredictable reliability problems using structured diagnostic methods.
- Conduct autonomous professional practice through field investigations, test execution, and decision making.
- Apply systems based thinking to asset performance and lifecycle strategy.
- Communicate technical findings and recommendations to diverse organisational stakeholders.
- Work ethically and safely in high consequence operational environments.

Graduate outcomes were benchmarked against Engineers Australia Stage 1 competencies to ensure that providers seeking accreditation have a clear pathway for demonstrating equivalence. This ensures national credibility and confirms that the qualification meets the academic expectations of a Bachelor level program while remaining vocationally grounded and work integrated.

Work Integrated Learning and the Vocational Degree Model

The vocational degree has been designed to reflect the intent of the AQF 7 vocational degree specification: to integrate academic learning with substantial, structured work based learning. Stakeholders across mining and training providers strongly supported a model where students engage in supervised workplace projects, applied investigations, reliability improvement activities, and field based testing. The design allows for flexible delivery arrangements including higher apprenticeship structures, cadetship models, and block release patterns suitable for FIFO and shift based workforces.

Consultation confirmed that work integrated learning must:

- Deliver authentic exposure to asset performance problems and operational constraints.
- Provide structured supervision and assessment aligned to AQF 7 learning outcomes.
- Accommodate mid-career technicians entering the program with significant workplace experience.
- Use workplace derived evidence as a core component of competency demonstration.

Industrial Relations and Workforce Integration

Phase 2 industrial relations consultation confirmed strong support for the intent of the qualification while highlighting the need for coordinated national engagement before industrial arrangements can be finalised. Early testing indicates that the qualification can likely be accommodated within existing award and enterprise agreement structures, although final award placement will require national agreement through consultation with unions, employer associations and industry bodies. Stakeholders noted that the Vocational Degree has the potential to strengthen workforce progression, provide clearer recognition of applied professional capability and reduce reliance on migration. Future enterprise agreements may choose to reference the qualification as one pathway into applied professional or technologist level roles, subject to outcomes of national industrial consultation in Phase 3.

Provider Feasibility and System Readiness

Phase 2 assessed the capability of selected TAFE Centres of Excellence and industry partnered RTOs to deliver an AQF 7 vocational degree. The feasibility review identified strong readiness in governance, industry partnerships, and workplace learning systems, although some technical capability uplift will be required in academic governance, assessment design, and digital infrastructure. Providers expressed a readiness to proceed to delivery pilots in partnership with mining employers.

Alignment with National Workforce, Industry, and Policy Priorities

The qualification aligns with a broad range of national strategies including the National Hydrogen Strategy, National Battery Strategy, National Electric Vehicle Strategy, Working Future White Paper, and critical technologies agendas. These strategies collectively signal strong future demand for applied professionals with capability in electrification, battery systems, hydrogen, diagnostics, automation, and digital operations. The reliability function directly supports these national imperatives, confirming the strategic relevance of the qualification.

Sectoral Mobility and Cross Industry Applicability

While mining is the focus of the initial pilot, consultation confirmed strong applicability across multiple sectors including defence, transport, advanced manufacturing, energy systems, and critical minerals processing. The qualification has been designed to support mobility through core reliability and testing capabilities and sector specific specialisations, ensuring relevance across Australia's industrial ecosystem.

Conclusion

The outcomes of Phase 2 confirm that the development of an AQF Level 7 Vocational Degree in Reliability Engineering is both necessary and feasible. The project has produced a validated discipline definition, a complete functional analysis, an aligned graduate outcomes framework, a proposed qualification structure, a work integrated learning approach, industrial relations feasibility, and evidence of strong industry and provider readiness. These elements establish a comprehensive foundation for transition to qualification development.

Recommendation

It is recommended that the Department of Employment and Workplace Relations and the Mining and Automotive Skills Alliance endorse progression to Phase 3, the development of the Vocational Degree in Reliability Engineering for inclusion in the national Training Package system.

Industry consultation, functional analysis, benchmarking and qualification design activities undertaken in Phase 2 provide strong evidence of a clearly defined occupational need, a coherent and AQF Level 7 aligned qualification structure and broad stakeholder support across industry, training providers, professional bodies and regulators. The project has confirmed that:

- reliability engineering constitutes a distinct applied professional role that is currently unsupported by existing qualifications
- the proposed Vocational Degree addresses a nationally recognised skills gap at the applied professional level

- the graduate outcomes, and qualification framework align with the Australian Qualifications Framework and Engineers Australia Stage 1 Engineering Technologist standards
- the qualification is feasible to deliver through the VET sector, with early interest from RTOs, universities and major employers
- the model provides national consistency, clear pathways, and the capacity to support workforce development across mining, manufacturing, energy, transport and defence

Progressing to Phase 3 will enable the development of detailed qualification components including units of competency, assessment requirements, work integrated learning arrangements, credit and packaging rules and implementation guidance. This work will be undertaken in partnership with industry, providers and regulators and will ensure the qualification is ready for endorsement, regulatory approval and pilot delivery.

It is therefore recommended that Department of Employment and Workplace Relations (DEWR) and AUSMASA formally approve the commencement of Phase 3 to ensure timely development and national implementation of the Vocational Degree in Reliability Engineering. The full list of required Phase 3 activities is detailed in the Recommendations section of this report.

Introduction and Project Purpose

Phase 2 of the AUSMASA Vocational Degree Project advances the work initiated through Phase 1, The Missing Middle – Investigating the Potential of Vocational Degree Models in the Mining and Automotive Sectors. Building on the confirmed need for an AQF Level 7 Vocational Degree to address workforce gaps between trade and professional engineering roles, this phase focuses on the development of a qualification model for the Reliability or Testing Engineer in the mining sector. The project applies an evidence-based, industry-led co-design process to refine the qualification structure, validate occupational alignment, and assess feasibility for implementation.

Summary of Deliverables, Timeframes, and Key Milestones

Phase 2 of the Vocational Degree Project is organised into six structured activity groups, as illustrated in Figure 2, each representing a distinct stage in the design, validation, and feasibility process leading to the development of the proposed qualification. This report details the outcomes of all activity groups.

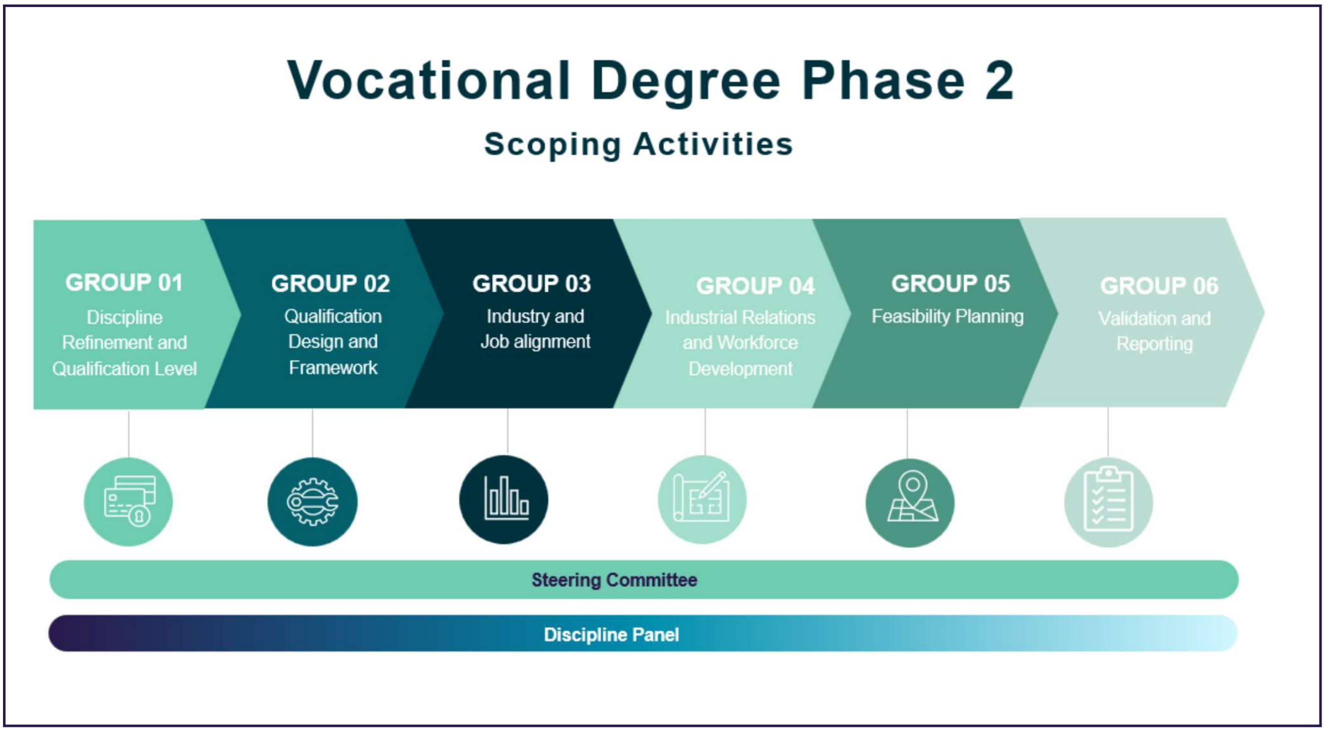


Figure 2: Vocational Degree Activity Phasing.

Phase 2 ran from August to December 2025. The timeline integrates design, validation, and feasibility activities, supported by formal governance checkpoints to ensure quality and accountability.

The period from August to October 2025 was dedicated to qualification design and framework development in close collaboration with industry. These months encompass the refinement of the discipline scope, development of the draft qualification structure, graduate outcomes, and validation of alignment with workforce roles and the AQF Level 7 Vocational Degree descriptor. The work undertaken during this stage culminated in the Interim Report.

From November 2025, the project transitioned to a focus on industrial relations and workforce development, including classification mapping, award alignment, and equity strategies. Parallel feasibility testing with selected providers and TAFE Centres of Excellence assessed delivery capability, resource requirements, and work-integrated learning settings.

The final stage in December 2025 consolidated findings from across all activity groups, completed validation processes, and prepared the Final Report for endorsement (Gate D), which confirms the proposed qualification structure, graduate outcomes, and pathway to Phase 3 – Qualification Development and Endorsement.

Key Milestones

- **August 2025:** Project mobilisation, governance established, and discipline focus confirmed (Gate A)
- **September 2025:** Draft qualification structure, volume of learning, and graduate outcomes developed (Gate B)
- **End October 2025:** Industry validation completed, and Interim Report tabled to the Steering Committee (27 Oct meeting) (Gate C)
- **November 2025:** Industrial relations analysis, workforce development planning, and provider feasibility testing
- **December 2025:** Final validation and reporting, Steering Committee endorsement, and submission to DEWR (Gate D)

Confirmation of the Selected Discipline Focus (Reliability Engineer)

The focus of the Phase 2 Vocational Degree Project has been confirmed as the Reliability Engineer role. This decision was informed by an early comparative analysis of the Reliability Engineer and Testing Engineer functions undertaken as part of the project's initial activities. The project team conducted a detailed interrogation of both occupational profiles, examining their respective responsibilities, required competencies, and alignment to workforce demand across the mining and related industrial sectors. This process culminated in the development of two functional analysis documents, which articulated the key functions, knowledge, and skills associated with each role in accordance with the AQF Level 7 Vocational Degree descriptors.

These analyses were reviewed and discussed in detail with the Discipline Panel, comprising industry and academic experts representing both mining operations and equipment manufacturing contexts. Through these discussions, it became evident that while Testing Engineer functions do exist within the sector, they are primarily concentrated in Original Equipment Manufacturers (OEMs) or design environments, where testing activities are typically performed by design engineers rather than by a dedicated occupational group. In contrast, the Reliability Engineer function was identified as a universal and critical role across all participating organisations, albeit under a range of titles such as Asset Health Engineer, Maintenance Engineer, or Condition Monitoring Specialist.

Given the prevalence and strategic importance of the reliability function within operational mining environments, the project team, in consultation with the Discipline Panel (Table 2), determined that the qualification should be structured around the Reliability Engineer as the primary occupational focus. To preserve flexibility and ensure coverage of related functions, testing-focused units will be incorporated as elective options within the qualification. This approach allows students with an interest in product development or equipment testing to develop those specialised capabilities while maintaining the broader industry relevance and transferability of the degree.

Methodology and Co-design Approach

Governance Structure and Consultation Mechanisms

The project has been guided by a co-design framework that provides a structured approach for developing solutions in partnership with stakeholders, ensuring that diverse perspectives are integrated into each stage of the process. It sets out the principles, decision points, and collaborative practices that guide how ideas are generated, refined, and implemented. By fostering active participation, shared ownership, and transparent communication, the framework supports the creation of outcomes that are practical, relevant, and widely supported across the sector.

The framework is supported by a suite of tools and templates designed to make collaboration clear, consistent, and efficient. The resources create a practical toolkit that enables stakeholders to engage meaningfully and ensures that project activities remain aligned with agreed objectives and timelines.

Governance

The governance of the project is structured to ensure transparency, accountability, and robust decision-making across all stages of qualification design. The model comprises a Steering Committee, that provides strategic oversight and ensures alignment with national priorities, a Discipline Panel, that contributes technical and academic expertise, and the AUSMASA Project Office that manages reporting, compliance, and stakeholder communication. The Meyvn Group leads day-to-day project delivery.

The Steering Committee brings together representatives from government, industry, training providers, unions, and professional bodies to provide expert advice, endorse key decisions at each project gate, and monitor progress against milestones. Its role extends beyond oversight to include stewardship of sector confidence, supporting transparency, and ensuring that the qualification design process reflects the shared interests of stakeholders. Through regular meetings and structured reporting, the Steering Committee validates project outputs, manages emerging risks, and provides direction on issues affecting policy alignment, industrial relations, and long-term implementation feasibility.

The Discipline Panel provides the technical and academic foundation for the project. It brings together subject matter experts from industry, education, and professional bodies to guide the design and validation of the Vocational Degree. The panel’s role is to refine the discipline definition, shape the qualification structure, and ensure that graduate outcomes and work-integrated learning settings are aligned with the expectations of an AQF Level 7 award and Industry. It evaluates benchmarking data, confirms the relevance of proposed content, and provides expert advice on the integration of emerging technologies and practices. Through iterative review, the Discipline Panel ensures that the qualification is both academically robust and technically current, reflecting the needs of modern reliability engineering practice.

In addition to the formal governance meetings, a series of one-on-one consultations has been conducted with selected technical experts from industry, training, and professional bodies. These targeted discussions provide deeper insight into specific technical, regulatory, and workforce issues that inform the qualification design. Consultation has also commenced with Higher Education Providers, regulators, and State and Territory representatives to investigate feasibility and implementation planning.

AUSMASA has participated in the Vocational Degree Symposium and VELG 2025 to provide an overview of the project's objectives, approach, and progress to date. To maintain transparency and encourage broad engagement, AUSMASA is also planning an open webinar to provide project updates, outline preliminary findings, and invite feedback from stakeholders across industry, government, and the training sector. A key focus of this engagement will be clear communication and messaging to build awareness and understanding of the Vocational Degree, which represents a significant new development for the sector. This ensures that the development process remains inclusive and informed by a diverse range of perspectives. It is critical that stakeholders across education, training, and industry are informed and confident in the purpose and value of this initiative...

As part of ongoing consultation activities, AUSMASA Industry Engagement Officers actively discuss the Vocational Degree Project in the course of their regular engagement with employers, training providers, and industry associations. The project is also an agenda item at AUSMASA SWAP meetings. Through these interactions, they gather feedback on emerging workforce needs, share project updates, and identify potential collaborators. Contact details for interested parties are recorded and referred to the project team to ensure they are included in future consultation and validation activities. This continuous engagement mechanism supports broad industry awareness and ensures that the project remains responsive to current and emerging sector priorities.

Co-Design and Engagement Themes

The co-design process provides a structured, evidence-based approach that brings together industry, education, unions, and government partners to collaboratively design and validate the Vocational Degree.

Co-design Principles

- Industry-led and jobs-focused, anchored to current and emerging roles and national priorities.
- Evidence-based, using the labour market, benchmarking and occupational analysis.
- Inclusion and access, with specific attention to regional and underrepresented learners.
- Transparency and shared ownership through structured governance and open consultation records.
- Feasibility first, with early testing of provider readiness and work-integrated learning settings.
- Alignment with sector reform, industrial relations settings and licensing.
- Risk aware, with live risk management and clear escalation.

Process and Phases with Artefacts and Gates

The framework aligns with the six steps in the proposal and runs from August to December 2025 providing an interim report by 31 October and a final report by 19 December 2025.

Activity Group 1: Discipline Refinement and Qualification Purpose

Activities, confirm discipline using ASCED and OSCA, map to national priorities and occupational clusters, run co-design sessions with industry, unions and RTOs.

Artefacts: ASCED and OSCA analysis, purpose statement, consultation log.

Gate A output - endorsed discipline and design scope.

Activity Group 2: Qualification Design and Structure

Activities, draft structure, volume of learning, core, specialisations, electives, work integrated learning (WIL), benchmark level and outcomes, apply Qualification Development Quality Principles.

Artefacts: structure blueprint, benchmarking matrix, and graduate outcomes rubric.

Gate B output, draft model approved for external validation.

Activity Group 3: Industry Engagement and Role Alignment

Activities: identify priority job roles, validate graduate profile with employers, licensing and associations, document pathways to jobs and further education, and gather letters of support.

Artefacts: role alignment map, pathways schema, validation pack, letters of support.

Gate C output, Interim report submitted and endorsed.

Activity Group 4: Industrial Relations and Workforce Development

Activities, map awards and classifications, test adoption conditions with unions and employer associations, explore recognition of prior learning and transition pathways, and define equity strategies.

Artefacts, IR brief, classification mapping, adoption conditions, and equity plan.

Activity Group 5: Feasibility Planning with Providers

Activities, test model with RTOs and Centres of Excellence, assess provider capability and delivery conditions.

Artefacts, feasibility findings, provider interest statements.

Activity Group 6: Final Validation and Reporting

Activities: consolidate evidence, present to governance, incorporate feedback, and finalise recommendations.

Artefacts, final scoping and recommendations report, with qualification structure, graduate outcomes, pathways, recognition and accreditation options, industry and provider support, and IR implications.

Gate D output, approval to proceed to Phase 3 development and submission to the Assurance Body.

Engagement Principles

The engagement principles for the Vocational Degree Project are designed to ensure that consultation is purposeful, inclusive, and transparent. All engagement activities are guided by a commitment to meaningful participation, where stakeholders contribute directly to shaping the qualification design, structure, and implementation approach. Consultation is not tokenistic but embedded throughout the project lifecycle, ensuring that decisions are informed by diverse perspectives and grounded in practical industry realities.

The process is industry-led and evidence-based, ensuring that the qualification responds to real workforce needs and reflects the operational contexts in which graduates will work. Engagement is structured to draw on the expertise of employers, unions, regulators, educators, and professional bodies, creating a shared sense of ownership and accountability for project outcomes. The project places particular emphasis on equity and access, with targeted efforts to include regional, Aboriginal and Torres Strait Islander, and under-represented groups in consultation activities.

Transparency underpins all engagement activities, with consultation outcomes recorded in logs, summarised for participants, and linked to specific design decisions. This approach ensures that feedback is acknowledged, traceable, and demonstrably influencing project outputs. Engagement is also continuous and adaptive, with mechanisms such as workshops, interviews, and webinars allowing stakeholders to contribute at different stages of the co-design process. Together, these principles establish a robust and inclusive framework for collaboration that ensures the Vocational Degree is credible, industry-led, and nationally relevant.

Engagement activities are also aligned with national qualification reform priorities and quality assurance standards, ensuring that the co-design process supports system integration and readiness for implementation.

Engagement Methods and Cadence

- Discipline panel workshops, fortnightly from August to December, with technical sprints for structure and outcomes.
- Industry validation meetings and targeted interviews during Activity Group 2 and 3.
- Equity and regional focus sessions, Activity Groups 3-5
- Advisory Committee meetings monthly, with briefing notes and risk updates.
- Public consultation, where relevant, with a published summary and response to themes

The meeting cadence for both governance committees is included in Appendix 1.

Equity and Access Considerations

Access and equity are core principles underpinning the Vocational Degree Project. The project is committed to ensuring that all stakeholders, including learners, employers, and providers, have equitable opportunities to contribute to consultation and future implementation, regardless of location, background, or organisational capacity. Deliberate efforts to embed diverse perspectives will be initiated through Activity Group 3, where engagement will broaden to capture feedback from across the wider industry and begin to address the policy and system-level considerations that shape equitable access to the Vocational Degree.

Consultation activities are conducted primarily through online engagement, targeted interviews, and written submissions to ensure participation is accessible to stakeholders across jurisdictions.

Feedback from these groups is recorded in the consultation log and used to inform design features, including delivery models, pathways, and work-integrated learning arrangements that support flexible participation.

Equity considerations are also embedded within the qualification design principles. The qualification will support flexible and modular pathways that recognise prior learning and allow students to progress while maintaining employment. This approach ensures that the model can accommodate diverse learning needs, enable participation by those in remote or site-based roles, and strengthen inclusion across the broader workforce.

Consultation Activities

Discipline Panel and Steering Committee Engagement Activities

Engagement with the project's governance bodies has been central to ensuring that both industry and academic expertise inform the project and qualification design. Seven Discipline Panel meetings have been convened, providing structured opportunities to test and refine the developing framework for the Vocational Degree. These sessions have focused on validating the functional analysis, reviewing the draft qualification structure, confirming alignment with AQF Level 7 and Engineers Australia accreditation standards, as well as exploring access and equity considerations, work integrated learning models and recognition and credit pathways and equipment and facility requirements for delivery. Each meeting has incorporated targeted technical discussions, allowing panel members to examine the balance between theoretical depth, applied skill, and work-integrated learning requirements. Between sessions, panel members have provided written feedback and technical advice on the various papers that have been prepared to guide the project.

The Steering Committee has met five times across Phase 2 to guide project direction, test emerging concepts and validate key milestones leading to the Final Report. These meetings progressively refined the discipline focus, confirmed the applied professional scope of the qualification, reviewed the qualification structure, endorsed the draft graduate profile and outcomes, and examined the implementation requirements for an AQF Level 7 vocational degree. In addition to structured meetings, one on one consultations were conducted with each committee member to capture organisation specific perspectives and to test critical elements of the qualification model, including system integration, national reform alignment, work integrated learning expectations, industrial relations considerations, industry adoption conditions and pathways for professional accreditation. This combination of collective deliberation and individual consultation ensured that Steering Committee members contributed strategic governance oversight as well as detailed operational and technical insights, shaping the qualification design and informing the recommendations presented in the Final Report.

See final report version for further detail.

Conclusion

The technical themes identified through consultation have been fully incorporated into the updated functional analysis and qualification structure presented in this report at Appendix 2 and 3 The refined framework strengthens coverage of sustainability, assurance, digital systems, human factors, teaming, change management and applied professional judgement. These refinements ensure that the Vocational Degree aligns with contemporary industry practice, reflects the responsibilities of applied professionals at AQF Level 7 and remains feasible for delivery within the VET system.

Strategic and Implementation Feedback

Consultation across Phase 2 also identified a series of system level themes that will shape the feasibility, adoption and sustainability of the Vocational Degree. Stakeholders from industry, RTOs, OEMs, government, universities and professional bodies emphasised that the qualification sits at the interface of workforce reform, tertiary harmonisation and organisational capability. The following themes describe the strategic conditions that must be addressed to ensure effective implementation.

Benchmarking, Professional Alignment and Tertiary Harmonisation

Stakeholders consistently advised that the qualification must be benchmarked explicitly against the Engineering Technologist standard at AQF Level 7 to ensure credibility, portability and alignment with professional expectations. Industry, RTOs and higher education representatives supported deeper engagement with Engineers Australia and emphasised the need for systematic articulation between VET and higher education. Early discussions with universities confirm strong interest in recognising the Vocational Degree for postgraduate admission and establishing bidirectional credit arrangements, strengthening tertiary harmonisation and enabling learners to move confidently between applied and academic pathways.

Industrial Relations Alignment and Workforce Impact

The success of the qualification depends on thoughtful alignment with industrial relations settings. Stakeholders emphasised the need to avoid unintended workforce tensions, such as credential inflation or misalignment with enterprise agreement structures. Feedback reinforced that the Vocational Degree should complement, not replace, existing organisational pathways and that recognition within enterprise agreements will be essential for consistent classification and mobility. This alignment must maintain stability for experienced workers, support equitable progression and recognise applied professional roles within existing job families.

Organisational Capability and Workforce Planning Readiness

Employers acknowledged that implementing the Vocational Degree may require updates to internal capability frameworks, job families, position descriptions and training strategies. Workforce planning processes will need to account for applied professional roles and identify supervision, mentoring and workplace learning opportunities. For many smaller or regional employers, delivery viability will depend on partnership models that share resources, equipment and supervision across organisations. Stakeholders also noted that provider readiness will require deliberate planning for academic governance, assessment integrity and staff capability to ensure delivery at AQF Level 7.

Delivery Practicality, Curriculum Feasibility and System Capacity

Stakeholders highlighted that the curriculum must maintain academic integrity while remaining feasible for vocational delivery. Concerns centred on the depth of mathematics, statistics, data systems and digital technology, and on ensuring that complexity is scaffolded. The availability of teaching staff with appropriate academic qualifications was raised as an area requiring system planning rather than a barrier, with applied engineering identified as one of the few VET fields where many educators already hold advanced academic qualifications. Feedback emphasised that delivery must integrate workplace learning and be designed for shift based, FIFO and regional workforces.

Access, Participation and Equity Enablers

Consultation strongly reinforced that equitable participation requires deliberate design. Stakeholders identified barriers relating to cost, rostering, distance, caring responsibilities, cultural obligations, workplace discrimination and academic confidence. Specialist advice emphasised embedding culturally secure and trauma aware practices, removing unnecessary academic barriers, providing technical English and writing support, and enabling flexible delivery arrangements. These requirements must be incorporated into admission processes, WIL design and support systems within the implementation architecture.

Cultural and Psychosocial Safety and Employer Readiness for WIL

Culturally safe and psychologically safe learning environments were identified as essential prerequisites for WIL. Employers will need to demonstrate inclusive leadership capability, safe facilities, gender equitable PPE and accommodation, and a demonstrable history of addressing complaints and improving local cultural conditions. Stakeholders emphasised that WIL cannot proceed without ensuring employer readiness and that a national WIL framework with clear supervision, safety and escalation requirements will be necessary for consistent implementation.

Risk Management, Funding Sustainability and Governance

Consultations identified credential inflation, workplace inequity, inconsistent supervision, unsafe placement environments and variable provider readiness as risks requiring early mitigation. A structured pilot with formal evaluation was recommended. Stakeholders also highlighted that funding arrangements will need to be addressed, given that AQF Level 7 qualifications currently sit outside standard VET funding frameworks. Sustained implementation will require co investment between government, industry and Jobs and Skills Councils, supported by strong governance and evidence of workforce impact.

Workforce Need Feedback

The consultation process reaffirmed that the Vocational Degree responds directly to a set of significant and long standing workforce needs across asset intensive industries. These needs relate to the structure of engineering teams, the emerging demands of digital and electrified operations, and national priorities tied to critical minerals, energy transition and productivity improvement.

Validation of the Reliability Engineer as the Priority Role

Industry consultation confirmed that the reliability function is a critical workforce gap across mining, energy, manufacturing, transport, infrastructure and defence. Unlike the testing function, which in Australia is largely performed by design engineers within OEM environments, reliability engineering is embedded within operational asset management teams across multiple sectors. The consensus view was that the qualification should centre on the Reliability Engineer role, with testing concepts included as electives for specialised contexts.

The Missing Middle in Engineering Capability

The work reaffirmed the existence of a systemic gap between trade qualified technicians and degree qualified engineers. Trade roles focus on task execution, while university engineering programs emphasise design and theory. Neither provides a clear pathway into applied professional roles that require advanced diagnostic capability, analytical decision making, lifecycle planning and operational risk assessment. The Reliability Engineer occupies this critical middle tier. The

Vocational Degree provides the structured pathway needed to support entry into this role and to build a sustainable workforce in industries that rely on complex, interconnected equipment.

Growing Importance of Asset Management and Cross Sector Relevance

Asset management has become central to organisational performance across sectors. However, workforce development has evolved inconsistently, driven by internal company efforts rather than national coordination. Many existing training pathways are non-accredited or proprietary. Consultation emphasised that a nationally recognised qualification is essential to establish coherent and portable career pathways. The functional analysis validated that the capabilities required for reliability engineering are highly transferable and relevant across critical minerals, clean energy, electrified mobile fleets, hydrogen technologies, defence sustainment, agriculture and advanced manufacturing. This reinforces the national significance of the qualification.

Professional Recognition and Accreditation Requirements

Stakeholder feedback confirmed that professional accreditation through Engineers Australia is essential to the qualification's credibility and international comparability. The functional analysis has been mapped to the Stage 1 Competency Standards for Engineering Technologists to ensure alignment with the Sydney Accord and global practice. This supports progression to AQF Level 8 and 9 programs and enables career mobility into Professional Engineer pathways.

Industrial Relations and Workforce Classification

Consultations highlighted the need for structured engagement with unions, employer groups and workforce representatives to ensure recognition of the role within enterprise agreements. Feedback confirmed that existing awards do not need to change to accommodate the qualification but that enterprise agreements will need to incorporate recognition of technologist level roles to maintain consistency, avoid inequitable outcomes and preserve organisational flexibility. These discussions have provided clarity that the Vocational Degree strengthens existing pathways rather than displacing them.

Educator Capability and System Readiness

Stakeholders emphasised the importance of ensuring educator capability, academic governance and quality assurance structures that align with higher level delivery. Feedback confirmed that applied engineering within VET is uniquely well placed to lead implementation, due to the high proportion of educators who hold postgraduate or doctoral qualifications alongside the mandated VET teaching credential. The challenge is ensuring that regulatory and funding systems recognise this capability and support provider readiness.

Reliability engineers function as the connective tissue in complex systems, ensuring that design, operations, and maintenance align to achieve resilience, safety, and efficiency.

National and Jurisdictional Context

The Workforce Demand and Skills Gap

The Australian labour market continues to experience sustained demand for advanced technical and engineering capability, driven by large-scale infrastructure, clean-energy transition, defence modernisation, and advanced manufacturing growth. Within these domains, the need for professionals skilled in reliability, testing, and assurance of complex systems has accelerated sharply. Across the data sources analysed, including Jobs and Skills Australia (JSA) labour-market insights, Engineers Australia job-vacancy reports, Australian Bureau of Statistics (ABS) Labour Force Surveys, and targeted industry submissions from AUSMASA partners (Advanced Manufacturing Growth Centre (AMGC), Ai Group, Defence WA), a consistent pattern emerges. The national workforce is constrained not only by the number of workers but by the shortage of mid-level, applied professionals able to integrate data-driven diagnostics, systems engineering, and reliability practice in operational environments.

The evidence confirms that the Reliability Engineer function sits at the heart of the “missing middle” identified in AUSMASA Phase 1. Current qualifications, whether trade-based, proprietary or university engineering degrees, do not adequately meet the skills profile required for these roles.

This section combines national workforce-demand indicators, sectoral trends, and job-advertisement evidence to define the scale and character of the skills gap that the proposed AQF Level 7 Vocational Degree is designed to address.

National Workforce and Vacancy Trends

The ABS Labour Force Survey (September 2025) reported employment at 14.65 million and unemployment at 4.3%, indicating overall market strength (ABS 2025). However, unfilled vacancies remain persistently high, with 214,600 online job advertisements recorded by JSA in December 2024, around 17% lower than 2023 but still well above pre-pandemic levels.

JSA’s Occupation Shortage Report (March 2025) found a national fill-rate of 69.7%, meaning almost one-third of advertised positions experienced recruitment difficulty. Engineering, technical, and maintenance roles ranked among the most difficult to fill. Engineers Australia (EA) recorded engineering vacancies 16.8% higher than the 2006 baseline and demand growing at three times the rate of the general workforce.

The AUSMASA Job-Advertisement Scan (Aug 2025) identified more than 2,400 vacancies nationally referencing reliability, condition-monitoring, asset-integrity, or testing responsibilities. Roughly 40% of these were within mining and resources, 25% in manufacturing and advanced industries, and the remainder across energy, defence, transport, and infrastructure. Titles such as Reliability Engineer, Asset Health Engineer, Testing Engineer, Condition-Monitoring Specialist, and Maintenance Strategy Analyst appeared repeatedly, underscoring the cross-sector nature of demand.

Sector-Specific Demand and Skill-Gap Patterns

Resources and Mining

Major miners and Mining, Equipment, Technology and Services (METS) companies report continuing shortages of reliability and maintenance engineers able to apply predictive analytics, failure-mode analysis, and digital condition monitoring. Industry consultations (AUSMASA 2025; MCA submission) confirmed that tradespeople often transition informally into reliability roles but lack structured education at the applied-professional level. Automation, remote operations, and data-rich plant environments are creating new testing and assurance requirements that existing trade or university pathways do not cover.

Energy, Renewables, and Critical Minerals

National strategies such as the National Battery Strategy 2024 and Hydrogen Strategy 2024, forecast tens of thousands of new technical jobs in storage, hydrogen, and electrified mining fleets. Each requires applied professionals capable of ensuring reliability and safety across battery, hydrogen, and electrical systems. Testing and reliability engineers are central to commissioning, validating, and sustaining these assets. JSA identifies electrical and industrial engineers among the top shortage categories (JSA 2025).

Defence and Sovereign Capability

Defence WA, Ai Group, and the Advanced Manufacturing Growth Centre (AMGC) submissions to Commonwealth's Defence Industry Workforce and Skills Review (2023–2024) highlight acute shortages in systems-assurance, reliability, and testing disciplines underpinning AUKUS, shipbuilding, and aerospace programs. Defence's Industry Capability Report (2024) notes that lifecycle assurance, through-life support, and verification and validation are emerging critical skills. These map directly to the proposed degree's functions in test planning, data analysis, root-cause investigation, and standards compliance.

Advanced Manufacturing and Process Industries

AMGC (2024) reports that over 70% of Australian manufacturers cite difficulties recruiting engineers with automation, diagnostics, and quality-assurance expertise. Reliability and testing engineers are required to integrate predictive maintenance with digital production systems. Randstad benchmarking shows engineering and maintenance vacancy rates double the global average. Employers also note deficits in cross-disciplinary communication, systems thinking, and data-analysis, which are competencies central to the AUSMASA qualification.

Infrastructure and Transport

Large civil-infrastructure projects and transport-digitalisation programs rely on verification and reliability regimes similar to those in heavy industry. EA data show civil and infrastructure engineering representing almost 40% of total engineering vacancies. Reliability and testing capability, particularly in control systems, sensors, and maintenance analytics, is increasingly embedded in rail, ports, and construction technology projects.

Nature of the Skills Gap

The absence of a defined applied-professional pathway creates inconsistency in practice, productivity loss, and reliance on imported expertise. Stakeholder feedback (EA 2025; AUSMASA Discipline Panel) indicates that up to 60% of reliability-type roles are filled by practitioners without discipline-specific qualifications, relying instead on vendor or overseas certification.

Table 3: Skills Gaps

Level	Typical capability	Gap identified
Trades / Technician (AQF 4–6)	Maintenance, repair, instrumentation, routine testing	Limited analytical, data, and systems-integration capability
Applied Professional (Target AQF Level 7)	Systems diagnostics, reliability analysis, testing, asset strategy, compliance, reporting	No formalised qualification pathway; learning ad-hoc or employer-specific
Professional Engineer (AQF 8+)	Design, modelling, theoretical systems engineering	Often removed from operational reliability context

Capability Themes

Analysis of national workforce datasets and employer consultations reveals several converging themes that define the emerging capability profile required of Reliability Engineers. The rapid adoption of the Industrial Internet of Things (IIoT), sensor technologies, and predictive analytics has created strong demand for professionals who can interpret complex performance data and translate it into actionable operational strategies. These roles increasingly serve as the link between design intent and operational reality, ensuring that systems meet performance, safety, and sustainability objectives through effective lifecycle assurance and systems integration.

The growing emphasis on compliance with international and Australian standards, such as International Organization for Standardisation (ISO) 55000, IEC 61508, and Australian/New Zealand Standards (AS/NZS) ISO 14224, has elevated the importance of engineers who possess advanced competence in testing, validation, and risk-based assurance. Employers consistently report that many graduates lack the contextual experience and applied judgment required for immediate workplace contribution, underscoring the need to embed structured work-integrated learning and applied projects at the AQF Level 7 level.

Finally, Jobs and Skills Australia data highlight persistent regional shortages and continued gender imbalance within technical fields, emphasising the importance of designing flexible and inclusive qualification pathways that can attract a more diverse and regionally distributed cohort of learners.

Implications for Workforce Planning

Persistent shortages in reliability functions present a growing national capability risk, with direct implications for productivity, safety, and operational continuity across the mining, energy, and defence sectors. These gaps limit Australia’s ability to sustain complex industrial systems and constrain the rollout of new technologies essential to national competitiveness and resilience. Addressing this deficit, particularly within the mid-career workforce identified as the “missing middle,” represents a significant economic opportunity.

Developing structured pathways into applied professional roles can deliver measurable productivity gains through reduced equipment downtime, increased asset utilisation, and accelerated technology adoption. The evidence collected through AUSMASA's co-design process confirms the need for training that combines theoretical depth with applied, work-based learning. The proposed industry-led AQF Level 7 Vocational Degree embodies this model by producing graduates capable of operating autonomously in reliability and testing environments.

Furthermore, the qualification aligns closely with the objectives of the Working Future White Paper (2024) and the National Skills Agreement (2023), directly supporting the national agenda to build a highly skilled, industry-responsive workforce underpinning Australia's energy transition, sovereign capability, and advanced manufacturing ambitions.

The combination of workforce data and evidence confirms that Australia's economy is constrained by a shortage of applied professionals skilled in testing, diagnostics, and reliability engineering. The gap is systemic, spanning sectors, regions, and qualification levels and cannot be bridged by existing trade or university pathways alone. National strategies consistently emphasise the need for roles that integrate theory, technology, and operational practice. The proposed AQF Level 7 Vocational Degree in Reliability Engineering directly responds to this need, providing a structured, accredited pathway to build the applied professional layer essential for Australia's industrial resilience and clean-energy future.

OSCA / Workforce Data

Reliability Engineer functions are represented inconsistently across Australia's official occupational classifications and workforce datasets, creating challenges for accurate national workforce measurement and planning. Analysis of the Occupation Standard Classification for Australia (OSCA 2024 v1.0), legacy Australian and New Zealand Standard Classification of Occupations (ANZSCO) groupings, Jobs and Skills Australia (Labour Market Insights) profiles, and ABS Labour Force releases reveals that these roles are currently dispersed across several engineering and technician categories rather than recognised as distinct occupations. This fragmentation limits visibility of the reliability workforce and constrains the ability to quantify supply, demand, and career progression pathways with precision.

Under OSCA, emerging engineering roles are better captured than under ANZSCO, providing an improved framework for recognising the applied professional functions central to reliability practice. However, until full implementation of OSCA across government and industry datasets is achieved, workforce estimates will continue to rely on aggregated categories that obscure the specific contribution of reliability-focused professionals. The transition between ANZSCO and OSCA represents a critical juncture and offers the opportunity to formally recognise Reliability Engineers as key enablers of Australia's industrial capability, while also requiring deliberate alignment of coding, reporting, and labour market data collection to ensure the workforce is measured accurately and consistently across national systems.

OSCA replaces ANZSCO

In December 2024, the ABS released OSCA 2024 v1.0, replacing ANZSCO for use in Australia and establishing a new maintenance strategy and tools (including an OSCA Coder) to improve the coding and updating of occupation titles to include emerging roles. OSCA provides correspondences to ANZSCO and is intended to be updated more regularly than past practice.

Engineers Australia notes OSCA introduces expanded and refined engineering role definitions compared with ANZSCO, reflecting contemporary practice and addressing stakeholder feedback gathered during the review. For engineering, this is expected to improve recognition of specialist functions that previously sat “not elsewhere classified” (NEC) under ANZSCO.

However, during the transition, many public labour market dashboards and historical series still publish by ANZSCO categories. For example, Jobs and Skills Australia’s occupation profiles explicitly state that displayed data for some roles remain mapped to ANZSCO 2013 v1.3 (pending full migration). The implications are two-fold; reliability/testing functions can be fragmented across several ANZSCO codes; and trend comparability requires careful crosswalks between OSCA and ANZSCO.

Representation of Reliability and Testing Roles in Current Occupational Classifications

Under ANZSCO, reliability/testing activities have historically been spread across several classifications and codes.

Table 4: Reliability/Testing Activities Spread Across ANZSCO

ANZSCO Code	Activities included
2335 Industrial, Mechanical and Production Engineers	Reliability, asset performance, maintenance strategy
2333 Electrical Engineers 2334 Electronics Engineers	High-voltage systems, controls, instrumentation, testing
2339 Other Engineering Professionals	Includes Engineering Technologist, Safety Engineer, Corrosion Engineer, and a small number of testing-related titles (e.g., Test and Activation Engineer (Naval Shipbuilding)) and a “catch-all” masking reliability/testing as a distinct function.

With OSCA, the ABS has created a refreshed structure with updated titles and indexes and published correspondence files to map ANZSCO to OSCA. This provides a pathway to improve visibility of reliability/testing roles as OSCA is adopted across data custodians and administrative systems.

National Workforce Estimates and Employment Trends

As Reliability Engineering is not yet identified as a discrete occupation within publicly available OSCA datasets, workforce analysis relies on indicative estimates derived from adjacent engineering and technical occupation groups. Data triangulated from Jobs and Skills Australia (JSA) Occupation Profiles, still based on ANZSCO classifications, and the Australian Bureau of Statistics (ABS) Labour Force series provides the most reliable current representation of employment levels and trends relevant to reliability, testing, and asset-assurance functions across Australian industry.

Table 5: ANZSCO Employment Trends

ANZSCO Code	Details:
2333 Electrical Engineers	• Employed: (approx.) 33,200 • Annual employment growth (approx.) 2,800 (trend figures in JSA profile). • This cohort captures a portion of reliability work in power and industrial systems.
2334 Electronics Engineers	• Employed (approx.) 6,200 • JSA notes data are still displayed under ANZSCO 2013 v1.3. • Testing/validation and controls specialists sit here, particularly for OEMs and defence.
3123 Electrical Engineering Draftspersons & Technicians	• Employed (approx.) 16,800 (combined)
312312 Electrical Engineering Technicians	• These technician roles undertake testing, data collection, calibration and condition-monitoring activities that support reliability engineers.

At the macro level, the ABS Labour Force (Latest Release) shows the September 2025 unemployment rate rising to 4.5% with participation at 67.0%, indicating a cooling but still historically tight market. Engineering roles remain comparatively hard to fill in JSA's shortage analysis. Detailed industry employment baselines feeding JSA dashboards are sourced from ABS Labour Force data.

Taken together, these signals suggest that the addressable population working in reliability functions is spread across several engineering professional and technician groups, with material overlap into industrial/mechanical, electrical/electronics, and "other engineering professionals" families. As OSCA adoption broadens, the expectation is for improved granularity in published series.

Data Architecture and Transitional Limitations Affecting Workforce Estimates

The transition from the ANZSCO to the new OSCA has introduced a temporary period of inconsistency across national datasets. Although OSCA has been formally adopted as the national standard, many public data outputs, such as Labour Market Insights (LMI) occupation profiles and several administrative systems, remain based on ANZSCO pending system upgrades and concordance implementation. This transitional overlap restricts the precision of workforce counts for reliability and testing engineers, as these roles are not yet coded as a discrete occupational cluster.

Under the legacy ANZSCO framework, reliability-focused roles have historically been subsumed within the broad category 2339 Other Engineering Professionals, specifically under 233999 Engineering Professionals Not Elsewhere Classified (NEC). The use of this catch-all grouping has diluted the visibility of reliability and testing functions within statistical reporting and complicated attempts to identify sector-specific employment trends.

The OSCA maintenance model seeks to address this limitation by introducing more frequent updates and richer title indexing through the OSCA Coder, enabling finer differentiation of emerging engineering specialisations in future datasets.

In addition to classification challenges, variability in data sources contributes to discrepancies in workforce estimates. Jobs and Skills Australia (JSA) profiles integrate information from the ABS Labour Force and complementary sources, but each uses different reference periods and measurement conventions. The *ABS Labour Force, Australia* release provides aggregate national employment figures, while *Labour Force, Detailed* underpins the industry and occupation baselines used by JSA. Aligning reporting units, such as seasonally adjusted versus trend data and quarterly versus four-quarter averages, is therefore essential to ensure consistency and accuracy when interpreting workforce estimates for reliability and testing functions.

Enhanced Measurement of Reliability Engineering Roles Under OSCA

The introduction of OSCA provides significant improvements in the accuracy and consistency of occupational measurement for reliability and testing engineers. Its updated title index and coder rules enable more precise classification of job titles captured through surveys, human resources, payroll, and administrative systems, reducing the long-standing misclassification of these roles into generic “Not Elsewhere Classified” (NEC) categories. The new maintenance strategy also establishes a regular update cycle, allowing emerging occupations, such as battery systems reliability and hydrogen systems testing, to be recognised far more rapidly than under the previous ANZSCO framework. Furthermore, the publication of official correspondence files between OSCA and ANZSCO facilitates the creation of bridging series and historical back-casting, ensuring continuity in labour-market trend analysis while progressively improving data specificity. As Jobs and Skills Australia and other data custodians complete their migration to OSCA, reliability and testing functions will be represented with greater fidelity across multiple sectors, including resources, energy, defence, manufacturing, and transport, allowing workforce estimates to be more accurately linked to industry employment profiles derived from the ABS Labour Force, Detailed series.

Implications for the AUSMASA Phase 2 report

The transition between ANZSCO and OSCA, together with the absence of occupation-specific data for reliability engineers, has several implications for workforce analysis in Phase 2 of the project. In the short term, workforce estimates rely on proxy occupational families, such as electrical, electronic, industrial, and mechanical engineers, along with engineering technicians, to approximate demand and pipeline capacity. These categories provide an indicative baseline for planning until OSCA is fully integrated across JSA, Labour Market Insights, and ABS datasets, at which point counts can be refined to OSCA-specific reliability groupings.

The reliance on broad ANZSCO “Not Elsewhere Classified” categories is likely to have masked a substantial proportion of the actual demand for reliability-focused professionals. As OSCA’s enhanced title index is progressively implemented, this hidden demand should become visible, reinforcing the rationale for establishing a dedicated AQF Level 7 applied-professional pathway in reliability engineering. For methodological consistency and transparency, the Final Report references both OSCA, as the current national standard, and ANZSCO-based JSA data, acknowledging the transitional nature of the occupational classification framework during this reporting period.

Alignment with National Strategies and Plans

The proposed AQF Level 7 Vocational Degree in Reliability Engineering aligns with and advances major Australian national strategies and plans. The AUSMASA Crosswalk to National Strategies (Appendix 4) provides structured mapping between the proposed qualification and the priorities of national frameworks including the National Hydrogen Strategy (2024), National Battery Strategy (2024), National Electric Vehicle Strategy (2023–24), the Working Future Employment White Paper (2023), the Australian Skills Guarantee (2024), and associated state and Commonwealth policy initiatives relating to critical minerals, defence capability, and regional development.

The purpose of this mapping is twofold. It demonstrates that the qualification responds directly to identified policy drivers and workforce priorities and provides evidence that it establishes a sustainable applied-professional pathway supporting Australia's clean-energy transition and sovereign capability agendas.

National Policy Alignment and Strategic Relevance

Australia's industrial and workforce landscape is undergoing significant transformation. National strategies now emphasise the decarbonisation of heavy industry, local manufacturing of advanced technologies, and the integration of automation and digital assurance within production systems. The Crosswalk to National Strategies confirms that the Reliability Engineer role functions as a cross-cutting capability across these strategic domains, enabling the reliability, performance, and safety assurance required to achieve national goals.

The design of the proposed Vocational Degree directly aligns with the following strategic frameworks.

National Hydrogen Strategy (2024)

The 2024 revision of the National Hydrogen Strategy positions hydrogen as a cornerstone of Australia's net-zero economy, forecasting tens of thousands of new jobs in production, storage, and transport. The Crosswalk to National Strategies identifies hydrogen systems as a priority context for reliability roles, highlighting the need for applied professionals capable of managing hazard analysis, safety-integrity verification, and lifecycle assurance of hydrogen infrastructure. The proposed qualification embeds this capability through electives in hydrogen systems safety, functional safety standards and work-integrated learning within emerging hydrogen precincts.

National Battery Strategy (2024)

The National Battery Strategy seeks to establish a globally competitive battery manufacturing and recycling ecosystem. The Crosswalk to National Strategies links this directly to reliability-testing functions across battery management systems (BMS), cell and pack diagnostics, thermal performance validation, and failure-mode analysis. These tasks mirror the competencies outlined in the functional analysis for the Reliability Engineer role. Through electives in battery systems reliability, diagnostics, and condition monitoring, and WIL placements in Battery electric Storage Systems (BESS) or downstream manufacturing facilities, the qualification operationalises the Strategy's workforce objectives.

National Electric Vehicle Strategy (2023–24)

The National Electric Vehicle Strategy emphasises development of a skilled workforce to support rapid Electric Vehicle (EV) adoption, charging-infrastructure deployment, and high-voltage systems maintenance.

The Crosswalk to National Strategies highlights synergies with mining-fleet electrification and autonomous vehicle systems. The proposed Vocational Degree directly addresses these needs through content on diagnostics, commissioning, system reliability, and digital fault analysis, enabling graduates to support electrified transport and logistics in both civil and mining environments.

Working Future – The Employment White Paper (2023)

The Working Future White Paper outlines the national framework for building a highly skilled, inclusive, and regionally distributed workforce. It promotes work-integrated, flexible pathways and the establishment of TAFE Centres of Excellence. The Crosswalk to National Strategies notes that the proposed Vocational Degree embodies these principles by combining academic rigour with structured WIL placements and regional delivery models. The proposed qualification's modular structure and recognition of prior learning (RPL) processes also align with Working Future objectives for mid-career upskilling and mobility between sectors.

Australian Skills Guarantee (2024)

The Australian Skills Guarantee mandates participation targets for apprentices, trainees, and women on major Commonwealth-funded projects (DEWR 2024). As noted in the Crosswalk to National Strategies, embedding work-placement components within the proposed degree allows participating employers to count student hours toward these targets. This provides a direct incentive for industry engagement while contributing to diversity and inclusion objectives.

Critical Minerals Strategy (2023) and Defence Industry Capability Plan (2024)

The Critical Minerals Strategy (Department of Industry, Science and Resources (DISR) 2023) and Defence Industry Capability Plan (Defence WA 2024) highlight the need for sovereign capability in asset integrity, testing, and certification across mining, processing, and advanced manufacturing supply chains. The Crosswalk to National Strategies explicitly links reliability engineering to these national security and economic resilience priorities. Graduates of the proposed qualification will be equipped to perform failure-mode analysis, root-cause investigation, and compliance testing for high-integrity systems, supporting both critical-minerals processing plants and defence manufacturing programs.

Contribution to National Capability Outcomes

Across all referenced strategies, the Crosswalk to National Strategies demonstrates that the Reliability Engineer role provides an operational bridge between design, production, and assurance.

Table 6: National Capability Outcomes Contribution

Contribution	Detail
Energy transition readiness	Delivering a workforce capable of testing and assuring hydrogen, battery, and electrified systems throughout their lifecycle.
Sovereign industrial capability	Strengthening domestic expertise in reliability and systems assurance, reducing dependence on imported technical services.
Regional workforce participation	Supporting equitable access through regional WIL placements and flexible study modes, consistent with Working Future principles
Regulatory and standards compliance	Embedding knowledge of ISO, IEC, and AS/NZS reliability and testing standards across energy and manufacturing sectors.
Workforce diversification	Enabling participation of mid-career and under-represented groups via modular, RPL-enabled entry pathways.

Policy Coherence and Implementation Considerations

The integration of the Crosswalk to National Strategies findings into the proposed qualification design ensures strong consistency between education outcomes and national industrial strategies. The proposed qualification incorporates electives in hydrogen systems, battery diagnostics, and high-voltage reliability that directly reflect the priority skill clusters identified in the crosswalk, ensuring graduates develop capabilities aligned with national clean-energy and manufacturing objectives.

Work-integrated learning is structured to mirror the implementation mechanisms of the Australian Skills Guarantee and the Working Future White Paper, embedding learners within active industry projects and enabling them to contribute to workforce targets on major national initiatives.

In addition, the qualification's performance measurement framework is aligned with OSCA occupational categories, allowing the tracking of graduate outcomes against the workforce metrics referenced in national strategies and strengthening evidence-based policy reporting. Ongoing collaboration with key stakeholders, including Department of Climate Change, Energy, the Environment and Water (DCCEEW), DISR, DEWR, Defence WA, and TAFE Directors Australia, will maintain relevance and ensure that the qualification remains responsive to evolving government priorities and industry requirements.

The mapping confirms that the proposed Vocational Degree in Reliability Engineering is deeply embedded within Australia's national strategic framework. The proposed qualification delivers tangible capability uplift aligned to the country's clean-energy, manufacturing, and sovereign-capability agendas.

By integrating reliability, testing, and lifecycle assurance into a nationally recognised applied-professional pathway, the degree transforms policy intent into workforce capacity and capability, ensuring that Australia possesses the skilled professionals necessary to implement and sustain the complex systems underpinning its industrial and energy future.

Broader Applicability of the Reliability and Testing Engineer Roles

The functions identified through the functional analysis have broad applicability across Australia's major industrial sectors. While mining has been the initial focus of this project, the underlying skills, knowledge and analytical frameworks that define reliability and testing engineering are essential to the operation, assurance and optimisation of complex systems in energy, transport, manufacturing, defence and emerging industries such as hydrogen production and critical minerals processing.

Energy and Utilities

In the energy sector, reliability engineers are essential to ensuring the stability, efficiency, and resilience of Australia's power systems as the grid transitions to high shares of variable renewable energy. The Australian Energy Market Operator's *Integrated System Plan* and *Engineering Framework* identify reliability, testing, and validation as critical engineering functions to maintain system security during this transition. Reliability engineers optimise asset performance across renewable generation, firming, and storage, applying predictive maintenance, diagnostics, and failure modelling to prevent costly outages. Testing engineers verify the performance and interoperability of new technologies such as hydrogen electrolysers, battery energy storage systems (BESS), and high-voltage transmission infrastructure. Together, these roles underpin the resilience of Australia's energy networks and support the nation's commitment to achieving net-zero emissions.

Defence, Space, and Aerospace

Reliability and testing engineers are equally vital in the defence and aerospace sectors, where assurance, certification, and lifecycle sustainment determine national readiness and sovereign capability. Defence's *Industry Development Strategy* and AUKUS-related programs highlight the need for specialists capable of managing through-life reliability across naval, aerospace, and digital systems. Testing and evaluation (T&E) are formalised as mission-critical disciplines within these programs. Reliability engineers contribute to the sustainment and predictive assurance of platforms, while testing engineers manage verification, validation, and systems integration processes required for certification and safety. The same competencies extend to Australia's emerging civil space sector, where robotic and autonomous system reliability is critical to mission success and the protection of national assets.

Advanced Manufacturing and Process Industries

Australia's advanced manufacturing and processing sectors are increasingly driven by Industry 4.0 technologies, automation, robotics, digital twins, and data analytics. In these environments, even brief equipment failures can cause production losses in the millions. Reliability engineers lead initiatives in predictive maintenance, condition monitoring, and continuous improvement, reducing downtime by up to 50% and maintenance costs by 25%, as evidenced in international benchmarking. Testing engineers ensure that new processes, prototypes, and production systems meet design intent and comply with rigorous performance and safety standards. Their work supports lean manufacturing, circular economy models, and ESG compliance by embedding reliability into lifecycle management and product validation.

Transport, Freight, and Infrastructure

Across transport networks, reliability and testing engineers play key roles in ensuring the safety and continuity of Australia's increasingly digital infrastructure. Projects such as the Australian Rail Track Corporation's *Advanced Train Management System* and Sydney Trains' *Digital Systems Program* rely on sophisticated verification and validation regimes to assure system reliability. In freight and logistics, predictive maintenance and condition monitoring of locomotives, ports, and automated handling systems improve efficiency and reduce disruptions to supply chains. Reliability and testing engineers provide the technical assurance required for these systems to operate safely and reliably across extended lifecycles.

Emerging Industries: Hydrogen, Critical Minerals, and Renewables

The rapid expansion of hydrogen production, critical minerals processing, and renewable energy technologies creates a new demand for professionals with cross-sector reliability and testing capability. The *National Hydrogen Strategy*, *National Battery Strategy*, and *Critical Minerals Prospectus* each highlight the importance of ensuring performance, safety, and lifecycle assurance in emerging clean energy technologies. Reliability and testing engineers will play a key role in commissioning, testing, and sustaining these systems, integrating new technologies into existing industrial frameworks while maintaining compliance with evolving standards.

National and Economic Impact

The transferability of these roles across sectors means that the proposed Vocational Degree will not only meet mining workforce needs but will also underpin broader national capability in engineering assurance. The qualification establishes a common foundation of practice that allows professionals to move between industries while maintaining a consistent standard of competence. For employers, this translates into improved productivity, reduced downtime, enhanced safety, and more effective integration of new technologies. For Australia, it strengthens sovereign capability, reduces reliance on imported expertise, and builds a future-ready workforce aligned with national priorities in energy transition, defence capability, and advanced manufacturing.

Summary of Data Sources and Identified Evidence Gaps

The Evidence Map – Mining (Appendix 5) consolidates evidence collected through Phase 1 and Phase 2 of the AUSMASA Vocational Degree Project. Its purpose is to verify the workforce rationale, industry priorities, and educational design imperatives underpinning the proposed AQF Level 7 Vocational Degree in Reliability Engineering, using mining as the lead sector while incorporating relevant insights from the automotive domain.

The evidence demonstrates a robust, multi-source foundation supporting the proposed qualification's development. Across datasets, consultation records, and international benchmarks, the map reveals converging indicators of workforce demand, educational misalignment, and policy opportunity. It also highlights several data and knowledge gaps that will inform the focus of subsequent project phases.

Workforce Demand and Skills Shortages

Evidence from the AUSMASA Phase 1 and 2 activities and associated job-role analyses identifies persistent national shortages in roles directly connected to reliability functions, particularly reliability engineers, metallurgical and geotechnical technicians, mine planners, and automation specialists.

Employers across the mining value chain report significant difficulty sourcing personnel with combined competence in predictive maintenance, digital diagnostics, systems integration, and data analytics.

The map also notes strong parallels between the mining and automotive sectors. The electrification of heavy mobile plant mirrors developments in electric-vehicle manufacturing, generating cross-industry demand for professionals skilled in high-voltage safety, hydrogen systems, and battery-management diagnostics. These overlapping requirements validate the transferability of the proposed qualification across industries.

While the strength of evidence for workforce demand is high, the map identifies the need for further quantitative modelling to refine projections for emerging cross sector occupations, particularly those associated with the electrification of mobile plant, electric fleet systems and hydrogen technologies.

Industry Perspectives and Priorities

Consultation findings captured in the Evidence Map emphasise employers' preference for vocationally grounded, workplace-integrated qualifications. Mining companies overwhelmingly support stackable and modular pathways that allow experienced technicians to progress into applied professional roles while maintaining employment.

Employers indicated that traditional bachelor's programs provide solid theoretical foundations but insufficient practical exposure, whereas trade and diploma-level qualifications do not extend far enough into diagnostic reasoning or systems thinking. The proposed Vocational Degree's emphasis on hands-on capability is therefore strongly aligned with industry priorities.

The evidence also reflects the shared expectations of automotive stakeholders, who stress the importance of skills in electrification, hydrogen propulsion, and digital fault-finding, which are all highly relevant to mining's transition toward autonomous and low-emission operations.

The strength of this evidence is high; however, further testing is required to gauge employers' long-term willingness to invest in work-integrated learning partnerships and co-designed qualification delivery.

Current Training and Education Provision

The map highlights a structural gap in the mining training ecosystem. Most accredited training ceases at the trade or diploma level, while higher-level technical education is dominated by academic engineering degrees that lack applied workplace integration. Upskilling is largely achieved through Original Equipment Manufacturer (OEM) short courses, which are product-specific, non-portable, and rarely credit-bearing within the AQF.

Advanced Diplomas remain under-utilised, and existing bachelor programs show significant deficiencies relative to workplace needs, particularly in applied diagnostics, digital data use, and system integration for predictive maintenance and automation. Few programs address the emerging requirements of hydrogen systems, battery operations, or autonomous haulage. Moreover, work-integrated learning remains limited, reducing graduate readiness for field deployment.

The evidence supporting these findings is rated strong; however, the map identifies the need for a systematic audit of OEM training to explore pathways for accreditation or recognition within the new AQF Level 7 Vocational Degree specification.

International Models and Benchmarks

International evidence cited in the map confirms the viability of an applied, work-integrated degree model. Germany and Switzerland's Dual Studies programs and the UK's Higher Apprenticeships demonstrate the effectiveness of structured WIL in producing industry-ready graduates with both academic and technical competence.

Comparable applied-engineering programs in Canada, particularly in electric-vehicle and hydrogen systems, illustrate transferable lessons for the Australian context. These models validate AUSMASA's co-design approach and support adaptation of automotive-style specialisations, such as EV and hydrogen diagnostics, to mining and industrial applications.

The evidence is assessed as strong, though the report recommends piloting these international principles within Australian mining operations to test feasibility and contextual alignment.

Policy and Regulatory Settings

The map notes that reliability engineers currently lack formal occupational recognition under ANZSCO, constraining visibility in workforce planning and migration frameworks. This gap strengthens the case for formalising the role through the new OSCA codes.

It further observes that existing AQF and industrial-relations frameworks provide limited flexibility for mid-career progression. The AQF reform endorses outcome-based Level 7 qualifications, creating an opportunity nationally.

In both mining and automotive contexts, electrification and hydrogen systems are highly regulated under WHS and electrical-licensing regimes. The map therefore identifies a pressing need to align training outcomes with relevant safety and licensing requirements to ensure portability and compliance across sectors.

This evidence is rated moderate, with follow-up engagement required with Engineers Australia, JSA, ABS, and state safety regulators to harmonise classification and licensing recognition.

Learner Perspectives and Pathways

The learner evidence summarised in the map is derived primarily from provider and employer consultations, with limited direct learner input. Nevertheless, it identifies clear preferences among mid-career mining workers for modular, RPL-enabled pathways that accommodate FIFO rosters and block-release delivery. Participants expressed concern that traditional exam-heavy assessment models disadvantage practical learners and those with neurodiverse profiles.

Demand exists for qualifications that recognise experience, provide clear articulation between vocational and higher-education levels, and are portable across sectors such as mining, manufacturing, and transport.

The strength of this evidence is moderate; future phases will require targeted learner surveys and focus groups to validate assumptions and inform curriculum design.

Economic and Workforce Trends

The Evidence Map situates workforce demand within broader economic transitions. The mining sector is undergoing profound transformation through automation, artificial intelligence, and the electrification of operations. The expansion of the critical-minerals sector, coupled with national net-zero commitments, has intensified the need for professionals capable of managing reliability, testing, and lifecycle assurance across increasingly complex asset systems.

JSA's Skills Priority List identifies 11 of the 20 most in-shortage mining occupations as engineering-related, including reliability engineers and geoscientists. Automotive data mirror these findings, with similar shortages in EV and hydrogen-vehicle technicians. Collectively, these trends reinforce the qualification's relevance to national strategies for clean energy, sovereign capability, and productivity.

The evidence strength is high, though the map calls for scenario-based forecasting of electrification and hydrogen adoption rates in mining fleets to refine workforce projections through 2035.

Taken together, the evidence mapped across all domains establishes a compelling case for the creation of a nationally recognised, work-integrated Vocational Degree at AQF Level 7. The data confirm strong, sustained demand for professionals who can combine technical depth with applied diagnostic and reliability expertise. The current training landscape provides no coherent pathway to these roles, leaving employers dependent on informal OEM training and ad-hoc professional development.

International and domestic evidence demonstrates that an integrated model, anchored in work-integrated learning, modular progression, and alignment with industry standards, offers the most effective solution. The map also underscores the need for continued data refinement: improved occupational coding, OEM course mapping, direct learner research, and long-term impact evaluation. Addressing these gaps will ensure the qualification is both evidence-based and policy-aligned, capable of underpinning Australia's industrial transformation across mining, energy, and advanced manufacturing sectors.

The Reliability Engineer – Job Context and the Value Proposition for Business

Engineering Team Structures in Contemporary Workplaces

Engineering, maintenance and operational teams in modern mining environments function as an integrated technical system. Together they provide the full range of capability required to sustain safe, reliable and efficient production. Each layer of the workforce contributes distinctive expertise, yet their effectiveness depends on continuous information flow, shared situational awareness and coordinated technical decision making.

At the operational level, trade assistants, operators and process technicians carry out routine tasks, operate fixed and mobile plant and provide the earliest insights into equipment condition. Their observations, trends and informal diagnostics form the frontline intelligence that informs maintenance and engineering decision making.

Trades and maintenance personnel hold responsibility for the technical work that sustains asset integrity. Mechanical, electrical, instrumentation and fabrication trades conduct inspections, repairs and planned maintenance. Senior tradespeople coordinate small teams and contribute critical practical knowledge that shapes maintenance planning, work quality and early failure detection.

Technical and applied technical roles provide the diagnostic and analytical capability that links field activity with engineering oversight. Planners, condition monitoring technicians, non-destructive testing specialists and asset health centre personnel gather, interpret and communicate asset information to support risk based maintenance strategies, work scheduling and operational decision making. These roles form the closest upstream pipeline into applied professional practice, given their diagnostic, systems and data driven focus.

Applied professional engineering technologist roles occupy a central position in this structure. Reliability engineers, testing and validation engineers, asset performance analysts and maintenance strategy specialists integrate advanced technical knowledge with operational data and engineering judgement. They lead investigations, diagnose system level issues, design improvements and translate field insights into structured strategies that enhance production performance and system resilience.

Professional engineers provide discipline governance, statutory assurance and design authority. They oversee complex modifications, lead high risk investigations and ensure that engineering decisions meet regulatory, safety and performance requirements. Senior engineers extend this responsibility into long term planning, risk management and technical direction for the organisation.

Supervisory and management roles coordinate these functions, align technical and operational priorities, allocate resources and ensure compliance across the workforce. They enable communication between operational, maintenance and engineering teams and ensure that the combined system supports safe and reliable production.

Together these layers form a highly interconnected engineering and maintenance ecosystem. The interdependence of operational observations, trade expertise, diagnostic data, applied technical analysis and engineering governance is fundamental to maintaining asset availability, integrity and performance. See Figure 3.

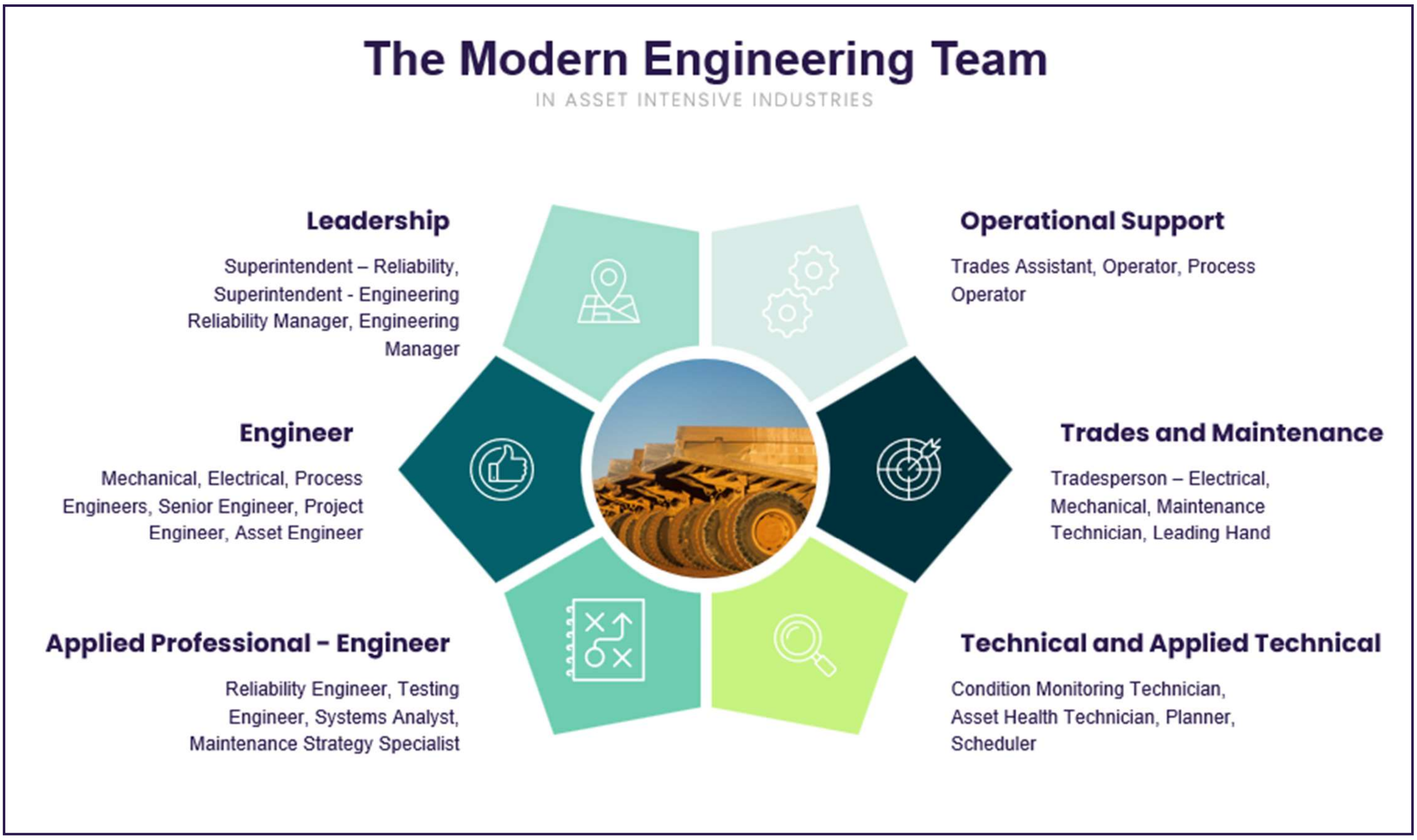


Figure 3 The Engineering Team in a Modern Mining Environment

The Structural Gap in the Workforce and Education System

Consultation across the sector demonstrates a clear misalignment between the workforce structure described above and the qualifications that currently support it. Operational and trade roles are well supported through the vocational education and training system. Engineering roles are well supported through higher education, which prepares graduates for design, governance and statutory functions.

However, the applied professional tier, located between trades and engineers, is poorly supported by existing pathways. Certificate IV and Diploma programs provide limited depth in diagnostics, data interpretation and systems integration, while university degrees often lack applied maintenance, reliability and operational readiness. Stakeholders repeatedly confirmed that this tier requires autonomous technical judgement, integrated systems capability and work based learning that reflects real operational contexts. These expectations are not met by current qualification structures.

This structural gap is the central rationale for a purpose built vocational degree at AQF Level 7, designed specifically to meet the capability requirements of applied professional engineering technologists.

The Strategic Importance of Reliability in Modern Mining

Across asset intensive industries, reliability has become a defining capability for operational performance, safety and sustainability. Mining assets are increasingly cyber-physical and digitally integrated, linking equipment, control systems and operational data across entire sites and supply chains. Failure events now propagate more quickly and with broader consequences, affecting safety, environmental performance, production and reputation. As a result, structured reliability engineering, advanced diagnostics and whole of lifecycle assurance have become essential to meeting national objectives for critical minerals, energy transition and sovereign capability.

Mining operations are being reshaped by automation, remote systems and advanced analytics. Autonomous haulage, remote operations centres and real time sensing are now embedded across major commodities. Organisations such as BHP have introduced centralised maintenance and reliability centres that apply analytics, standardised processes and continuous learning to support site operations. Similar models across the sector demonstrate that testing, verification and system reliability are now core enablers of safe and productive mining.

The role of the reliability engineer has expanded in response to this environment. Reliability engineers apply systems thinking, diagnostics, validation, data analytics and predictive maintenance to understand and improve asset performance. They sit at the intersection of operational practice and engineering governance, translating data into actionable strategies and coordinating improvements that extend asset life, reduce unplanned downtime and enhance operational predictability. These functions are not traditional maintenance tasks nor conventional design responsibilities. They represent applied professional practice requiring both advanced technical knowledge and substantial workplace experience.

Stakeholders consistently emphasised that such capabilities cannot be developed through theoretical study alone. They require structured, work integrated learning in real operational settings and the ability to connect data, diagnostics and engineering principles with field conditions.

Value Proposition of the Vocational Degree for Mining Organisations

The proposed Vocational Degree in Reliability Engineering provides a structured education and development pathway that aligns directly with industry need. It builds a pipeline of applied professionals who can integrate systems knowledge, operational understanding and data analysis to improve asset reliability and performance.

For mining organisations, the value proposition is clear. Graduates will be able to interpret condition monitoring data, conduct root cause and failure mode analyses, validate equipment performance, and translate diagnostic findings into engineering and maintenance strategies. These capabilities strengthen decision making, reduce downtime and support safer, more predictable operations.

The degree also supports workforce renewal by providing a formal progression pathway for experienced tradespeople and technical workers. This improves retention, supports internal mobility and prepares workers for supervisory and technical leadership roles. As automation, electrification and data driven systems become embedded across mining operations, the qualification ensures that the sector has access to professionals who understand both the technology and the operational context required to sustain productivity and safety.

Stakeholder consultation confirmed that this qualification responds not only to immediate workforce shortages but also to a broader structural need for an applied professional engineering tier within Australia's tertiary system.

Career and Educational Pathways

Industry stakeholders described a pathway into reliability engineering that is progressive, experience-based, layered and employer dependent. Employees commonly begin in maintenance or machine health roles, where they develop practical skills in troubleshooting, servicing and collecting performance data. With experience and additional training, they move into asset health roles focused on system diagnostics, root cause analysis and lifecycle optimisation.

Progression into reliability engineering marks a transition to applied professional practice. Reliability engineers interpret trends, coordinate condition monitoring programs and develop improvement strategies and business cases for equipment redesign or replacement. From this point, two progression routes generally emerge. A technical pathway leads to specialist or principal reliability positions in site, regional or corporate teams. A leadership pathway leads to superintendent or manager roles with responsibility for asset performance, maintenance strategy and operational improvement.

The current education system does not align well with this progression. Trade training prepares individuals for early career roles but does not develop the analytical or systems capability required for reliability positions. University engineering degrees provide theoretical knowledge but rarely equip graduates for applied roles embedded in maintenance or asset health teams. The Vocational Degree addresses this mismatch by providing a structured pathway that recognises the strengths of both backgrounds, extending capability into analytics, systems engineering and applied reliability practice.

Major employers confirmed that reliability roles exist across multiple organisational layers, from local site teams through to central, national, and global reliability functions. This vertical integration underscores the scalability of the qualification, which can support entry-level development, professional progression, and leadership preparation for the reliability workforce, providing a consistent benchmark for capability across the workforce.

The Distinctive Role of the Reliability Engineer

Reliability engineers occupy a unique position in Australia's industrial landscape. They work between trade qualified technicians and professional engineers, drawing on the strengths of both groups while filling a function that neither can perform alone.

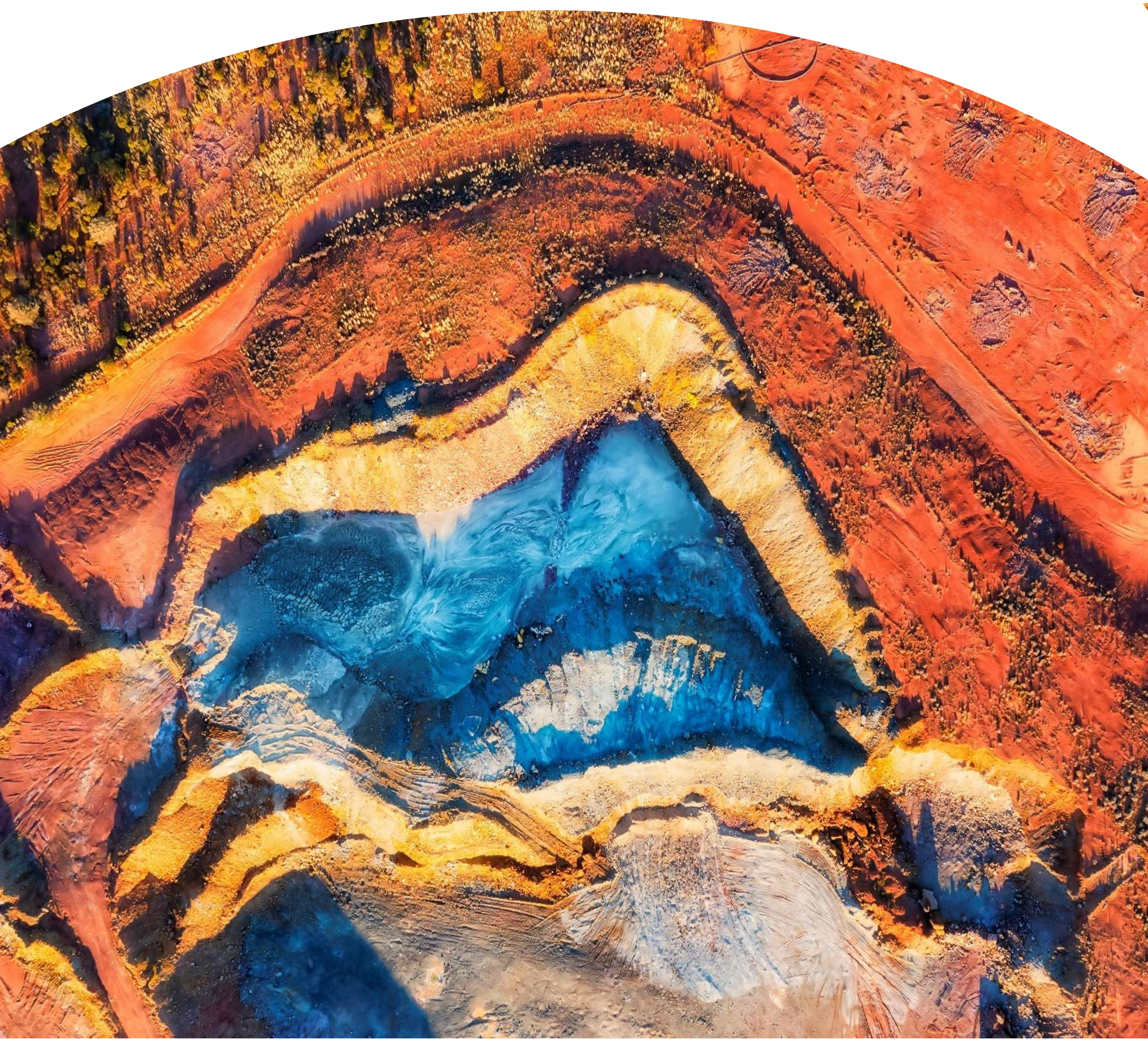
They share with tradespeople a deep engagement with equipment, operating environments and practical constraints. Their work relies on understanding how machinery performs in real conditions and how maintenance practices influence asset health.

They share with professional engineers the capacity to analyse complex systems, apply modelling and statistical tools, interpret datasets and evaluate lifecycle performance. They operate at the point where technical analysis must translate into practical change.

This dual orientation allows reliability engineers to act as integrators and translators within industrial systems, ensuring that design intent, operational realities and maintenance practice align to achieve safe, reliable and efficient production.

Internationally, this role is widely recognised. In North America and Europe, reliability engineering is defined as a specialised field with its own competencies and professional frameworks. In Australia, however, no structured educational pathway or occupational definition exists for this applied professional tier. This gap contributes to workforce inconsistency, variable practice quality and limited career mobility.

By defining the reliability engineer as a distinct applied professional role, the vocational degree provides a clear identity, a supported pathway and a nationally consistent capability standard. This creates long term benefit for industry, the workforce and the national skills system.



Priority Job roles and Applied Professional Outcomes

Overview of the Reliability and Testing Engineer Roles

Reliability and testing engineers occupy a critical applied professional tier across mining, energy, utilities and manufacturing. Although job titles vary by sector, the underlying purpose of these roles is consistent. They apply engineering principles, diagnostic methods and data informed judgement to ensure that complex systems operate safely, predictably and within design intent.

In production environments such as mining and heavy industry, the role is commonly referred to as the reliability engineer. Their work focuses on sustaining asset health, optimising lifecycle performance and reducing unplanned downtime through predictive and condition based maintenance. In research, development and advanced manufacturing environments, the parallel function is the testing engineer, where the emphasis is on validating designs, proving performance and ensuring compliance with engineering and regulatory standards before equipment is deployed into service.

Across both contexts, these professionals work at the intersection of operational practice and engineering analysis. They collaborate with trades, technicians and professional engineers to interpret asset behaviour, diagnose emerging issues and embed reliability considerations into design, maintenance and operational decisions. This dual engagement ensures that field experience and engineering analysis remain connected, strengthening the organisation's overall approach to asset assurance.

Reliability engineers integrate data, systems knowledge and operational insight to support continuous improvement across mechanical, electrical, control and process systems. Testing engineers apply the engineering process in dynamic test environments, adapting conditions and prototype configurations to collect reliable and impartial data that informs design decisions. Together, these roles represent a distinct applied professional capability that blends analytical depth, technical precision and practical engineering judgement. They underpin productivity, safety and sustainability across asset intensive industries and form the core occupational focus of the proposed Vocational Degree.

Functional Model for Reliability and Testing Engineers

To define the scope of these roles and their capability requirements, a detailed functional analysis was undertaken. This analysis identifies the common activities, decision making responsibilities and areas of professional practice shared across reliability and testing roles. The eleven functional areas presented in Table 7 form the basis for qualification design and define the applied professional outcomes expected of graduates.

Table 7: Reliability and Testing Engineer Job Functions

Function	Core Activities	Benefit to the Business
Function 1: Reliability Engineering	Conduct Failure Mode and Effects Analysis (FMEA) to predict failure modes of components and processes. Optimise component and system uptime using reliability-centred maintenance (RCM).	Improves equipment uptime and productivity by identifying and managing failure modes before they disrupt operations
Function 2: Asset Strategy, Lifecycle Management and Sustainability	Implement reliability strategies and sustainable processes as part of a wider asset life cycle approach.	Reduces total cost of ownership through strategic planning that extends asset life and optimises maintenance investment.
Function 3: Root Cause Analysis	Lead investigations into failure events using techniques such as 5 Whys, Fishbone, and fault tree analysis.	Prevents repeat failures by uncovering systemic issues and driving corrective actions that enhance safety and efficiency.
Function 4: Data Collection & Analysis	Gather, interpret and report data from tests, sensors, and operational environments to support decision-making.	Enables data-driven decision-making that improves forecasting accuracy, maintenance scheduling, and asset performance.
Function 5: Technical research	Conduct technical research to identify potential product and/or process improvements through new and emerging technologies.	Accelerates innovation and competitiveness by introducing new technologies and methods that enhance reliability and testing efficiency.
Function 6: Test Planning & Execution	Implement structured testing protocols for new and existing systems under simulated and real conditions.	Ensures systems and components meet performance, safety, and compliance requirements before full-scale deployment, reducing operational risk.
Function 7: Continuous Improvement	Drive improvements to product reliability, testing efficiency, and lifecycle performance through structured improvement initiatives.	Strengthens operational efficiency and cost control through ongoing optimisation of processes, tools, and maintenance practices.
Function 8: Systems Integration & Digitalisation	Integrate advanced computation and simulation methods to increase visibility of system reliability reduce the requirement of physical testing	Enhances real-time visibility of asset health and performance, enabling proactive interventions and reducing downtime.
Function 9: Reporting & Documentation	Produce technical reports, validation protocols, and	Improves organisational learning and decision transparency

Function	Core Activities	Benefit to the Business
	recommendations for design or process improvements.	through clear communication of findings, performance metrics, and recommendations.
Function 10: Standards & Compliance	Ensure compliance with quality, safety, and performance standards	Protects business continuity and reputation by ensuring compliance with regulatory, safety, and quality requirements.
Function 11: Cross-functional Collaboration	Liaise with design, manufacturing, operations, and maintenance teams to ensure reliability objectives are integrated.	Builds organisational capability and alignment by connecting engineering, maintenance, and operations around shared reliability objectives.

Together, these eleven functions describe the full applied professional capability expected of a reliability or testing engineer at AQF Level 7. They combine technical knowledge, analytical skill and operational decision making to deliver measurable business value.

Application of the Functions in Workplace Contexts

While the eleven functions describe a unified capability framework, their expression differs across reliability engineering and testing engineering roles.

Reliability Engineering Contexts

In reliability engineering practice, the functions are applied through activities that improve operational performance and asset lifecycle outcomes. Reliability engineers use advanced diagnostics, systems thinking and risk based decision making to optimise maintenance plans, interpret asset behaviour and reduce unplanned downtime. Their knowledge spans reliability centred maintenance, condition monitoring, materials behaviour and asset strategy. Skills include fault analysis, predictive modelling, performance trend interpretation and clear technical communication.

Work integrated learning (WIL) in reliability contexts would involve analysing real failure data, participating in investigations, interpreting condition monitoring trends and contributing to preventive maintenance strategies that directly influence production performance.

Testing Engineering Contexts

In testing environments, the functions enable the validation of new or modified components and systems before deployment. Testing engineers design and execute structured experiments, measure performance against defined standards and ensure compliance with safety, regulatory and customer requirements. Their knowledge spans instrumentation, experimental methods, data integrity and quality assurance. Skills include experimental design, calibration, measurement, data acquisition and technical reporting.

WIL experiences would place students in laboratories or commissioning teams to plan and deliver verification tests, analyse results, and present recommendations that support product assurance and operational readiness.

Cross Context Integration

Across both roles, WIL is essential for the development of applied professional capability. Students learn to collaborate with trades, technicians, engineers and data specialists, applying analysis in environments defined by real constraints of time, cost and safety. This reinforces professional judgement, adaptability and the capacity to apply AQF Level 7 learning outcomes in complex workplace settings.

Development and Validation of the Functional Analysis

The functional model was developed through a structured, iterative process to ensure accuracy, relevance and consistency with industry practice.

The initial framework was informed by consultation with an experienced engineer who had worked in reliability and testing roles across major industrial environments. This practitioner insight provided detailed understanding of the shared diagnostic and systems analysis foundations of both roles, as well as the contextual differences that influence how functions are expressed.

Further research examined national and international frameworks, including models from the United States, Europe and Canada where reliability engineering is a recognised discipline. This benchmarking clarified expected competencies and levels of autonomy for applied professionals at AQF Level 7 and confirmed the relevance of the eleven functions across sectors.

The Discipline Panel, comprising technical experts from industry, training and professional bodies, reviewed and refined the functions through multiple consultation cycles. Each function was tested for relevance, clarity and transferability, with particular attention to alignment with AQF Level 7 descriptors and measurable industry outcomes. Practitioner interviews then further validated terminology, functional boundaries and the practical tasks associated with each area of responsibility.

Appendix 2 presents the final functional analysis for reliability engineers and Appendix 6 provides the equivalent analysis for testing engineers.

Graduate Outcomes and Qualification Structure

Graduate Outcomes Framework

A detailed graduate outcomes framework has been developed to ensure that the Vocational Degree in Reliability Engineering meets both educational and professional expectations at AQF Level 7. The outcomes have been derived from the validated functional analysis of the reliability engineer role, informed by extensive consultation with industry and professional experts, and benchmarked against national and international models of applied engineering education.

The outcomes describe the knowledge, skills and professional capabilities expected of graduates who will enter the workforce as applied professionals. The framework confirms alignment with Engineers Australia Stage 1 Competency Standard for Engineering Technologists and with the expectations of the Sydney Accord. This ensures national professional recognition and international equivalence with accredited engineering technologist programs.

The graduate outcomes framework is structured in two complementary layers to support both qualification design and provider implementation.

Internal Graduate Outcomes

The internal outcomes form a detailed, fine grained specification of the capabilities required of an Engineering Technologist working in reliability and testing roles. They were developed to support:

- explicit mapping to the eleven functional areas validated in the functional analysis
- alignment with AQF Level 7 descriptors for knowledge, skills and application
- evidence of compliance with Engineers Australia Stage 1 competency standards
- benchmarking against national and international applied engineering programs
- design of units, assessment approaches and professional practice requirements

These internal outcomes provide the depth and precision necessary for qualification development, accreditation, and quality assurance. They establish the technical and analytical spine of the program, ensuring that every component of the qualification can be traced directly to validated role requirements.

External Graduate Outcomes

The external outcomes translate the detailed internal specifications into a concise and accessible set of statements suitable for training providers, industry partners, regulators and learners. They present a coherent summary of the capabilities graduates are expected to demonstrate, framed in functional and professional terms appropriate for curriculum design and delivery.

These outcomes describe graduates who can:

- integrate engineering science, systems knowledge and diagnostic methods
- apply judgement and autonomy in operational and testing environments
- communicate effectively with diverse technical and operational audiences
- operate ethically and safely within regulatory and organisational frameworks
- contribute to innovation, system resilience and continuous improvement

The external outcomes support provider level interpretation, training delivery, unit design and assessment planning, while maintaining a clear and consistent representation of graduate capability.

Relationship Between the Two Sets

The internal and external outcomes operate at different levels of abstraction but are fully aligned. The internal outcomes ensure educational integrity, accreditation readiness and technical completeness. The external outcomes provide clarity and usability for training organisations and industry stakeholders. Together, they form a coherent framework that supports both the design and the delivery of the qualification.

Graduate Profile

Graduates of the Vocational Degree in Reliability Engineering are applied professionals who combine engineering principles, diagnostic reasoning, and workplace experience to improve the reliability, safety, and performance of industrial assets. They draw on knowledge of real-world maintenance practices and engineering system behaviour to analyse failures, implement corrective actions, and optimise asset performance. Their applied approach integrates technical, digital, and organisational perspectives to achieve sustainable and reliable operations.

Graduates are typically employed as Reliability Engineers, Reliability Technologists, Asset Engineers, Testing and Validation Specialists, or Asset Performance Analysts within industries such as mining, manufacturing, transport, utilities, Defence and energy. They work autonomously and collaboratively in roles that require technical leadership, diagnostic capability, and the capacity to manage technical and organisational change across the asset lifecycle.

External Graduate Outcomes Statement

Graduates of the *Vocational Degree in Reliability Engineering* will be able to apply engineering, scientific, and financial principles to enhance the reliability, safety, and sustainability of complex industrial systems. They will integrate technical, digital, and organisational knowledge to lead improvement, manage change, and exercise professional judgement within multidisciplinary environments.

Graduates will be able to:

1. Apply and adapt engineering principles to design, test, and implement reliability and defect-elimination solutions based on broadly defined technical concepts, standards, and regulatory requirements.

2. Integrate field, laboratory, and digital data to diagnose performance issues, determine root causes, and inform system improvement, maintenance, and lifecycle planning.

3. Use systems thinking to analyse interdependencies across technical, operational, and organisational interfaces, anticipating the implications of innovation and change on people, processes, and performance.

4. Evaluate financial, risk, and sustainability factors in engineering decisions, preparing business cases and lifecycle cost analyses that support responsible investment and continuous quality improvement.

5. Communicate and collaborate professionally across multidisciplinary teams, using influence, facilitation, and structured communication to support the adoption of new reliability practices, technologies, and processes.
6. Lead and contribute to projects that apply reliability methodologies, testing programs, and digital tools to improve safety, efficiency, and organisational outcomes through managed change.
7. Demonstrate professional judgement, integrity, and accountability consistent with the standards of practice expected of an applied engineering technologist and reliability professional.

Table 8: Alignment of Reliability Engineer Internal Graduate Outcomes to Engineers Australia Stage 1 Requirements

Internal Graduate Outcome	EA Sydney Accord	EA Stage 1 May 2025 Elements
1. Apply engineering science, mathematics, and digital tools to analyse and resolve reliability and testing challenges in applied professional contexts and inform evidence-based improvements	Engineering knowledge, Problem analysis	1.1, 1.2, 1.3, 1.4, 2.1
2. Implement reliability, maintainability, and testing strategies that enhance system performance, integrating standards, lifecycle principles, and operational requirements	Design and development of solutions	1.5, 1.6, 2.1, 2.3, 3.1
3. Plan and conduct diagnostic tests, monitoring activities, and performance evaluations in real-world environments, applying appropriate tools and methods to generate valid and reliable results.	Investigation, Modern tool usage	1.2, 2.2, 2.4, 3.4
4. Apply functional safety principles and risk reduction concepts across the safety lifecycle, including hazard analysis, Safety Integrity Level targeting, verification and validation	Engineering practice, Risk and impact	1.6, 2.1, 2.2, 2.4, 3.1, 3.3
5. Apply quality assurance and compliance systems to reliability activities, ensuring alignment with recognised standards, professional practice, and operational requirements	Engineering Practice, Ethics	1.6, 2.2, 2.4, 3.1, 3.3, 3.5
6. Apply asset lifecycle thinking to improve performance and value, including condition monitoring, maintenance strategy development, reliability-centred maintenance, and cost-risk trade-offs.	Engineering practice, The engineer and society	1.5, 2.1, 2.4, 3.3
7. Integrate digital tools, data analytics, and predictive technologies into reliability-centred maintenance and testing practices to improve asset performance, supporting continuous improvement and system resilience	Design and development, Investigation	2.3, 2.4, 3.3
8. Use digital tools for modelling, simulation, data acquisition, analytics and automation, and explain the principles, limitations and accuracy of the models and tools used	Modern tool usage	1.2, 1.3, 2.2, 2.4, 3.4
9. Incorporate sustainability, ESG awareness, and environmental considerations into engineering practice, aligning with contemporary professional standards	Environment and sustainability, Ethics	1.5, 1.6, 3.1
10. Produce and present clear, evidence-based technical reports, briefings and recommendations to diverse professional and community audiences, supporting informed decision-making	Individual and teamwork, Communication	3.2
11. Collaborate effectively across multidisciplinary teams, integrating perspectives of engineers, technicians, operators, and managers to achieve reliability and performance objectives	Individual and teamwork, Communication	3.2, 3.3, 3.6

Internal Graduate Outcome	EA Sydney Accord	EA Stage 1 May 2025 Elements
12. Undertake applied inquiry and workplace-based projects to address complex reliability and testing challenges, focusing on improvement and innovation in professional practice	Investigation, Design and Development	1.6, 2.2, 2.3, 2.4, 3.2, 3.4
13. Plan and manage projects, schedules, budgets and risks, engage with stakeholders and suppliers, and comply with relevant legislation, standards, codes and organisational policies	Ethics, The engineer and society, Practice	1.6, 2.4, 3.2, 3.5
14. Ensure all reliability practices comply with industry standards, WHS obligations, and regulatory requirements, with emphasis on asset integrity and critical control verification	Design and development of solutions	1.5, 1.6, 2.1, 2.3, 3.1
15. Demonstrate professional conduct, integrity and accountability, including respect for intellectual property, confidentiality, safety and privacy obligations	Lifelong learning, Professionalism	1.6, 3.1, 3.4, 3.5
16. Exercise initiative and sound professional judgement in planning, executing, and improving reliability and testing activities, demonstrating autonomy within professional practice parameters	Ethics, The engineer and society, Practice	1.6, 2.4, 3.2, 3.5
17. Engage in reflective practice and lifelong learning to remain current with evolving technologies and standards, and drive quality and continuous improvement in engineering operations and service delivery	Lifelong learning, Professionalism	3.3, 3.4, 3.5, 3.7

Table 9: Alignment of Reliability Engineer Internal Graduate Outcomes to Functional Analysis

Functional Area	Graduate Outcomes
Function 1: Reliability Engineering – Conduct failure mode analysis (FMEA) to predict failure modes of components and processes. Optimise component and system uptime through the use of reliability-centred maintenance (RCM).	1. Apply engineering science, mathematics, and digital tools to analyse and resolve reliability and testing challenges in applied professional contexts and inform evidence-based improvements. 2. Design and implement reliability, maintainability, and testing strategies that enhance system performance, integrating standards, lifecycle principles, and operational requirements. 6. Apply asset-lifecycle thinking to improve performance and value, including condition monitoring, maintenance-strategy development, reliability-centred maintenance, and cost-risk trade-offs.
Function 2: Asset Strategy, Lifecycle Management and Sustainability – Implement reliability strategies and sustainable processes as part of a wider asset life-cycle approach.	2. Design and implement reliability, maintainability, and testing strategies that enhance system performance, integrating standards, lifecycle principles, and operational requirements. 6. Apply asset-lifecycle thinking to improve performance and value, including condition monitoring, maintenance-strategy development,

Functional Area	Graduate Outcomes
	reliability-centred maintenance, and cost-risk trade-offs. 9. Incorporate sustainability, ESG awareness, and environmental considerations into engineering practice, aligning with contemporary professional standards.
Function 3: Root Cause Analysis – Lead investigations into failure events using techniques such as 5 Whys, Fishbone, and fault-tree analysis.	1. Apply engineering science, mathematics, and digital tools to analyse and resolve reliability and testing challenges in applied professional contexts and inform evidence-based improvements. 3. Plan and conduct diagnostic tests, monitoring activities, and performance evaluations in real-world environments, applying appropriate tools and methods to generate valid and reliable results. 12. Undertake applied inquiry and workplace-based projects to address complex reliability and testing challenges, focusing on improvement and innovation in professional practice.
Function 4: Data Collection & Analysis – Gather, interpret and report data from tests, sensors, and operational environments to support decision-making.	1. Apply engineering science, mathematics, and digital tools to analyse and resolve reliability and testing challenges in applied professional contexts and inform evidence-based improvements. 7. Integrate digital tools, data analytics, and predictive technologies into reliability-centred maintenance and testing practices to improve asset performance, supporting continuous improvement and system resilience. 8. Use digital tools for modelling, simulation, data acquisition, analytics and automation, and explain the principles, limitations and accuracy of the models and tools used.
Function 5: Technical Research – Conduct technical research to identify potential product and/or process improvements through new and emerging technologies.	12. Undertake applied inquiry and workplace-based projects to address complex reliability and testing challenges, focusing on improvement and innovation in professional practice. 17. Engage in reflective practice and lifelong learning to remain current with evolving technologies and standards and drive quality and continuous improvement in engineering operations and service delivery.
Function 6: Test Planning & Execution – Develop and execute structured testing protocols for new and existing systems under simulated and real conditions.	3. Plan and conduct diagnostic tests, monitoring activities, and performance evaluations in real-world environments, applying appropriate tools and methods to generate valid and reliable results. 4. Apply functional safety principles and risk-reduction concepts across the safety lifecycle, including hazard analysis, Safety Integrity Level targeting, verification and validation. 14. Ensure all reliability practices comply with industry standards, WHS obligations, and regulatory

Functional Area	Graduate Outcomes
	requirements, with emphasis on asset integrity and critical-control verification.
Function 7: Continuous Improvement – Drive improvements to product reliability, testing efficiency, and lifecycle performance through structured improvement initiatives.	7. Integrate digital tools, data analytics, and predictive technologies into reliability-centred maintenance and testing practices to improve asset performance, supporting continuous improvement and system resilience. 17. Engage in reflective practice and lifelong learning to remain current with evolving technologies and standards and drive quality and continuous improvement in engineering operations and service delivery.
Function 8: Systems Integration & Digitalisation – Integrate advanced computation and simulation methods to increase visibility of system reliability and reduce the requirement for physical testing.	7. Integrate digital tools, data analytics, and predictive technologies into reliability-centred maintenance and testing practices to improve asset performance, supporting continuous improvement and system resilience. 8. Use digital tools for modelling, simulation, data acquisition, analytics and automation, and explain the principles, limitations and accuracy of the models and tools used.
Function 9: Reporting & Documentation – Produce technical reports, validation protocols, and recommendations for design or process improvements.	10. Produce and present clear, evidence-based technical reports, briefings and recommendations to diverse professional and community audiences, supporting informed decision-making.
Function 10: Standards & Compliance – Ensure compliance with quality, safety, and performance standards (e.g. ISO, MIL-STD, AS/NZS).	5. Apply quality assurance and compliance systems to reliability activities, ensuring alignment with recognised standards, professional practice, and operational requirements. 14. Ensure all reliability practices comply with industry standards, WHS obligations, and regulatory requirements, with emphasis on asset integrity and critical-control verification. 15. Demonstrate professional conduct, integrity and accountability, including respect for intellectual property, confidentiality, safety and privacy obligations.
Function 11: Cross-Functional Collaboration – Liaise with design, manufacturing, operations, and maintenance teams to ensure reliability objectives are integrated.	11. Collaborate effectively across multidisciplinary teams, integrating perspectives of engineers, technicians, operators, and managers to achieve reliability and performance objectives. 13. Plan and manage projects, schedules, budgets and risks, engage with stakeholders and suppliers, and comply with relevant legislation, standards, codes and organisational policies. 16. Exercise initiative and sound professional judgement in planning, executing, and improving reliability and testing activities, demonstrating autonomy within professional practice parameters.

The Qualification Concept and Structure

The qualification framework (Appendix 3), translates the graduate outcomes into a coherent and deliverable structure built around seven capability clusters Each cluster integrates the knowledge, skills, and professional capabilities identified in the functional analysis, ensuring that learning is scaffolded from foundational to advanced application across the three program years.

Qualification Structure and Rationale

The qualification framework translates the graduate outcomes into a coherent and deliverable structure built around seven capability clusters. Each cluster integrates the knowledge, skills and professional capabilities identified in the functional analysis, ensuring that learning is scaffolded from foundational to advanced application across the three program years.

The proposed qualification is structured as a three year program that combines provider based learning with work integrated learning in authentic industrial contexts. The design reflects the AQF Level 7 descriptors for Vocational Degrees, requiring graduates to demonstrate broad and coherent knowledge, well developed cognitive and technical skills, and the ability to apply these with autonomy and professional judgement in complex industrial settings.

Units within the qualification are expressed in capability terms rather than as discrete, task based subjects. This aligns with the Australian Government Knowledge, Skills and Application framework and with qualification reform principles that shift from task lists to the development of integrated capability and professional judgement.

The functional analysis provides the foundation for defining the application domain. Real workplace functions are translated into the qualification structure and units that will collectively achieve the intended learning and graduate outcomes. This ensures that technical, analytical and professional capabilities are developed concurrently, reflecting the multidisciplinary nature of contemporary reliability engineering.

A defining feature of the qualification is its emphasis on people and communication capabilities as core elements of reliability practice. Industry feedback consistently highlighted that technical competence alone is insufficient. Reliability engineers must communicate complex technical information, influence decision making and build collaborative relationships across operational, maintenance, engineering and management teams. These interpersonal and professional capabilities are embedded throughout the qualification, particularly within the Professional Practice, Collaboration and Influence capability cluster, and are developed progressively through workplace based learning and project activities.

The result is a qualification that builds not only proficiency in specific tasks but also the capacity to operate autonomously, think critically and collaborate effectively in complex engineering environments, consistent with the expectations of an AQF Level 7 Engineering Technologist program.

Capability Clusters

Seven capability clusters inform the organising framework for the qualification. Together they ensure that the structure and content reflect the functional requirements of reliability engineering practice and support the development of graduate capabilities at AQF Level 7.

1. Engineering Foundations and Technical Communication

   This cluster develops fundamental engineering knowledge, analytical reasoning, and technical communication. It integrates principles of engineering science, materials, and systems with structured approaches to documentation and diagnostic analysis, providing the foundation for all subsequent learning.

2. Safety, Risk and Environmental Compliance

   This cluster embeds safety, risk management, and environmental responsibility across all stages of asset design, operation, and maintenance. It emphasises compliance with WHS legislation, ISO standards, and sustainability frameworks as core elements of reliable engineering practice.

3. Condition Monitoring and Diagnostics

   This cluster develops capability in data collection, instrumentation, and diagnostic analysis. It builds the skills required to identify and interpret early indicators of equipment degradation and failure, forming the basis for predictive maintenance and reliability improvement.

4. Reliability Methods and Failure Prevention

   This cluster focuses on structured reliability methods, including failure modes and effects analysis (FMEA), reliability-centred maintenance (RCM), and root cause analysis. It develops the analytical and problem-solving capability required to design and implement continuous improvement strategies.

5. Digital Systems, Data and ERP Integration

   This cluster develops capability in data-driven reliability and systems integration. It covers the use of digital tools, enterprise resource planning (ERP) systems, and emerging technologies such as digital twins, simulation, and Artificial Intelligence (AI) analytics to support performance optimisation.

6. Professional Practice, Collaboration and Influence

   This cluster develops interpersonal, communication, and leadership capability. It emphasises the ability to operate within multidisciplinary teams, prepare technical documentation, present recommendations, and influence decision-making processes within complex organisational settings.

7. Applied Research, Innovation and Systems Thinking

   This cluster develops the capacity for innovation, applied research, and the evaluation of emerging technologies. It develops systems-thinking approaches that enable graduates to analyse, design, and implement improvements across whole-of-life asset systems, culminating in an applied capstone project.

Each cluster draws on multiple functional areas from the analysis, ensuring that technical, analytical and professional competencies are embedded across all stages of learning. In parallel, the clusters are aligned with the three domains of Engineers Australia Stage 1 Competency Standard for Engineering Technologists: Knowledge and Skill Base, Engineering Application Ability, and Professional and Personal Attributes. (Table 10).

Table 10: Alignment of Capability Clusters with Functional Areas and Engineers Australia Stage 1 Competency Domains

Capability Cluster	Aligned Functional Areas	Engineers Australia Stage 1 Competency Domains
Engineering Foundations and Technical Communication	1 Reliability Engineering, 9 Reporting and Documentation	Knowledge and Skill Base, Professional and Personal Attributes
Safety, Risk and Environmental Compliance	2 Asset Strategy Lifecycle Management and Sustainability, 10 Standards and Compliance	Engineering Application Ability, Professional and Personal Attributes
Condition Monitoring and Diagnostics	3 Root Cause Analysis, 4 Data Collection and Analysis	Knowledge and Skill Base, Engineering Application Ability
Reliability Methods and Failure Prevention	1 Reliability Engineering, 6 Maintenance Planning and Execution, 7 Continuous Improvement	Engineering Application Ability, Knowledge and Skill Base
Digital Systems, Data and ERP Integration	4 Data Collection and Analysis, 8 Systems Integration and Digitalisation	Knowledge and Skill Base, Engineering Application Ability
Professional Practice, Collaboration and Influence	9 Reporting and Documentation, 10 Standards and Compliance, 11 Cross-Functional Collaboration and Supplier Assurance	Professional and Personal Attributes, Engineering Application Ability
Applied Research, Innovation and Systems Thinking	2 Asset Strategy Lifecycle Management and Sustainability, 5 Technology Utilisation and Research, 7 Continuous Improvement	Knowledge and Skill Base, Professional and Personal Attributes, Engineering Application Ability

Progressive Scaffolding and Year-on-Year Development

The qualification is intentionally scaffolded across three years (Figure 4) to support structured and cumulative development of knowledge, skills, and application. This progression moves students from guided exposure and structured learning toward autonomous professional practice. The scaffolding design directly reflects the Functional Analysis Version 7, which identifies increasing levels of responsibility, decision-making, and analytical depth across the eleven functional areas and aligns with the AQF Level 7 Vocational Degree descriptors.

Each capability cluster is revisited and deepened across the three years, with learning experiences designed to transition from supervised learning environments to authentic, work-integrated settings. The approach balances theoretical understanding, technical practice, and professional development, ensuring that students not only acquire capability but also learn how to apply it effectively within organisational systems.

Figure 4 – The Three Year Qualification Structure.

Year 1 – Structured Exposure and Foundational Knowledge

In the first year, students are introduced to the fundamental principles of reliability engineering and the systems context of asset performance. The focus is on establishing core technical knowledge and diagnostic literacy, alongside foundational safety and risk awareness. Learning activities are targeted at developing familiarity with industrial environments and the practical application of reliability principles from the outset of the program. Students begin to understand how engineering, maintenance, and operational functions interact, laying the foundation for multi-disciplinary collaboration. The capability emphasis includes:

- Understanding basic engineering systems and materials (Function 1)
- Observing and documenting operational processes (Functions 3, 9)
- Recognising standards and safety principles (Function 10)
- Developing communication and technical reporting skills (Function 9)

Year 2 – Applied Practice and Supervised Contribution

In the second year, students progress from observation to active participation in reliability activities. They apply diagnostic and analytical methods, contribute to data collection and root cause analysis, and participate in reliability improvement projects under supervision.

The learning design strengthens integration between technical and professional capabilities, supported by structured workplace learning and reflection. Students begin to demonstrate the capacity to evaluate information, apply engineering judgement, and contribute to decision-making processes. The capability emphasis includes:

- Conducting data analysis and condition monitoring (Functions 3–4)
- Applying reliability and failure prevention methods (Functions 6–7)
- Supporting maintenance and lifecycle management processes (Functions 2, 6)
- Operating safely and ethically within a multidisciplinary team (Functions 10–11)

Year 3 – Integrated Application and Professional Judgement

In the final year, students demonstrate full integration of technical, analytical, and professional capabilities. They apply reliability methods to complex, real-world systems through workplace-based projects and research tasks. Emphasis is placed on innovation, systems thinking, and independent decision-making, consistent with the level of autonomy expected of Engineering Technologists. The capstone activities could, for example, require students to identify a reliability challenge within their workplace, design an improvement strategy, and evaluate its outcomes against performance, cost, and sustainability criteria. The capability emphasis includes:

- Leading reliability improvement or diagnostic projects (Functions 1, 7)
- Integrating digital systems and data analytics to optimise asset performance (Functions 4, 8)
- Applying research and innovation to solve complex engineering problems (Function 5)
- Demonstrating professional ethics, leadership, and effective communication (Functions 9–11)

Integration of Workplace Learning

Work-integrated learning (WIL) is embedded throughout all three years, rather than being confined to discrete placements. Each capability cluster includes components that draw directly on the student's workplace experience. This ensures that academic learning and professional practice develop concurrently, with feedback loops between industry supervisors, lecturers, and peers. The progressive structure of WIL supports:

- Year 1: Structured exposure and reflection on workplace systems and culture;
- Year 2: Application of technical and analytical skills under supervision; and
- Year 3: Autonomous project work demonstrating full professional capability.

This staged approach ensures that by graduation, students have accumulated extensive, documented workplace experience, providing evidence for Engineers Australia Stage 1 competencies and satisfying the practical requirements of an AQF Level 7 Vocational Degree qualification.

Mining and Automotive Skills Alliance

Elective Streams

The qualification framework includes a suite of elective streams that allow specialisation in different industry contexts while maintaining a strong core identity around reliability engineering. These streams extend the core capability into emerging and sector specific areas and ensure that the qualification remains responsive to evolving technologies and workforce needs. The proposed elective streams include:

Energy Systems and Sustainability – focuses on hydrogen safety, battery systems, and reliability engineering in energy and utilities.

Digital and Data-Driven Reliability – develops advanced skills in simulation, digital twins, and AI-enabled analytics.

Materials, Testing and Innovation – focuses on materials science, environmental testing, and laboratory integration for failure analysis.

Industry Applications and Collaboration – applies reliability principles to mobile and fixed mining plant and explores OEM - customer collaboration.

Testing and Validation Engineering (Specialisation Stream) – covers lifecycle and environmental testing, data acquisition systems, test data analysis, and digital simulation for verification and validation.

The specific content and configuration of these electives will be refined through consultation with broader industry engagement in Phase 3. This will ensure that each stream reflects genuine industry demand and maintains consistency with AQF Level 7 expectations for cognitive and professional depth.

Mining and Automotive Skills Alliance

AQF Level 7 Alignment and Level Justification

The qualification has been designed through a structured evidence-based process to ensure full alignment with the Australian Qualifications Framework and with Engineers Australia Stage 1 Competency Standard for Engineering Technologists.

Graduates at AQF Level 7 are expected to possess broad and coherent theoretical and technical knowledge, well developed cognitive, technical and communication skills, and the ability to apply these with autonomy and professional judgement in complex contexts.

In this qualification:

- Knowledge is defined through the eleven functional areas, which cover reliability centred maintenance, systems integration, lifecycle management, digital diagnostics, risk analysis, safety and compliance. These provide both disciplinary depth and breadth across industrial contexts.
- Skills are developed through analytical and problem solving activities such as fault tree modelling, statistical life data analysis and predictive maintenance planning. Communication and collaboration skills are integrated so that graduates can convey complex technical information across operational, engineering, management and regulatory settings.
- Application of knowledge and skills is demonstrated through structured work integrated learning. Students progressively assume greater accountability, from guided participation in early stages to independent leadership of reliability projects in the final year, applying knowledge to improve asset reliability, safety and performance in real workplaces.

Alignment has been validated through:

- Explicit mapping of each functional area against AQF Level 7 descriptors for cognitive and technical depth
- Benchmarking against Engineers Australia accredited technologist and applied science degrees, confirming equivalence in level with stronger workplace integration
- Discipline Panel review, in which experts verified that the analytical complexity, decision making expectations and volume of learning meet Level 7 requirements

Through this process, the qualification demonstrates full alignment with AQF Level 7 and provides a robust basis for level justification.

Benchmarking and Comparative Analysis

Benchmarking, detailed in Appendix 7, was undertaken to confirm that the proposed Vocational Degree aligns with AQF expectations and Engineers Australia Stage 1 requirements and to identify gaps in existing qualifications that the new degree is intended to address.

Qualifications at AQF Levels 6 to 8 were examined across vocational education, higher education and dual sector delivery to understand vertical progression and boundary alignment. Six primary comparators were selected to represent a cross section of Australian practice, including:

1. Advanced Diploma of Engineering MEM60122, which is representative of the highest level vocational engineering qualification
2. RMIT Mechanical Engineering Degree Apprenticeship, which combines an Advanced Diploma and a Bachelor program
3. CQUniversity Bachelor of Engineering Technology, a Sydney Accord accredited applied technologist program

4. Edith Cowan University Bachelor of Technology in Motorsports, a specialised applied technology degree
5. Charles Darwin University Bachelor of Engineering Science Mechanical, a regional technologist degree with embedded professional practice
6. University of South Australia Bachelor of Software Engineering Honours, an AQF Level 8 degree apprenticeship illustrating advanced employment based delivery

The analysis confirmed that:

- Advanced Diplomas provide strong technical grounding but limited analytical and systems capability relative to AQF Level 7 expectations
- Bachelor Honours degrees and some degree apprenticeships exceed the applied professional scope targeted for the Vocational Degree and sit at AQF Level 8
- Applied bachelor degrees such as Engineering Technology and Engineering Science meet cognitive benchmarks for AQF Level 7 but often lack consistent work integrated design and cross sector transferability

When mapped against the eleven functional areas, none of the benchmarked qualifications addressed the full range of reliability functions or their interrelationships. Existing programs either support diagnostic tasks without sufficient analytical depth, or provide cognitive depth without integrated reliability, testing and lifecycle management content.

The benchmarking outcomes can be summarised as:

- No existing qualification offers a scalable, nationally consistent model that combines strong industry integration, analytical rigour and accreditation readiness at AQF Level 7
- The proposed Vocational Degree occupies a unique middle ground between the vocational Advanced Diploma and AQF Level 8 honours degrees
- The design reflects best practice from comparator programs, particularly in relation to work integrated learning, while remaining accessible to regional and mid-career learners

The benchmarking process validated that the graduate outcome design and cognitive level are equivalent to Engineers Australia accredited technologist degrees, while addressing their limitations through stronger system level reliability functions and continuous work integrated learning

International comparisons also indicate that while applied engineering degrees exist in comparable jurisdictions, none fully align with the integrated reliability, testing and lifecycle focus proposed for the Vocational Degree. Programs in the United Kingdom, the United States, Germany and Singapore typically sit within traditional engineering or engineering technology domains and vary in their orientation toward reliability, testing, digital systems and applied practice. Several institutions, including the University of Portsmouth, Purdue University, the University of Stuttgart and the Singapore Institute of Technology, offer or have offered bachelor level programs that incorporate elements of reliability engineering, industrial testing or digital manufacturing. However, these programs are generally structured around broader engineering disciplines, do not integrate the full range of functions identified in the functional analysis, and rely less heavily on structured work integrated learning as a core organising feature.

Across these systems, no qualification combines applied professional engineering capability, reliability specific functions and continuous workplace learning in a way that mirrors the proposed Vocational Degree.

The international scan therefore reinforces the distinctiveness of the qualification within the global applied engineering landscape and supports its purpose of building capability in an area not addressed by existing models.

This confirms that the qualification addresses a clearly identified gap in the current education system and fills the missing middle between vocational and university pathways.

Professional Recognition, Pathways and Credit

From the outset, the qualification has been designed to meet the requirements for Sydney Accord recognition through Engineers Australia accreditation of Engineering Technologist programs. Accreditation principles have informed the definition of functional areas, graduate outcomes, capability clusters and the design of work integrated learning.

The inclusion of Engineers Australia representatives on both the Steering Committee and the Discipline Panel has ensured that competency standards have been embedded throughout development. Graduates will therefore meet the national threshold for independent practice as Engineering Technologists, with the theoretical depth, analytical capability and ethical awareness required for applied professional roles.

The qualification also provides defined progression pathways into AQF Level 8 and 9 study for those seeking Professional Engineer registration under the Washington Accord. Mapping to Engineers Australia competency frameworks enables formal credit and articulation into accredited Bachelor honours or postgraduate conversion programs. Engagement with dual sector universities and regulators, commenced in this phase, will continue to confirm specific credit arrangements and recognition of parity with existing engineering qualifications.

A credit point framework consistent with standard higher education practice will support mobility and articulation. The qualification will be designed on the basis that one year of full time study is equivalent to 120 credit points, consistent with common university conventions. This approach will:

- Clarify the volume of learning at AQF Level 7
- Support transparent credit transfer arrangements between vocational and higher education providers
- Facilitate recognition within established accreditation and articulation frameworks

Specific credit point allocations for units will be finalised in Phase 3 of the project. The overarching principle is to support recognition between sectors, provide a strong foundation for Engineers Australia accreditation and uphold the portability of the qualification within the national tertiary education system.

Summary and Next Steps

The draft qualification framework provides a coherent and scaffolded structure that aligns with the functional analysis, AQF Level 7 requirements and Engineers Australia Stage 1 Technologist standards. The capability based design ensures that technical, analytical and professional skills are developed concurrently, rather than sequentially, and that work integrated learning is central rather than peripheral.

Elective streams and applied research components provide flexibility and innovation capacity while maintaining a clear core identity around reliability engineering. Benchmarking confirms that the qualification occupies a distinct position in the current ecosystem, filling the missing middle between vocational and university programs and directly supporting national priorities for industrial capability and workforce resilience.

The next phase of work will fully develop the qualification and supporting framework and enable testing with industry, regulators and providers through readiness assessment, confirming deliverability, workforce capacity and accreditation alignment prior to finalisation, endorsement and pilot delivery.

Work Integrated Learning

Work Integrated Learning is a defining feature of the vocational degree qualification type and is central to the development of applied professional capability in reliability engineering at AQF Level 7. WIL is not an adjunct or peripheral placement activity, but an organising principle that connects academic learning with performance in real engineering environments. Stakeholders emphasised that reliability engineering capability develops through repeated exposure to authentic operational problems, structured application of diagnostic frameworks and opportunities to exercise judgement in unpredictable contexts. This aligns with national expectations for vocational degrees, the Australian Qualifications Framework and the cognitive science evidence that mastery requires deliberate practice, spaced application and learning across varied contexts.

The purpose of WIL in this qualification is to build the capability required for complex diagnostic reasoning, systems thinking, data interpretation and investigation within engineering teams. Reliability engineering relies on durable knowledge structures rather than content volume, and learners benefit from scaffolded workplace experiences that reinforce core concepts across increasing levels of complexity. WIL provides the environment in which learners retrieve, apply and consolidate their learning, transforming theoretical understanding into practical capability through engagement with real equipment, real data and real failure conditions. Learning transfer is enabled when learners encounter operational variability and work across multiple asset classes, failure modes and system contexts.

WIL also plays a critical role in supporting the transition from technical roles into applied professional practice. It enables learners to form a professional identity as reliability practitioners by participating in multidisciplinary investigations, communicating findings and contributing to asset performance decisions. To achieve this, WIL must be substantial, structured and carefully sequenced across the three years, with clear learning outcomes, supervision expectations and evidence requirements that reflect the cognitive and workplace demands of AQF Level 7 reliability engineering roles.

The design of WIL in the vocational degree reflects a partnership approach in which providers ensure academic quality, employers provide access to authentic operational environments and learners engage in ongoing evidence collection, reflection and applied practice. Delivering reliable, safe and equitable WIL experiences requires clearly defined system settings, national tools and consistent expectations across employers and regions.

The following sections set out the design principles, structure, supervision requirements, safety expectations and assessment arrangements that will guide the implementation of WIL for the Vocational Degree in Reliability Engineering. These design parameters form the foundation for the detailed tools, agreements and national guidance that are recommended for full development. (Appendix 8)

Purpose and Role of Work Integrated Learning in the Vocational Degree

Work Integrated Learning in the vocational degree serves as the primary mechanism through which learners develop and demonstrate the applied professional capability required in reliability engineering roles.

At AQF Level 7, learners must show that they can integrate theoretical knowledge with professional practice, exercise judgement in uncertain conditions and analyse complex systems using structured methodologies. WIL provides the authentic operational environments in which these capabilities can be formed, refined and validated.

Within reliability engineering, capability develops through engagement with real asset behaviour, evolving operating conditions and genuine system variability. WIL therefore enables learners to work with live data, participate in failure investigations, observe patterns emerging from operational histories and contribute to multidisciplinary decision making. These experiences allow learners to move beyond conceptual understanding and build the practical reasoning that underpins reliability practice. WIL also supports the development of professional judgement by immersing learners in the ambiguity and complexity that characterise engineering problem solving in mining and asset intensive environments.

A core purpose of WIL is to strengthen learning transfer. Reliability engineers must apply diagnostic frameworks to a wide range of equipment classes, environmental conditions and failure scenarios. Exposure to varied contexts during WIL enables learners to generalise their knowledge, adapt methodologies appropriately and recognise emerging patterns across different systems. This aligns with evidence that transfer is most effectively achieved when learners apply concepts repeatedly across diverse situations, supported by scaffolding and structured feedback.

WIL also makes visible the professional behaviours, communication practices and interdisciplinary collaboration that reliability engineering requires. Through participation in workplace meetings, cross functional investigations and operational reviews, learners gain insight into how engineering decisions are made and how reliability functions interface with maintenance, operations, planning and asset management. These experiences are foundational to forming an applied professional identity and transitioning from technical roles into higher level engineering practice.

In this way, WIL is not primarily an exposure activity but a structured, intentional component of the qualification that enables learners to develop the technical, analytical and professional capabilities expected of AQF Level 7 reliability engineers. It provides the operational authenticity needed to consolidate learning, demonstrate competence and graduate with the capability to contribute meaningfully to engineering teams.

Design Principles for Work Integrated Learning

The design of WIL within the vocational degree is informed by national policy expectations for vocational degrees, workforce requirements for reliability engineering roles and evidence about how adults develop durable professional capability. The following principles establish the foundations for WIL to guide the detailed development work undertaken in Phase 3 and pilot implementation.

WIL must be substantial, structured and scaffolded across all three years of the degree

WIL is not a peripheral or optional activity. It is a core component of the qualification that requires deliberate sequencing. Learners must progress from supported observation and foundational tasks in Year 1, to applied practice in Year 2, and to increasingly autonomous investigation and decision making in Year 3. This scaffolding ensures that learners build capability in a cumulative manner and are not placed in environments beyond their readiness.

WIL must explicitly align with AQF Level 7 expectations

WIL activities must enable learners to demonstrate the cognitive, technical and communication capabilities expected of an applied professional. This includes the ability to analyse complex data, apply structured reliability methodologies, justify decisions, and communicate findings to multidisciplinary audiences. Workplace tasks must therefore be selected to reflect the complexity and judgement associated with reliability engineering roles.

WIL must be linked to essential reliability engineering concepts and workflows

WIL experiences must reinforce and extend the specific knowledge structures required for reliability practice, including failure analysis, condition monitoring, diagnostics, systems thinking and data interpretation. This avoids cognitive overload and ensures that workplace learning strengthens foundational concepts rather than overwhelming learners with unrelated tasks.

WIL must support repeated retrieval and application of learning

Consistent with cognitive science evidence, the design of WIL must create opportunities for repeated application of core analytical processes across varied contexts. Learners need multiple cycles of practice in diagnosing issues, interpreting data and applying structured methodologies. Repeated retrieval and spaced application contribute to long term capability development and mastery of reliability engineering practice.

WIL must provide varied contexts to support learning transfer

Learners must encounter more than one operational environment to develop the ability to generalise and adapt their knowledge. WIL should provide exposure to different equipment types, failure modes, system behaviours and workplace conditions. This variation enables learners to recognise patterns, discern critical information and apply their knowledge flexibly, preparing them for the diversity of real engineering problems.

WIL environments must be safe, respectful and inclusive

Reliability engineering roles operate in complex environments, including remote, regional and FIFO contexts. Placement sites must meet standards of cultural safety, psychological safety and physical safety. This includes the supervision capability of workplace mentors, the suitability of amenities, respect for cultural obligations and the creation of learning environments free from harassment, bias and unsafe practices.

WIL must be underpinned by strong partnerships between providers and employers

WIL requires coordinated effort between RTOs and host organisations. Providers retain academic oversight of WIL outcomes, while employers provide access to authentic tasks, equipment, data and supervision. Effective WIL design therefore depends on clearly articulated roles, transparent communication, structured agreements and consistent expectations across industry partners.

WIL must support the development of applied professional identity

Reliability engineering requires more than technical skill. It involves professional judgement, ethical conduct, communication and collaboration across engineering, maintenance, operations and planning. WIL must expose learners to the interpersonal and professional dimensions of reliability work, supporting the development of identity as an applied professional within engineering teams.

WIL tasks must produce valid, authentic evidence for assessment

Workplace activities should be selected so that learners can produce evidence demonstrating their capability against the outcomes. This may include investigation reports, data interpretation, structured reflections, supervisor attestations and analysis of real failure events. WIL design must ensure that evidence is both authentic and attributable to individual learners.

WIL design must support equitable participation

WIL must be designed in ways that reduce barriers for under-represented groups, including women, Aboriginal learners, migrants, neurodiverse learners and regional workers. Flexibility in scheduling, consideration of FIFO rosters, mechanisms for addressing cultural obligations and access to local mentors are essential to supporting equitable experiences across diverse workplace settings.

Structure and Progression of Work Integrated Learning Across the Three Years

The structure of WIL in the vocational degree is designed to support progressive learning in reliability engineering. Each year builds on the last, with learning experiences carefully sequenced to support cognitive development, capability progression and professional identity formation. Assessment draws on WIL activities, but its role is to validate learning rather than to shape it. The primary function of WIL is to ensure that learners gain the applied professional capability required at AQF Level 7.

Year 1: Foundational exposure, systems learning and development of workplace readiness

Year 1 WIL introduces learners to the operational environments, equipment classes and system behaviours that underpin reliability engineering. The learning focus at this stage is on developing system awareness, understanding equipment functions and observing how maintenance and engineering teams work in practice. Learners participate in structured shadowing, supervised tasks and guided observation, which allow them to connect theoretical concepts with authentic workplace behaviours.

Assessment at this stage is intentionally developmental. Evidence such as reflections, simple data interpretation tasks or supervisor observations helps learners articulate what they are learning, but the primary emphasis remains on building foundational systems knowledge and workplace readiness.

Year 2: Applied technical learning, problem solving and cross disciplinary engagement

In Year 2, learners begin to take on tasks that require applied technical capability and structured diagnostic reasoning. WIL enables them to work with real data, participate in basic investigations and observe how reliability decisions are formed in multidisciplinary teams. The learning focus shifts toward applying structured methods, recognising failure patterns and interpreting operational information in context. Learners encounter more variability in tasks and systems, supporting the development of adaptable reasoning and deeper conceptual understanding.

Assessment becomes more substantive in Year 2, but it follows learning rather than leading it. Evidence may include preliminary investigation notes, interpretations of condition monitoring outputs or analyses of simple reliability tasks. Workplace supervisors contribute to verifying authenticity, but the central aim is to reinforce and deepen learning through meaningful, real world application.

Year 3: Advanced applied learning, complex investigations and professional capability

Year 3 WIL focuses on developing advanced analytical and professional capability. Learners undertake complex reliability tasks that require integration of knowledge, independent judgment and clear communication of technical reasoning. WIL immerses them in system level diagnostics, detailed investigations, multidisciplinary reviews and improvement projects. Learning at this stage is characterised by autonomy, complexity and synthesising information across multiple sources and contexts.

Assessment at Year 3 validates this advanced capability through applied evidence such as detailed investigation reports, reliability analyses or technical briefings. The priority remains on learning: assessment confirms that learners can operate as applied professionals, applying structured methodologies and demonstrating the judgment required in reliability engineering roles.

Progression of learning and readiness across the WIL pathway

Across the three years, WIL tasks become progressively more complex and autonomous. This structured progression supports cognitive development, repeated retrieval of key concepts and exposure to varied operational contexts, which are all essential for long term learning and transfer. Learner readiness is supported through preparatory learning, clear expectations and collaboration between providers and workplaces.

Assessment remains integrated with learning throughout, providing a mechanism for demonstrating capability without overshadowing the learning purpose of WIL. By graduation, learners will have developed the applied professional capabilities, confidence and judgment required for reliability engineering roles.

Workplace Variability

A concern raised by higher education providers and members of the Discipline Panel is the variability in the type and quality of tasks available to learners in different workplaces. Some sites may offer limited exposure to the full scope of reliability engineering activities, such as structured investigations, complex data interpretation or multidisciplinary decision making.

In the vocational degree, this challenge will be addressed through a collaborative and co-design approach rather than expecting individual providers to solve the issue in isolation. As Phase 3 progresses, AUSMASA, providers and employers will work together to identify the range of reliability engineering activities that WIL must expose learners to, and to develop pathways that ensure learners can access these experiences across different contexts. Options may include coordinated rotation models across multiple sites, shared WIL partnerships between employers, structured project based tasks drawing on authentic operational data, pooled access to specialist equipment or systems, and regionally coordinated placement agreements.

The guiding principle is that no learner’s development should be constrained by the operational limitations of a single workplace. Ensuring access to the required breadth of learning experiences will be a shared responsibility across the system, supported by national tools, partnership agreements and collaborative planning processes.

Minimum Work Integrated Learning Requirements for the Qualification

The vocational degree requires a consistent national approach to WIL to ensure that all learners, regardless of workplace context or geographic location, can develop the applied professional capability required for reliability engineering roles at AQF Level 7. The following minimum requirements establish the baseline expectations for WIL environments, supervision, learner support and workplace engagement. These requirements reflect the essential conditions under which applied learning can occur.

Minimum duration and continuity of WIL

WIL must occur in each year of the qualification and provide sufficient exposure to real operational environments to support progressive capability development. While the exact structure will be finalised during Phase 3, WIL must include:

- ongoing workplace engagement across the three years
- enough time for learners to participate meaningfully in reliability tasks rather than singular observations
- continuity of supervision and support to enable learners to transition from foundational engagement to autonomous practice.

The volume of WIL must be substantial enough to demonstrate capability at AQF Level 7 and align with the applied professional purpose of the degree.

Given the applied professional purpose of the vocational degree and the nature of reliability engineering work, the total volume of WIL must constitute at least one third of the overall degree time. This reflects both industry expectations and the reality that most learners will be employed in operational or maintenance environments where reliability capability can be developed through authentic, repeated practice.

For learners who are not currently employed in suitable workplaces, system level solutions will be required to ensure equitable access to WIL. These may include coordinated rotations across partner employers, structured placements, or shared industry hosted learning experiences developed through Phase 3 co design.

The principle is that WIL must remain substantial and authentic for every learner, regardless of employment status, and that access to appropriate workplace environments will be achieved through collaborative arrangements across providers, employers and AUSMASA rather than relying on individual learners or providers to secure placements independently.

Minimum exposure to reliability engineering tasks

WIL must expose learners to the core tasks that define reliability engineering practice. At a minimum, learners must have opportunities to engage with:

- asset systems and operational environments relevant to their discipline
- access to relevant equipment, technologies and data
- condition monitoring activities and interpretation of performance data
- failure investigation processes and structured diagnostic methods
- multidisciplinary collaboration with engineering, maintenance and operations teams
- application of reliability concepts across varied contexts to support learning transfer

- change management activities that support the introduction, adoption and evaluation of new processes or technologies within operational environments

These activities form the foundation of applied learning and contribute to the authentic evidence learners will later present for assessment.

Minimum supervision and workplace support

Workplace supervision must be appropriate to the level of capability expected at each stage of the qualification. Supervisors or workplace mentors must:

- possess the technical understanding needed to support the learner
- be familiar with the objectives of WIL and the expectations of the vocational degree
- provide structured guidance and feedback
- verify the authenticity and individual contribution of workplace tasks.

Supervision models will be further developed in Phase 3 to ensure national consistency while accommodating workplace diversity.

Minimum standards for physical, psychosocial and cultural safety

All WIL environments must demonstrate:

- physical safety, including safe facilities, equipment and work practices
- psychosocial safety, including respectful team environments, zero tolerance for harassment or bullying, and psychologically safe communication
- cultural safety, particularly for Aboriginal learners, ensuring respect for cultural identity, access to culturally informed support and appropriate engagement with Traditional Owners where learning occurs on Country.

These safety requirements apply to all workplace learning and must be met before a site is approved for WIL.

Minimum expectations for integration of WIL with academic learning

WIL must be integrated with curriculum through:

- clear learning outcomes for each WIL stage
- preparatory learning modules that ensure learners have the appropriate baseline knowledge and skill
- structured reflection activities
- alignment between workplace tasks and the outcomes of the units of competency and qualification.

Assessment design is addressed separately in this report, however WIL must generate authentic evidence aligned to those expectations.

Minimum requirements for equity and accessibility

WIL must be designed and delivered in ways that ensure equitable access for all learners, including women, Aboriginal learners, migrants, regional and remote learners, and learners with disability.

Minimum requirements include:

- predictable scheduling to accommodate FIFO and shift rosters
- flexibility for cultural obligations and family responsibilities
- accessible facilities and appropriate personal protective equipment
- mentoring arrangements that support under-represented cohorts.

Equity considerations must be built into partnership agreements, supervisor training and learner support systems.

Minimum expectations for provider-industry collaboration

WIL requires considered and coordinated planning between providers and employers. As a minimum, providers and employers must:

- participate in the development of WIL learning plans
- agree on the tasks, supervision and support to be provided
- maintain communication around learner progress and wellbeing

This collaboration ensures WIL is consistent, safe and aligned to the capability needs of reliability engineering roles.

Supervision, Workplace Learning and the Role of Industry Partners

WIL within the vocational degree relies on strong and sustained collaboration between providers, employers and workplace supervisors. Reliability engineering capability develops through engagement with authentic tasks, access to relevant operational systems and exposure to expert reasoning within engineering teams. For this reason, the quality of supervision and the commitment of industry partners are critical to ensuring that learners can develop the applied professional capability required at AQF Level 7. This section outlines the expectations for supervision, workplace learning and industry partnership that will underpin the implementation of WIL.

Expectations for workplace supervision

Supervision during WIL must be provided by individuals with sufficient technical expertise in reliability engineering or closely related domains. Supervisors must be able to:

- support learners in understanding and applying reliability concepts in real contexts
- provide accurate and timely feedback on learner performance
- guide the learner’s participation in workplace tasks appropriate to their level of capability
- verify the authenticity and individual contribution of workplace learning activities
- support safe, inclusive and culturally respectful learning environments.

Supervision is expected to evolve as learners progress through the degree. In early stages, supervision will be more directive and focused on observation and supported engagement. In later stages, learners may undertake tasks with increasing autonomy, with supervisors providing guidance, monitoring and professional feedback appropriate to advanced capability development.

The supervisor's role in supporting applied learning

Supervisors play a central role in helping learners interpret operational data, understand complex system behaviour and navigate real workplace constraints. Through guided participation, learners gain insight into professional judgement, multidisciplinary collaboration and decision making processes. Supervisors contribute to the learner's development by modelling analytical reasoning, demonstrating structured investigative methods and providing access to relevant tools, data and systems. As learners build confidence, supervisors facilitate opportunities for them to take ownership of tasks, apply methods independently and contribute to discussions within engineering and maintenance teams.

Workplace learning environments and task access

Workplaces hosting WIL must provide learners with access to meaningful reliability engineering tasks. These tasks should reflect authentic practice and may include participating in condition monitoring rounds, assisting with preliminary investigations, analysing equipment histories, contributing to root cause analysis processes or supporting reliability improvement initiatives. The availability of such tasks will depend on operational conditions, asset types and site requirements. When task availability is limited at a single site, collaborative arrangements between employers and providers will be used to ensure learners can access the breadth of experiences needed to demonstrate capability.

Responsibilities of industry partners in providing high quality WIL

Employers have a critical role in supporting WIL delivery. At a minimum, industry partners must:

- provide access to safe, culturally safe and psychosocially safe workplaces
- allocate supervisors or workplace mentors with appropriate technical capability
- ensure learners can participate in relevant reliability engineering tasks
- engage in regular communication with providers regarding learner progress and wellbeing
- support flexible arrangements where necessary to accommodate cultural, family or roster related needs
- participate in co designed WIL agreements developed during Phase 3.

Industry partners must also ensure that learners are not placed in environments where workplace culture, safety risks or operational constraints would prevent meaningful learning or place learners at risk.

Co designed workplace learning plans

WIL must be guided by workplace learning plans that are jointly developed by providers and industry partners. These plans outline the tasks, learning outcomes, supervision arrangements and evidence requirements appropriate to each stage of the degree. Co designed learning plans ensure that workplace experiences align with curriculum, support progressive capability development and are responsive to the realities of the site. They also provide clarity for learners, supervisors and providers about expectations, responsibilities and support mechanisms.

Supporting supervisors and workplaces

Effective WIL requires system level support for supervisors and workplaces. During Phase 3, AUSMASA, providers and industry partners will co-develop supervisor guidance materials, workplace induction resources, templates for learning plans and tools to support consistent feedback and verification of learner activity. This approach will reduce the administrative burden on workplaces, strengthen the quality and consistency of supervision and support workplaces to meet safety, cultural and learning requirements.

A Shared Responsibility Model

WIL within the vocational degree operates on a shared responsibility model, see Figure 5. Providers retain responsibility for the academic oversight of WIL, ensuring learners progress appropriately and meet the required outcomes. Employers provide the operational environments, supervision and task access required for learning to occur. Learners are active participants who engage in workplace tasks, reflect on their learning and contribute to evidence generation and professional conduct. AUSMASA provides ongoing industry stewardship, maintains system wide partnerships and supports continuous improvement in WIL quality and consistency. This shared model reflects the complexity of developing applied professional capability in reliability engineering and ensures that learners experience workplace learning that is safe, authentic and educationally sound.

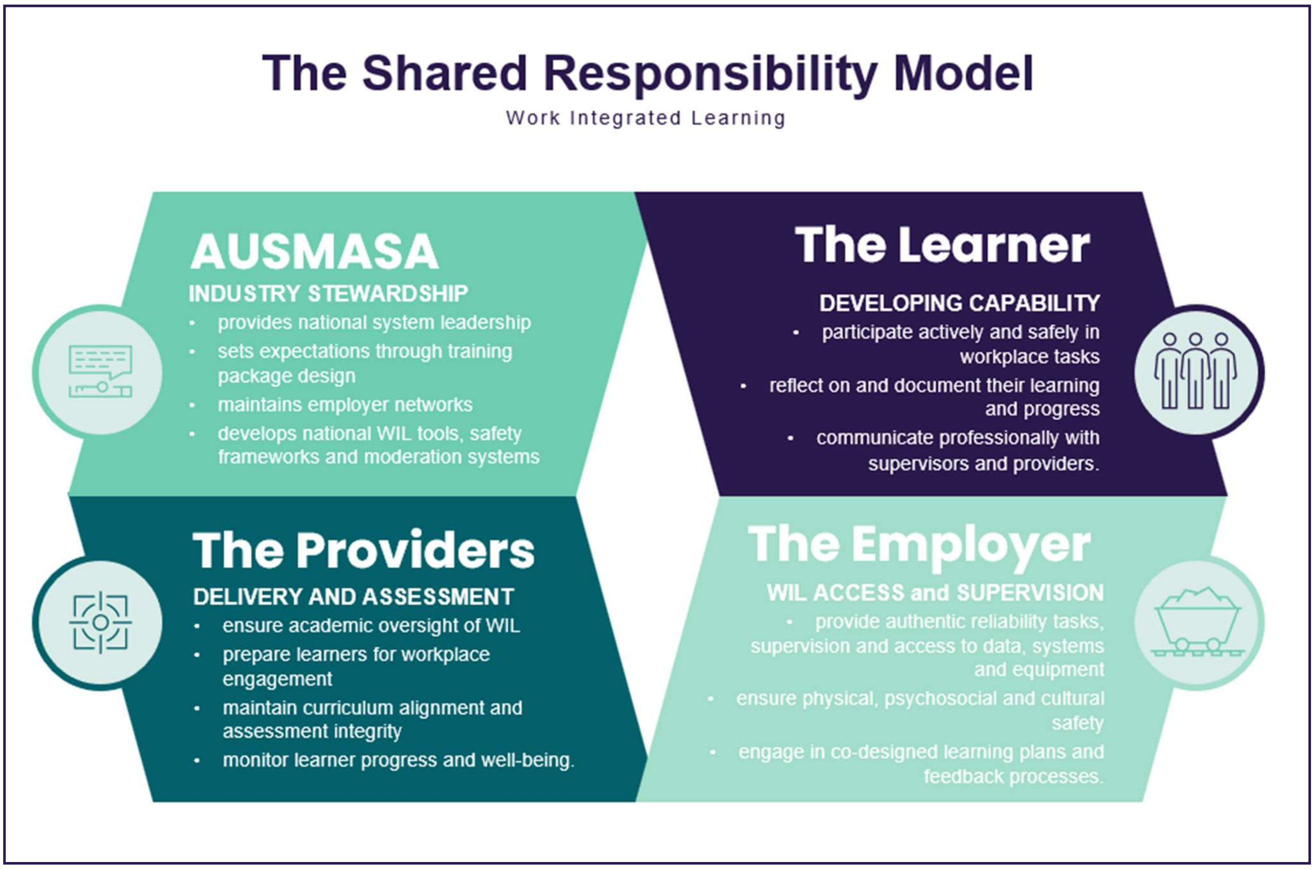


Figure 5: The Work Integrated Learning Shared Responsibility Model

Physical, Psychosocial and Cultural Safety in Work Integrated Learning

Ensuring the safety of learners in WIL is fundamental to the quality and integrity of the vocational degree. Reliability engineering occurs in complex, high-risk industrial environments where learners may be exposed to physical hazards, hierarchical workplace structures, culturally unsafe practices or psychosocial risks associated with remote and FIFO work. For these reasons, WIL sites must demonstrate that they can provide environments that uphold physical safety, psychosocial safety and cultural safety. These expectations apply to all learners and are essential to achieving equitable access, learner wellbeing and meaningful participation in the degree.

Physical safety requirements

All WIL environments must meet the basic physical safety standards expected in mining and industrial settings. Learners must have access to:

- safe facilities and amenities, including appropriate PPE, hygiene facilities and equipment suited to different body types
- safe systems of work that comply with relevant legislation and site protocols
- clear induction processes and ongoing supervision appropriate to task risk
- accommodation and travel arrangements that meet safety expectations in FIFO and remote contexts.

Sites with known or unresolved physical safety issues are not suitable for WIL placements.

Psychosocial safety requirements

Learners must be able to participate in WIL in environments that support psychological wellbeing and respect. Industry consultations highlighted risks such as bullying, exclusion, unsafe communication practices and hierarchical cultures that can undermine learner confidence and engagement. To meet psychosocial safety expectations, workplaces must demonstrate:

- respectful communication and team practices
- zero tolerance for harassment, discrimination or intimidation
- support for learners to ask questions, raise concerns and contribute appropriately
- supervisory practices that reinforce psychological safety and model supportive behaviours
- awareness of wellbeing risks associated with shift work, isolation or remote operations.

Psychosocial safety is particularly important for under-represented groups, including women, migrants and learners with disability, who may be more vulnerable to exclusion or bias in workplace settings.

Cultural safety requirements

Cultural safety is essential for Aboriginal learners and for WIL that occurs on or near Country. Workplaces must demonstrate practices that:

- respect Aboriginal identity, knowledge and cultural obligations
- avoid experiences of racism, cultural invalidation or unsafe communication
- engage appropriately with the relevant Traditional Owner group where WIL involves work on Country

- support learners to participate in cultural obligations, including sorry business and family responsibilities
- provide access to Aboriginal mentors or community partners where appropriate.

Cultural safety applies to all learners, and is critical to supporting Aboriginal learners' participation, retention and progression.

Supporting safe participation for learners with diverse needs

The qualification must ensure that learners from diverse backgrounds can participate safely and equitably in WIL. This includes:

- adjustments for learners with disability or neurodiversity
- support for women working in remote or male dominated sites
- language and communication support for migrants
- flexibility for cultural, family or community obligations
- arrangements that address isolation, transport and accommodation risks.

Safety must be embedded into learning plans, induction processes, supervisory practices and communication between providers and employers.

Assessment in Work Integrated Learning

Assessment within WIL must provide valid, authentic evidence of learners' capability to apply reliability engineering knowledge in real operational contexts. At AQF Level 7, assessment must demonstrate not only technical understanding but also the ability to analyse information, exercise judgement, communicate effectively and contribute to professional decision making.

WIL therefore forms a critical source of evidence for assessing applied professional capability, complementing classroom based learning and ensuring that assessment outcomes reflect genuine workplace performance.

Ensuring authenticity and individual contribution

Authenticity is essential in WIL assessment due to the collaborative nature of reliability engineering work. Evidence must be authentic, meaning it arises naturally from workplace activity rather than staged simulations.

To ensure authenticity:

- supervisors must verify the learner's role in complex tasks
- learners must articulate their reasoning and interpretation through written or oral evidence
- assessors must triangulate evidence from multiple sources (for example workplace artefacts, learner reflections, supervisor attestations)
- assessment tasks should require explanation of decisions rather than mere descriptions of completed activities.

These processes ensure that assessment reflects the learner's individual capability rather than the output of a team.

Relationship between WIL assessment and academic assessment

WIL assessment forms one part of the overall evidence for meeting unit and qualification outcomes. Academic assessments may include analysis tasks, data interpretation, research informed investigations or problem solving activities that complement workplace learning. The relationship between the two must be clearly defined so that:

- WIL provides authentic workplace evidence of applied capability
- academic tasks allow learners to demonstrate conceptual understanding and methodological rigour
- together, they demonstrate the full breadth of AQF Level 7 expectations.

The assessment system must ensure coherence between workplace learning and academic learning, without duplicating tasks or overburdening learners.

Assessment integrity, moderation and system consistency

Assessment integrity must be upheld through processes that ensure fairness, consistency and defensibility. Minimum expectations include:

- moderation of WIL assessment across assessors and providers
- processes to verify authenticity and resolve discrepancies in evidence
- documentation standards that meet the requirements of the Standards for RTOs
- system level calibration activities developed in Phase 3 to support consistency nationally.

These expectations ensure that WIL assessment maintains the credibility of the qualification and supports high quality outcomes for learners and employers.

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The increasing complexity, interconnectivity, and cost of modern machinery and systems mean that the traditional "run-to-failure" approach is no longer viable. Over the past decade, asset management has matured into a critical organisational capability that directly influences safety, productivity, and profitability

Implementation Architecture for an AQF Level 7 Vocational Degree

The analysis undertaken for this project shows that delivering the Vocational Degree in a way that supports equitable participation and workforce relevance will require new system capabilities that do not currently, or only partially, exist within the VET sector. While the resources sector has strong initiatives that support workforce development, cultural safety and inclusion, these initiatives are largely company based and therefore do not provide the consistent, sector-wide capability required for higher level applied professional learning at AQF Level 7.

Developing new system capability is essential to ensuring that the Vocational Degree reduces, rather than reinforces, existing barriers to participation. Learners entering the qualification may include mid-career workers, tradespeople, women, Aboriginal learners, migrants, people with disability and neurodiverse learners, many of whom face financial, cultural, academic or geographic barriers to higher level study. The implementation capability described in this section is therefore not only an operational requirement but a central mechanism for achieving access, diversity, equity and learner safety.

These system capabilities form the enabling infrastructure that underpins the Vocational Degree. They include mechanisms for delivering higher level learning and assessment, supports for foundation skills, culturally and psychosocially safe learning environments, partnership arrangements between RTOs, employers and OEMs, and learner support models suited to FIFO, shift working and regional learners. Because these capabilities do not currently exist as a coherent system within VET, they must be developed in parallel with the qualification to ensure that learners, Training providers and employers can meet the requirements of an AQF Level 7 vocational pathway.

The remainder of this section outlines the implementation architecture required for delivery at AQF Level 7. It describes the systems, governance expectations and delivery conditions that provide the operational environment for the Vocational Degree and ensure that higher level learning is delivered safely, consistently and equitably across the sector.

AQF Level 7 Vocational Degree Implementation Architecture

The Vocational Degree requires a purpose built implementation architecture because the VET sector does not currently have delivery systems capable of supporting higher level applied professional learning at AQF Level 7. Existing arrangements were designed for lower level qualifications and do not reflect the cognitive expectations, academic integrity requirements, workplace learning obligations or cultural and psychosocial safety considerations required for equitable participation at this level. A new implementation architecture is therefore necessary to provide the structured environment in which the Vocational Degree can operate, ensuring that learning, assessment and workplace integration are delivered safely, consistently and in ways that support diverse learners to succeed.

Learning and Teaching at AQF Level 7

The implementation architecture must support learning that requires analysis, evaluation, conceptual understanding and applied judgement. Teaching approaches must enable learners to integrate theoretical knowledge with real workplace environments, develop autonomy and apply professional reasoning under realistic conditions. This shifts delivery from procedural competency to applied professional capability, consistent with the expectations for graduates who will contribute to equipment reliability, testing, validation and operational performance across the resources sector.

The architecture must support learning that requires analysis, evaluation, conceptual understanding and applied professional judgement. Teaching approaches must enable learners to integrate theoretical knowledge with real workplace environments, build autonomy and apply problem solving skills under realistic conditions. This supports equitable participation by enabling learners with strong practical experience, including tradespeople and mid-career workers, to succeed in higher level study through applied learning pathways.

Academic Governance and Quality Assurance

Delivery at AQF Level 7 requires governance arrangements that ensure the integrity and consistency of academic processes. The implementation architecture must therefore support:

- structured academic governance bodies that oversee curriculum, assessment and academic integrity,
- clear policies for progression, academic misconduct, moderation and appeals,
- processes for monitoring learner performance and initiating early intervention, and
- professional development for staff teaching and assessing higher level learning.

These arrangements mirror the academic quality frameworks used in higher education and are essential for protecting qualification credibility and ensuring that delivery is consistent across providers and locations.

Higher Level Assessment Requirements

Assessment practices must demonstrate advanced cognitive skills and independent judgement. The implementation architecture must also enable RTOs to deliver assessment that includes:

- case based analysis and workplace related investigations,
- scenario driven decision making that tests professional judgement,
- independent tasks not reliant on employer discretion,
- assessment rubrics that articulate higher order expectations, and
- rigorous moderation to ensure fairness and consistency.

These practices reflect AQF Level 7 standards and align with employer expectations for applied professional roles. The also support equity by providing clear expectations and consistent standards across diverse learner groups.

Work Integrated Learning and Assessment as a Core Implementation Requirement

Informed by national policy settings and industry consultations, the implementation architecture must treat work integrated learning and assessment as a central organising element of the Vocational Degree.

Simulation and scenario based learning and assessment can assist with preparation but cannot replicate the conditions of real operational environments, including risk, fatigue, production pressures, competing priorities, and the professional responsibility associated with real equipment and system performance.

The implementation architecture must therefore support substantial, structured and quality assured workplace learning and assessment, including:

- minimum supervision and mentoring requirements,
- workplace suitability criteria covering safety, cultural capability and technical scope,
- mechanisms for monitoring learner wellbeing and psychosocial safety,
- clear documentation of learning outcomes achieved in the workplace, and
- assessment tasks that integrate workplace experience with independent academic judgement.

These structures ensure that learners develop the judgement, capability and contextual understanding expected of applied professionals. Work integrated learning supports equity by providing real world learning pathways for learners who benefit from applied, experiential learning, particularly mid-career workers, Aboriginal learners and migrants entering unfamiliar education systems.

Foundation Skills and Learner Support Systems

The implementation architecture must support embedded foundation skill development for learners transitioning into higher level study, particularly mid-career workers, tradespeople and culturally diverse learners. This includes support in academic writing, mathematics, digital literacy, technical communication and analytical reasoning. Learner support systems must also accommodate non-standard work patterns, including FIFO, shift rosters and regional or remote locations, ensuring that assistance is accessible outside standard hours and through multiple modes. These supports are essential for addressing barriers identified across the people domain.

Recognition of Prior Learning and Structured Pathways

The implementation architecture must incorporate clear, equitable and defensible pathways into, through and beyond the Vocational Degree. Many prospective learners will enter the qualification with extensive industry experience, trade qualifications or partial higher education study. Recognition of prior learning must therefore be capability based, academically rigorous and aligned with the cognitive expectations of AQF Level 7. RPL processes must allow learners to demonstrate higher level judgement, problem solving and contextual reasoning developed through workplace practice, while ensuring that credit is only awarded where evidence reflects the applied professional capability required of the qualification.

Entry pathways must also support learners transitioning from Certificate III, IV and Diploma level qualifications. These pathways should consider academic preparation, foundation skills and work experience holistically, ensuring that learners are supported to succeed in higher level study. Bridging modules, diagnostic assessment and tailored learning support may be required for learners whose academic or foundation skills need development, particularly those returning to study after many years.

Pathways beyond the Vocational Degree are equally important. The implementation architecture must include mechanisms that support graduates to progress into higher education qualifications, including AQF Level 8 or postgraduate coursework degrees in fields such as engineering, reliability engineering, asset management or applied sciences. Clear articulation arrangements, credit recognition agreements and alignment with higher education admission requirements will be essential to ensuring that the Vocational Degree sits coherently within the broader tertiary system. These pathways support learner mobility, strengthen the applied professional profile of graduates and align the qualification with national tertiary reform priorities.

Together, these RPL and pathway arrangements ensure that the Vocational Degree is accessible to diverse learners on entry, academically rigorous during delivery and connected to further learning opportunities on graduation. They reinforce the access and equity intent of the qualification while maintaining its standing as an AQF Level 7 pathway supporting professional progression in the resources sector.

Provider Capability Requirements

RTOs delivering the qualification must demonstrate capability to operate within this implementation architecture, including:

- staff with discipline expertise and higher level teaching capability,
- systems for academic governance, assessment integrity and moderation,
- capacity to support regional, remote and shift working learners,
- structured partnerships with employers and OEMs, and
- mechanisms to ensure cultural and psychosocial safety across learning contexts.

These requirements establish the operational threshold necessary for high quality delivery at AQF Level 7.

Integrated Partnership Structures

Finally, the implementation architecture must include partnership models that bring together RTOs, employers, contractors, OEMs and community organisations. No single organisation can meet all requirements for the qualification. Partnerships must ensure access to equipment, data, technical supervision, cultural capability and workplace learning and assessment environments that collectively support the development of applied professional capability. Collaboration supports equitable access to quality learning for learners across diverse sites and regions.

The Vocational Degree introduces a level of vocational learning not previously delivered in Australia. While both the resources sector and the VET sector have established initiatives that support workforce development, inclusion, cultural safety and quality, these initiatives were designed for different purposes and require expansion, integration and higher level capability to support equitable participation at AQF Level 7. Elements of the required system already exist in VET policy frameworks, such as foundation skills, RPL, partnership-based delivery and quality assurance processes, but they must be developed further to operate at the level of complexity, consistency and collaboration expected of higher level tertiary education.

The implementation architecture described in this section provides the structure through which these concepts can be strengthened, connected and harmonised with broader tertiary system expectations. It ensures that qualification integrity, learner safety, cultural capability and workforce relevance are embedded from the outset, while supporting diverse learners to progress into applied professional roles.

Delivering this architecture will require coordinated action between the JSC, RTOs, employers, OEMs and community organisations, reinforcing the essential role of co-design and shared implementation in achieving an accessible and equitable vocational pathway at AQF Level 7.

Access, Equity and Inclusion in Australia's Skills System

Access, equity and inclusion have become defining priorities of the Australian education and training system. Across Commonwealth, state and territory strategies, and within industry led frameworks such as those of the Minerals Council of Australia, these principles are consistently identified as essential to workforce development, economic participation, national productivity and social cohesion. The skills system is expected to provide opportunities that are available to all Australians, and particularly to those who face structural or historic barriers to participation. This section outlines how national and jurisdictional strategies, the National Skills Agreement, the National Foundation Skills Strategy, industry diversity and inclusion frameworks, and state based skills plans describe the importance of access, equity and inclusion and how these expectations have shaped the design of the Vocational Degree.

National policy settings that place equity at the centre of the VET system

The National Skills Agreement sets an explicit expectation that the VET system must be accessible, of high quality, and responsive to the needs of all Australians. Governments jointly commit to a shared national skills system that enables people from all backgrounds to obtain the skills they need to participate in the economy. The Agreement emphasises participation, opportunity and fairness, and recognises that a skilled workforce can only be created if education and training systems do not exclude those who most need pathways into work. These foundational principles shape all subsequent Commonwealth and state actions, including funding decisions, infrastructure planning and the strengthening of TAFE and community based pathways.

The National Foundation Skills Strategy reinforces this commitment. It establishes a ten year national framework to improve language, literacy, numeracy and digital capability for adults. The Strategy acknowledges that foundation skills are a critical enabler of full participation in vocational education and in the workforce. Without adequate foundation skills, adult learners cannot successfully complete qualifications, progress in employment or participate in the social and civic life of their communities. The Strategy identifies adults with low literacy or numeracy, migrants, people in regional and remote Australia, and people with disability as priority groups requiring targeted support to improve completion rates. It also emphasises the need for accessible and flexible delivery, culturally safe learning environments and the removal of financial and structural barriers. For the Vocational Degree, this confirms that foundation skill development, learner preparation and accessible course structures are essential for equitable entry, progression and completion.

Related national strategies further reinforce the importance of equitable participation. The Jobs and Skills Roadmap for Regional Australia identifies equity of access across regions as a core principle for the national skills system. The Report on Government Services states that VET must enable all working age Australians to develop and use their skills. National settlement programs such as the Adult Migrant English Program support language acquisition for new migrants so that they can participate effectively in education and training. Together these frameworks create a coherent national direction.

They place a responsibility on governments and providers to ensure that adult learners who face barriers are supported through well designed policies, inclusive pedagogies and funded support programs.

State and territory skills systems and their equity priorities

Every state and territory skills plan place access, participation and inclusion at the centre of its training system. While each jurisdiction responds to its own economic context, all are aligned to the national objective that education and training must be available to every learner, regardless of location, background or personal circumstance.

Western Australia (WA) frames access and participation as a core function of the Department of Training and Workforce Development. Its VET system includes extensive learning support, foundation skills programs, Jobs and Skills Centres across metropolitan and regional areas, and specific services for Aboriginal people and people who face barriers to employment. The WA Jurisdictional Action Plan under the National Skills Agreement commits the state to increasing access to training for Aboriginal people, young people and people with lower levels of educational attainment.

New South Wales prioritises fee exemptions, expanded foundation skills programs and targeted support for students with disability. The NSW Skills Plan outlines the importance of wraparound support, flexible delivery and early intervention for disengaged youth and adults with low foundation skills. These actions are positioned as essential to ensuring equitable access to the benefits of NSW's training and employment opportunities.

Victoria's Skills Plan emphasises economic fairness and access to training for people who face disadvantage. It focuses on strengthening foundation skills, expanding training in areas linked to gender equity and family violence prevention, and ensuring TAFEs play a system wide role in supporting equitable access. Victoria's approach positions access and equity not only as educational responsibilities but as important public value outcomes.

Queensland's Skills Strategy, Good Jobs Great Training, commits to ensuring that all Queenslanders, including those in rural, regional and remote areas, can access quality education and a good job. The Strategy recognises that equitable access is necessary for both workforce growth and social inclusion. Queensland explicitly links its equity commitments to the National Skills Agreement and positions TAFE as the central vehicle for inclusive delivery.

South Australia focuses on a connected skills system that brings together schools, training providers, industry, unions and higher education to support learner transitions. The state's foundation skills plan requires RTOs to identify learner needs and ensure access to appropriate foundation skills training, acknowledging that this is essential for equitable engagement and completion.

Tasmania and the Northern Territory have particularly strong emphasis on equity, reflecting their regional and demographic contexts. Tasmania funds programs that support people who face personal, physical or social barriers to employment, including long term unemployed people, migrants and adults with low literacy. The Northern Territory prioritises access for First Nations people, regional and remote communities, women entering under-represented industries, and disadvantaged learners through targeted investment plans and Equity Training Grants. The ACT similarly administers grants that fund community based learning for adults experiencing barriers to education, training and employment.

Across all jurisdictions, equity is understood as both a moral and economic imperative. Systems are designed to identify barriers and provide targeted supports so that people who have historically been excluded can access training, succeed in it and use it to participate in work.

Minerals sector leadership on diversity, safety and inclusion

Australia's minerals sector is a large and complex ecosystem that includes Tier one and Tier two mining operators, mining contractors, drilling and exploration companies, original equipment manufacturers, engineering and maintenance providers, labour hire firms and a wide supply chain of specialist technical and professional services. These organisations work across iron ore, coal, gold, base metals, critical minerals and rare earths, and operate in locations that range from metropolitan fabrication hubs to some of the most remote communities in Australia. The scale and diversity of this sector mean that workforce practices, safety systems and community expectations must be consistent and robust across multiple employers, sites and regions. This context shapes the sector's approach to access, equity, safety and inclusion.

The Minerals Council of Australia positions diversity, safety and inclusion as critical to workforce performance, risk management and long term social licence. Its policy frameworks emphasise that mining workplaces must be respectful, culturally safe, psychologically safe and representative of the communities in which operations occur. The MCA's Industry of Choice Framework and the Towards Sustainable Mining protocols require member companies to strengthen gender equity, increase Aboriginal and Torres Strait Islander employment, address discrimination and harassment, improve psychosocial safety, and report transparently on workforce culture indicators. These expectations apply not only to large operators but also to contractors, service companies and supply chain partners that form a significant proportion of the sector's workforce.

Across the sector, companies have recognised that inclusive workplaces directly contribute to safety, productivity, workforce attraction, retention and innovation. Major operators such as BHP, Rio Tinto and Fortescue have established large scale diversity and inclusion programs focused on gender equity, First Nations participation and respectful workplace culture. Mining contractors including Thiess, Macmahon and NRW Holdings have implemented targeted trainee programs, gender equity strategies and culturally safe employment pathways that support new entrants and underrepresented groups. Original equipment manufacturers and heavy industry service organisations have developed apprenticeship programs, mentoring initiatives and cultural capability frameworks to broaden participation in technical and trade roles. These actions demonstrate that inclusion is viewed as a capability requirement that strengthens operational performance across the entire value chain.

The sector's commitment to access, equity and inclusion reinforces and complements national and jurisdictional strategies that seek to increase participation in education, training and employment. Mining companies operate in communities with diverse cultural identities and often in regional and remote areas where employment opportunities have significant social and economic impacts. Ensuring that workplaces are inclusive and culturally safe is essential to attracting local workforces, building community trust and supporting long term regional development. These expectations influence the design of qualifications, the structure of work integrated learning, and the development of culturally safe training and assessment practices.

Why access, equity and inclusion are essential to national outcomes

Taken together, the policy and industry frameworks show that access, equity and inclusion are not standalone initiatives. They form an integrated system responsibility that touches every stage of the education and training journey. They matter for Australia for several interconnected reasons.

Workforce participation and productivity

Australia requires a highly skilled and adaptable workforce to meet the demands of a changing economy, including digital transformation, the net zero transition and major sector workforce shortages. These national goals cannot be achieved if large groups of Australians cannot access or complete training. Inclusive education systems directly increase participation, labour supply, productivity and regional economic resilience.

Addressing structural and historical inequities

Many Australians face entrenched barriers to training and employment, including Aboriginal and Torres Strait Islander people, migrants with limited English, people with disability, people in regional and remote areas, women in male dominated occupations, and adults with low foundation skills. Equity strategies are necessary to reduce these barriers and create pathways that support long term social and economic participation.

National cohesion and social inclusion

Education and training deliver benefits beyond workforce outcomes. Accessible and inclusive systems support social inclusion, community participation and stronger civic engagement. National strategies recognise that equitable participation in education is central to building a fair and cohesive society.

System coherence and consistency

The National Skills Agreement and related frameworks aim to create a consistent national skills system where all Australians receive equitable access to high quality provision regardless of where they live. Jurisdictional plans operationalise this by embedding inclusion into funding, infrastructure, guidance, quality systems and provider obligations.

Industry performance, safety and social licence

Across the minerals sector, inclusive and culturally safe workplaces are recognised as essential to performance, safety and workforce retention. Major mining companies, contractors, original equipment manufacturers and industry bodies have all identified that diverse teams, respectful culture and equitable access to career pathways strengthen operational outcomes and support long term workforce sustainability. These expectations extend to the education and training system, which is expected to prepare learners to enter workplaces that meet high standards of safety, cultural capability and inclusion. For the Vocational Degree, this means designing learning and assessment that reflect contemporary workforce expectations, provide equitable access to workplace learning, and contribute to the sector's broader social licence and community relationships.

Sustainability of the VET and tertiary systems

Equitable access to training supports sustained enrolment, progression and completion. Without inclusive systems, attrition rises, learner confidence decreases and the training market fragments. Inclusion is therefore a core sustainability measure for the VET sector.

Implications for the Vocational Degree

The Vocational Degree sits at the intersection of workforce demand, tertiary reform and national commitments to equitable participation. The analysis of national, state and industry strategies indicates that the inclusion of access, equity and participation principles is not optional but a foundational requirement for an AQF Level 7 qualification designed for applied professional roles. Embedding these principles has specific implications across the four domains of people, operations, client and community, and risk (Figure 6).

Figure 6 Access and Equity Impact Domains

Source: With thanks to Eliza-Jane Young, Senior Advisor – Senior Advisor, Social Performance - QLD at Thiess.

People: Participation, Workforce Development and Learner Access

The Vocational Degree must create equitable pathways into higher level vocational learning. This requires structures that support diverse learners, including mid-career workers, tradespeople, women, Aboriginal and Torres Strait Islander learners, migrants, people with disability and those with lower levels of academic preparedness. Accessible entry pathways, culturally safe learning environments, and embedded foundation skills are essential. These actions address structural barriers and support national goals for increased participation in priority industries.

Mining and Automotive Skills Alliance

Operations: Qualification Design and Provider Capability

The qualification needs an operational framework that reflects higher level cognitive expectations and aligns with workforce needs. Work integrated learning must be accessible, structured and supported to ensure consistent experiences across operators, contractors and regional contexts. Providers must demonstrate the capability to deliver AQF Level 7 learning, including rigorous assessment, academic governance and learner support systems that accommodate diverse participation. This is an operational requirement that strengthens the integrity, recognisability and transferability of the qualification.

Client and Community: Social Licence, Regional Equity and Inclusive Workforce Development

Mining and resources companies emphasise the importance of diverse, inclusive and culturally safe workplaces. The Vocational Degree can contribute to these industry expectations by preparing graduates to work respectfully in regional and remote communities and by strengthening local employment pathways. Ensuring that training is available outside metropolitan centres and responsive to community needs enhances the sector's social licence and aligns the qualification with state and territory workforce strategies that prioritise inclusive regional growth.

Risk: Mitigation Through Early Design and System Alignment

The national evidence base identifies risks that arise when qualifications are not designed for equitable access. These include low participation rates, high attrition, limited employer adoption and regulatory non alignment. Embedding diversity and inclusion principles during qualification design mitigates these risks by ensuring that providers, employers and learners are supported from the outset. This creates a more resilient qualification system with stronger completion outcomes and clearer alignment to government reforms.

Opportunity for National Impact

The Vocational Degree provides a structured opportunity to give effect to national and industry expectations for equitable participation in higher level vocational learning. It strengthens pathways into applied professional roles that are central to Australia's economic and social future and contributes to a more inclusive workforce across the mining and resources sector. By aligning qualification design with evidence based access and inclusion principles, the Vocational Degree responds directly to the national landscape and delivers measurable benefits to learners, industry and communities.

Analysing the Opportunities and Challenges

The development of the Vocational Degree has been informed by detailed evidence based analysis of the opportunities and challenges that affect equitable participation in higher level vocational learning across the resources sector. These insights were derived from national and jurisdictional strategies, industry workforce priorities and targeted consultation undertaken during Phase 2. The analysis identifies the conditions that support or limit participation, the operational requirements for high quality delivery, the expectations of employers and communities, and the risks that must be mitigated to ensure learner success. Organising these insights across four domains, people, operations, client and community, and risk, provides a structured way to interpret the evidence and to identify the design principles that will underpin an accessible, equitable, scalable and sustainable AQF Level 7 qualification.

People Domain

The people domain considers who will participate in the Vocational Degree and the conditions that influence their ability to enter, engage and succeed at an AQF Level 7 level. Evidence from national and jurisdictional strategies, workforce planning documents and targeted consultation during Phase 2 points to several clear opportunities for broadening participation in higher level vocational learning, alongside persistent challenges that must be addressed through qualification design.

A central opportunity is the capacity to create a structured applied professional pathway for mid-career workers and experienced tradespeople who have strong practical capability but have historically had limited opportunities to transition into higher level technical or engineering related roles. Consultation reaffirmed that these workers often have deep industry experience that can be recognised through RPL, and many are motivated by the prospect of career progression that does not require leaving employment or relocation This aligns with national goals to increase the participation of working adults in higher level training.

There is also significant opportunity to strengthen participation among regional and remote learners who are under-represented in higher education pathways. State and territory strategies consistently highlight that participation in regional areas is constrained by geography, reduced access to providers, cost barriers and limited availability of local higher level study options. The Vocational Degree can address this by enabling earn while you learn models, flexible delivery and local access to work integrated learning supported by employers already active in these regions.

Other opportunities relate to groups that industry and government have identified as priority cohorts. Aboriginal and Torres Strait Islander learners emphasised the importance of culturally grounded learning environments, visible support structures and training that aligns with community priorities and employment pathways. The qualification can provide culturally safe entry points into applied professional roles in mining and resources and can strengthen local employment options without requiring relocation. Women seeking entry into trade and technical pathways in the resources sector represent another significant opportunity, particularly as major mining companies and contractors have made explicit commitments to increasing female participation in operational and technical roles. The Vocational Degree has the potential to create clearer, more supported pathways for women into roles that have historically lacked accessible higher level entry points.

Migrants with engineering experience or trade backgrounds also represent an opportunity for the qualification. National settlement and foundation skills strategies highlight the need for structured pathways that allow skilled migrants to build technical communication, gain Australian contextual knowledge and obtain qualifications that support progression. Consultation indicated that many migrant workers in the sector face barriers related to technical language, unfamiliar assessment practices and limited recognition of prior learning. A vocational degree structure that integrates preparation, support and RPL can address these gaps.

At the same time, several challenges must be addressed to ensure that the qualification is genuinely accessible. Financial pressures remain a significant barrier, particularly for learners supporting families, paying mortgages or working FIFO rosters with limited paid study time. National policy documents emphasise cost as a major access barrier to higher level study, especially among adults with existing financial commitments. Academic preparedness is another challenge. Many potential learners have not engaged in formal study for many years or have limited experience with academic writing, data analysis or theoretical reasoning at a higher level. Foundation skills, particularly in technical communication, digital literacy and analytical writing, will need to be embedded or supported through preparatory learning building capability and confidence.

Digital exclusion affects a proportion of regional and remote learners and many mid-career workers. Distance based learning relies on stable connectivity, reliable devices and confidence with digital platforms. Without deliberate design, digital inequity can compound access barriers. Language and communication barriers also affect many learners, particularly migrants and people for whom English is an additional language. Technical vocabulary, safety documentation, engineering concepts and written assessments present challenges that require explicit instructional design support.

Ensuring cultural safety for Aboriginal and Torres Strait Islander learners is essential. Consultation indicated that experiences of racism, unsafe learning and workplace environments or a lack of culturally competent trainers can undermine participation and completion. Women and culturally diverse learners also reported that workplace dynamics, psychosocial safety issues and a lack of visible role models can affect confidence and belonging. Learners with disability or neurodiversity require predictable structure, universal design for learning, and consistent access to assistive technologies. Caring responsibilities and non-standard work arrangements, including FIFO and shift work, affect time, energy and access to support outside standard hours. Many learners also identified a need for strong peer support, mentoring and community connection to sustain engagement.

These opportunities and challenges have direct implications for qualification design. They indicate the need for flexible and transparent entry pathways that recognise experience and capability, structured RPL processes, bridging and foundation skill supports, culturally safe learning and assessment environments, flexible delivery that accommodates shift work and regional contexts, trauma aware practice, and learner support systems that account for caring responsibilities and variable working arrangements. For the Vocational Degree to support the development of an applied professional workforce in the resources sector, these considerations must be embedded as core design features rather than supplementary supports.

Operations Domain

The operations domain focuses on the structures, processes and delivery systems that will enable the Vocational Degree to function effectively as an AQF Level 7 qualification in the vocational education and training sector. Analysis of national and jurisdictional strategies, industry expectations and the consultation undertaken through Phase 2 highlights a set of operational opportunities that can strengthen the qualification, alongside challenges that must be addressed to ensure accessible, high quality and equitable delivery.

A major operational opportunity is the capacity to design work integrated learning so that it is substantial, structured and aligned to real industry environments while also remaining accessible to a diverse learner group. Industry partners emphasised that structured workplace learning supported by clear expectations, mentoring and supervision can strengthen skill development and provide the contextual understanding required for applied professional roles. National training reform and industry safety expectations also recognise that work integrated learning is a key mechanism for embedding industry standards, psychosocial safety practices and inclusive workplace behaviour. By designing work integrated learning that is explicit, properly supervised and quality assured, the degree can leverage the strength of the VET sector while meeting higher level cognitive and technical expectations.

Another opportunity relates to earn while you learn models that allow learners to maintain employment while completing higher level study. This is particularly important in the resources sector where the workforce includes mid-career workers, tradespeople and technicians who cannot cease work to undertake study. Employers consistently indicated support for models that enable learning to occur alongside employment, whether through apprenticeships, traineeships, cadetships or structured rotations. This aligns with the National Skills Agreement and state based workforce strategies that highlight the need for flexible pathways for working adults. Integrating earn while you learn structures into the qualification can strengthen participation and retention, reduce financial barriers and increase employer engagement.

There is also an opportunity to use the Vocational Degree to set higher expectations for provider capability in areas such as academic governance, quality assurance, delivery of higher order cognitive skills and integration of workplace and academic learning. Providers who deliver the qualification will need systems that reflect higher level academic expectations, including robust assessment design, moderation and validation processes, and the capacity to monitor learner progress and provide targeted support. This is consistent with the direction of VET sector reforms which emphasise quality, integrity and capability building at higher AQF levels. The qualification therefore presents an opportunity to strengthen provider readiness and to model the kinds of governance and support arrangements that will be required as more higher level vocational qualifications emerge in future national work.

While these opportunities strengthen the qualification, several operational challenges must be addressed. A significant challenge relates to the variability in the capacity of employers, particularly small and medium enterprises, to support high quality work integrated learning. Consultation revealed that not all workplaces have the staffing, supervision capability or administrative capacity to host learners at a vocational degree level. Some may lack the ability to provide structured mentoring or to release staff for training. Ensuring that workplace learning is of consistently high quality despite these variations is a core challenge that will require clear standards, transparent expectations and support for employers.

Another challenge is the potential inconsistency in workplace learning experiences across sites and regions. The resources sector includes large multinational operators, mid-tier miners and contractors with varied organisational structures and safety practices. Without clear quality frameworks, learners may experience different levels of supervision, exposure to technical tasks or support for cultural safety. National and state strategies emphasise the importance of equitable access to high quality training regardless of location. This means the qualification must include design features that ensure consistency, such as minimum supervision requirements, training agreements and structured assessment tasks independent of the workplace.

Administrative complexity is another challenge raised in consultation. Learners, particularly mid-career workers and migrants, can find it difficult to navigate RPL, admission processes, provider systems and the interaction between workplace and academic requirements. Providers will need to invest in clear guidance, streamlined processes and learner support systems that prevent administrative barriers from limiting participation. This includes ensuring that learners can access assistance outside standard hours, an important consideration for FIFO workers and shift workers.

The operational domain also includes challenges associated with technology and delivery infrastructure. Many regional learners experience connectivity issues that affect their ability to participate in online learning, assessment or communication with trainers. Industry partners noted that digital platforms need to be intuitive, mobile friendly and supported by clear induction processes. Consultation with universities also highlighted the importance of ensuring the authenticity of assessment evidence produced in workplace settings, particularly where tasks are completed by teams rather than individuals. Providers delivering at AQF Level 7 will therefore require secure systems and assessment designs that verify individual contribution within team based activities, support academic integrity and maintain fairness, transparency and consistency.

Taken together, these opportunities and challenges highlight that the operational design of the Vocational Degree must be deliberate, rigorous and responsive to the realities of the resources sector. Clear work integrated learning structures, strong academic governance, flexible delivery models and consistent employer engagement will be essential to ensure that the qualification is accessible, equitable and aligned with industry expectations. Addressing these operational factors from the outset will strengthen the credibility, transferability and long term sustainability of the Vocational Degree.

Client and Community Domain

The client and community domain considers how the Vocational Degree can strengthen community outcomes, support industry expectations and contribute to broader social and economic priorities. The resources sector operates in diverse communities across Australia, including remote regions, regional centres and metropolitan areas where mining services, contracting and equipment manufacturing play significant roles. Analysis of national and state strategies, combined with stakeholder consultation, highlights several opportunities for the qualification to strengthen community outcomes, alongside challenges that must be addressed to ensure that the qualification contributes positively to local, regional and industry contexts.

A significant opportunity in this domain is the potential for the Vocational Degree to strengthen local and regional employment pathways. Many resource operations are located in regional and remote communities where access to higher level qualifications is limited. State and territory workforce strategies highlight the economic and social benefits of increasing local employment in regional areas, reducing FIFO dependence and supporting long term community resilience.

By creating a higher level vocational pathway that is accessible to people already living and working in these regions, the qualification can support regional development, broaden local career options and reduce the need for relocation.

Another opportunity relates to building stronger community relationships and enhancing the social licence of the resources sector. Major mining companies and contractors have made visible commitments to inclusion, safe workplaces and respectful engagement with Aboriginal communities.

The qualification can support this by ensuring that graduates have the cultural capability, communication skills and ethical awareness needed to work in diverse community settings. Consultation confirmed that employers value graduates who can operate respectfully in Aboriginal communities, work collaboratively with local organisations and contribute to positive community relationships.

Embedding cultural capability and community engagement principles into the qualification design aligns with these expectations and strengthens the sector's long term social licence.

There is also an opportunity to support the participation of under-represented groups who bring important skills and perspectives to local communities. Increasing the representation of women in technical roles, strengthening opportunities for Aboriginal learners, and providing structured pathways for migrants are all priorities reflected in state and national strategies. The qualification can assist by providing a clear, supportive and equitable pathway into applied professional roles that are available in the communities where these groups live and work. Consultation indicated strong interest from community leaders and Aboriginal organisations in pathways that build local capability in areas such as reliability engineering, operational technology and asset management.

Alongside these opportunities, several challenges must be addressed. Geographic isolation remains a significant barrier in some regional and remote communities. Learners may face long travel distances, limited public transport and inconsistent access to local training facilities or reliable internet. These factors can affect participation in online learning, access to support and engagement with assessment requirements. Consultation also highlighted that community based learners often juggle family responsibilities, cultural obligations and work demands, requiring flexible and predictable learning structures that respect community rhythms and obligations.

Another challenge relates to the variability of community based support systems. Some regions have strong community networks, local training providers and employer partnerships that can support learners, while others have limited services. This variation means that the qualification must not assume the presence of consistent local support and must incorporate design features that can operate effectively in communities with limited infrastructure. This includes culturally safe and trauma informed teaching and learning practices, clear communication with learners and community leaders, and mechanisms for remote support.

Cultural safety is an essential consideration for Aboriginal learners and community based participants. Consultation highlighted that learners may experience racism or cultural invalidation in education or workplace settings and that these experiences can affect retention and wellbeing. To support participation and success, learning and workplace environments must be culturally grounded, respectful and guided by Aboriginal perspectives. This includes ensuring that any work integrated learning on Country is shaped by local cultural authority rather than generic corporate modules, and that regional providers and employers engage with the relevant Traditional Owner groups. Placement sites must demonstrate proven cultural safety, with careful consideration of past issues, complaint histories and existing relationships.

Ongoing mentoring from Traditional Owners, Aboriginal staff or community partners should be embedded across the learner journey, rather than delivered as isolated sessions. Providers and employers must also offer flexibility for cultural obligations such as sorry business, ceremony and family responsibilities to ensure that Aboriginal learners can participate in ways that align with cultural expectations and community needs.

The client and community domain therefore establishes that the Vocational Degree must be designed to strengthen local workforce capability, support diverse communities, and contribute to respectful and sustainable relationships between the resources sector and the regions in which it operates. This requires flexible delivery models, culturally capable learning environments and assessment practices, and strong partnerships with employers and community organisations. Embedding these expectations into the qualification design ensures that the Vocational Degree not only prepares individuals for applied professional roles but also contributes to the long term social and economic wellbeing of the communities that support the resources sector.

Risk Domain

The risk domain considers the potential risks that may affect equitable participation, the quality and integrity of the Vocational Degree and the wellbeing of learners as they move between education and workplace environments. National and jurisdictional strategies, industry frameworks and consultation findings highlight that risks arise not only from unsafe workplaces or inadequate delivery systems but also from structural inequities, inconsistent learning environments and the absence of clear safeguards for diverse learner groups. Addressing these risks through qualification design is essential for meeting government expectations, maintaining provider accountability and supporting long term learner success.

One of the most significant risks identified relates to psychosocial safety in both training and workplace learning environments. Industry stakeholders acknowledged that learners from under-represented groups, including women, Aboriginal and Torres Strait Islander learners, migrants and culturally diverse workers, can experience racism, sexism, harassment and exclusion in some settings. National reforms under the Respect at Work framework and new psychosocial risk regulations emphasise that organisations must prevent harm rather than respond after incidents occur. For the Vocational Degree, this means designing work integrated learning structures that require employers to demonstrate safe, respectful and inclusive environments, and ensuring that learners have mechanisms to report concerns and access support.

Another major risk relates to inequitable access to support, infrastructure and learning environments. Learners in regional and remote communities may experience unreliable internet, limited access to computers or digital tools and inconsistent opportunities for local support. Without explicit design features, these disparities can widen participation gaps and contribute to lower completion rates for learners outside metropolitan centres. Providers must therefore implement delivery models that account for uneven digital access and must ensure that offline or low bandwidth participation options are available where required.

The transition from industry to academic learning presents another risk. Many potential learners are mid-career workers who have not engaged in formal study for extended periods and may have limited experience with academic writing, analysis or theoretical reasoning. In many cases the issue is not a lack of capability, but a lack of confidence in applying these skills in an academic context. Without clear preparation pathways and embedded foundation skill development, learners may face early academic difficulties that can affect confidence and retention.

This risk is heightened for learners with disability, neurodiversity or English as an additional language who may require structured accommodations and consistent access to assistive technologies or language support.

Work integrated learning introduces additional operational and safety risks. Variation in employer capacity, supervision capabilities and workplace culture can result in inconsistent learner experiences and exposure to unsafe or unsupported environments.

Without clear standards, oversight and assessment structures, learners may be placed in situations where learning outcomes cannot be met, or where safety and wellbeing are compromised. Industry partners noted that some workplaces, particularly small and medium enterprises, may not have the staffing, governance systems or scope of work to host higher level learners without additional support.

Administrative and system navigation risks were also identified. Mid-career workers, migrants and learners with caring responsibilities may find it difficult to navigate provider systems, enrolment processes, RPL, workplace learning documentation and academic integrity requirements. If administrative processes are complex or unclear, learners may disengage early or be unable to progress through key stages of the qualification. Providers must therefore ensure that systems are transparent, guidance is clear and support is available outside standard business hours to accommodate shift and FIFO workers.

There are also risks associated with inequitable recognition of prior learning. If RPL processes are not rigorous, transparent and fair, learners may either be over credited or under credited based on previous experience, which may undermine the integrity of the degree or discourage learners who feel their skills are not recognised. The qualification must support consistent, evidence based RPL processes that recognise capability while maintaining AQF Level 7 expectations.

The risk domain makes clear that the Vocational Degree must incorporate strong safeguards through its design, governance and implementation. This includes establishing culturally safe and inclusive learning and workplace environments, ensuring that work integrated learning is properly supervised and quality assured, embedding foundation skill development and learner support, implementing accessible digital and administrative systems and setting explicit expectations for employer partners. Mitigating these risks from the outset will strengthen learner confidence, protect wellbeing, uphold qualification integrity and ensure that the Vocational Degree is a credible, equitable and sustainable pathway into applied professional roles.

Implications for the Vocational Degree

The evidence across the four domains indicates that the Vocational Degree must be intentionally designed to support diverse learners, ensure consistent and high quality delivery, strengthen community outcomes and mitigate risks associated with participation at an AQF Level 7 level. The analysis demonstrates that access, equity and inclusion are foundational rather than peripheral considerations. They inform the structure of entry pathways, the integration of work integrated learning, the expectations placed on provider capability and the relationships between education, industry and communities.

Across the people domain, the evidence shows that learners will come from varied backgrounds, including mid-career workers, tradespeople, Aboriginal learners, women entering technical fields, migrants and people with disability or neurodiversity. Many will require structured support to transition into higher level study, including foundation skills in academic writing, technical communication and digital literacy.

The qualification must therefore incorporate flexible and transparent entry pathways, clear recognition of prior learning, culturally safe learning environments and learner support systems that account for diverse circumstances, including regional location, caring responsibilities and FIFO work patterns.

From an operations perspective, the qualification must reflect the higher level academic expectations associated with AQF Level 7 while remaining grounded in the strengths of vocational learning.

Work integrated learning must be substantial, structured and accessible, with clear expectations for employers, consistent supervision and quality assurance across sites. Provider capability will be central to integrity and consistency, requiring strong academic governance, robust assessment design and effective learner monitoring. Administratively, learners will require simple and transparent processes for enrolment, RPL, placement coordination and access to support.

The client and community domain indicates that the qualification has an important role in supporting regional workforce development, strengthening local employment pathways and contributing to respectful relationships with Aboriginal communities and other regional stakeholders. The degree must support community connectedness by ensuring that delivery is available in regional and remote areas, that cultural capability is embedded and that workplace learning and assessment practices respect the diversity of local contexts. Consideration of community benefit is also essential for maintaining the social licence of the resources sector, which depends on a skilled workforce that can operate respectfully and inclusively.

The risk domain highlights the importance of protecting learners' wellbeing and ensuring qualification integrity. Psychosocial safety concerns, inconsistent workplace cultures, digital exclusion, academic preparedness gaps and administrative complexity all pose risks to participation and completion. The qualification must incorporate safeguards that require employers to demonstrate safe and supportive environments for work integrated learning, ensure that learners can access support in a timely manner, and provide clear expectations around assessment and academic integrity. Embedding universal design for learning, trauma aware practice and culturally safe approaches will be essential to reducing harm and promoting learner confidence.

Taken together, these insights show that the Vocational Degree must be designed as an accessible, equitable and high quality pathway into applied professional roles in the resources sector. Qualification design decisions should address the opportunities and challenges identified across the four domains, ensuring that the degree is robust, responsive to workforce needs and capable of supporting diverse learners to progress and succeed.

Design Principles for the Vocational Degree

The development of the Vocational Degree requires two interconnected sets of principles.

1. **Design principles**, which establish the qualification level expectations are the responsibility of the Jobs and Skills Council.
2. **Implementation principles**, which guide how RTOs, employers and workplace partners will deliver the qualification in practice.

This structure aligns with the VET system, where qualification design and operational delivery are separate responsibilities that must function in a coordinated and consistent way.

Design Principles (JSC Responsibility)

These principles define the structure, expectations and standards of the qualification. They provide the foundation for consistent national delivery and ensure alignment with AQF Level 7 outcomes, national policy settings and industry expectations.

Equitable and Transparent Entry Pathways

- Establish flexible entry conditions that recognise diverse learner backgrounds, including structured recognition of prior learning for mid-career workers and experienced tradespeople.
- Specify preparatory and bridging expectations focused on both academic confidence and capability, including technical writing, study skills and mathematics.

Embedded Foundation Skills for Higher Level Learning

- Define requirements for embedded foundation skills in academic writing, digital literacy, technical communication, numeracy and analytical reasoning.
- Ensure these expectations reflect AQF Level 7 cognitive demands while using accessible, plain language structures that remove unnecessary academic barriers.

Requirements for Substantial and Structured Work Integrated Learning

- Specify the duration, structure and purpose of work integrated learning, including expectations for supervision, mentoring and assessment that recognise team based work, individual contribution and authentic workplace practice.
- Establish minimum conditions for culturally safe and psychosocially safe workplace learning environments.

Curriculum Requirements for Cultural Capability and Community Alignment

- Embed cultural capability, ethical practice, community engagement and communication expectations within curriculum structures.
- Ensure that work integrated learning on Country is guided by local cultural authority, with formal engagement with the relevant Traditional Owner group.

Expectations for Higher Level Assessment and Academic Integrity

- Define assessment types that demonstrate AQF Level 7 outcomes, including independent analysis, problem solving and applied reasoning.
- Establish moderation, validation and academic integrity requirements consistent with higher level vocational learning in line with universal design for learning.

Provider Capability and Governance Requirements

- Set explicit expectations for academic governance, staff capability, assessment expertise and learner monitoring systems.
- Require providers to demonstrate readiness to deliver an AQF Level 7 qualification.

Role of AUSMASA as Industry Steward and System Partner

- Continue to exercise industry stewardship functions under the Jobs and Skills Council framework, including monitoring the performance, relevance and workforce impact of the vocational degree once implemented.
- Sustain national coordination of employer partnerships, work integrated learning pathways and industry capability development to support high quality and equitable learner access across regions and workplaces.
- Provide ongoing workforce intelligence, labour market analysis and feedback to government to ensure the qualification remains aligned with emerging reliability engineering capability needs, technological change and industry practice.
- Support continuous improvement by facilitating system wide moderation, reviewing training product performance data and advising on future updates to the training package where required.

Partnership Framework for Development and Delivery

- Establish partnership expectations between RTOs, employers, OEMs and community organisations to ensure access to equipment, expertise, workplace learning and technical environments.
- Require that partnerships include Aboriginal organisations and local community groups in regions where delivery occurs.
- Develop Higher Education partnerships to support articulation, capability development and discipline alignment.

Implementation Principles (RTO and Employer Responsibility)

These principles describe how the qualification will be delivered and supported in practice. They detail the operational, cultural and learner support requirements that ensure consistent, equitable and high quality learner experiences across diverse workplaces.

Delivery of Foundation Skill Supports

Provide accessible, contextualised support in academic writing, digital literacy and technical communication throughout the qualification.

Culturally Safe and Inclusive Learning Environments

- Deliver training and assessment in ways that reflect cultural safety principles, trauma aware practice and universal design for learning.
- Ensure trainers are supported to teach culturally diverse cohorts, including Aboriginal learners and learners with disability or neurodiversity.
- Embed psychological safety practices to counter workplace bias often experienced by women and migrant learners.

Accessible Delivery Models for Regional, Remote and FIFO Learners

- Offer predictable, flexible timetabling and blended delivery models that accommodate irregular shifts, rotation patterns and geographic isolation.
- Ensure digital resources are accessible for learners with varied connectivity.

High Quality Work Integrated Learning Delivery

- Provide placement supervision that meets minimum standards for learner support, cultural safety, psychological safety, and technical exposure.
- Require supervisors to have completed training in cultural safety, gender equity, neurodiversity inclusion and inclusive leadership.
- Ensure learners can access pastoral care, safety support and academic assistance during workplace learning.
- Provide structured shadowing models so underrepresented learners are not overlooked, supported by clear mentoring arrangements.

Supportive Administrative Systems

- Provide clear enrolment, RPL, scheduling and guidance processes that are easy for learners to navigate.
- Ensure support is available outside standard hours to accommodate diverse work patterns.
- Offer pre admission and ongoing conversations to identify barriers relating to cost, transport, rostering or family load and refer to appropriate supports.

Assessment Delivery and Quality Assurance

- Deliver assessment tasks according to the academic standards established in the qualification while enabling multiple modes of demonstration through universal design principles.
- Implement moderation, validation and integrity processes to ensure fairness, transparency and reliability, including verifying individual contribution within workplace team activities.

Local Partnership and Community Engagement

- Work with local employers, Aboriginal organisations and community groups to ensure that delivery is aligned to community needs and is culturally respectful.
- Engage Traditional Owners or Aboriginal community partners to support learners throughout the full learning journey, not just during discrete modules or placements.

Co-Design and Collaboration

The separation of design and implementation responsibilities highlights the structural necessity of co-design and collaboration for the Vocational Degree. No single organisation can meet all requirements.

- The JSC sets qualification standards, curriculum architecture and work integrated learning expectations.
- RTOs deliver training, assessment and learner support.
- Employers, contractors and OEMs provide technical environments, supervision and workplace learning experiences.
- Aboriginal organisations, community groups and regional stakeholders contribute to cultural capability and community alignment.

The analysis undertaken during this project shows that the resources sector already has strong initiatives in cultural safety, psychosocial safety, mentoring, workforce development and regional partnerships.

However, these initiatives are dispersed across different organisations and vary in maturity and effectiveness. The Vocational Degree can therefore serve as the mechanism that brings these elements together into a coherent, structured model.

Co-design ensures that qualification expectations are realistic and aligned with industry practice. Collaboration ensures that implementation is feasible, consistent and culturally safe across diverse workplaces. A shared model also strengthens quality assurance, reduces duplication, and supports the goal of accessible, equitable and higher level vocational learning at AQF Level 7.

This coordinated approach not only improves the viability of the Vocational Degree but also supports broader national objectives. It enables the qualification to contribute meaningfully to workforce development, regional participation, cultural safety, and the inclusive growth of the resources sector.

Leveraging Existing Sector Initiatives

The analysis undertaken for this project shows that the resources sector has already developed a substantial suite of workforce, diversity and cultural safety initiatives that can be leveraged to support the Vocational Degree. These initiatives provide a practical foundation for many of the design and implementation principles outlined in the previous section and reduce the need to create new systems where effective practice already exists. Leveraging existing strengths also supports alignment with current workforce expectations and enables the qualification to integrate smoothly into established sector structures.

Existing Workforce Development Pathways

Many operators, contractors and OEMs already offer structured development pathways for apprentices, trainees, early career employees and mid-career workers seeking progression. These programs often include supervised workplace learning, mentoring and exposure to technical environments. The Vocational Degree can build on these structures by aligning work integrated learning requirements with systems that employers already use, ensuring that higher level learning is supported by environments familiar with competency development.

Established Inclusion, Diversity and Psychosocial Safety Initiatives

Tier one miners, major contractors and OEMs have implemented visible, and, in some cases, award winning initiatives focused on gender equity, Indigenous employment, respectful workplace culture and psychosocial safety. These initiatives often include leadership capability programs, safe workplace systems, diversity networks and local community partnerships. Rather than creating new frameworks, the qualification can leverage these existing initiatives by requiring employer partners to demonstrate alignment with established cultural safety and psychosocial standards.

Regional and Community Partnerships

Many companies maintain active relationships with Aboriginal organisations, regional councils, community groups and local training providers. These partnerships support regional recruitment, community based training and culturally safe engagement. The Vocational Degree can draw on these relationships to support regional delivery, community aligned learning and local mentoring arrangements, particularly in remote areas where higher level study options are limited.

Digital Systems and Technical Environments

Resource companies and OEMs use advanced digital systems for asset management, equipment monitoring, data analytics and safety reporting. These platforms create rich environments for applied learning and higher level problem solving.

The Vocational Degree can integrate these systems into assessment and work integrated learning requirements, reducing the need for simulated environments and ensuring that learners engage with tools that reflect contemporary practice.

Employer Provided Support Services

Many employers provide employee assistance programs, onsite wellbeing services, mentoring programs and diversity networks. These support structures can be leveraged to complement academic and pastoral support provided by RTOs during work integrated learning. This strengthens learner wellbeing and provides consistent support across classroom and workplace settings.

Existing Supervisory and Mentoring Capability

Large and mid-tier organisations already train supervisors and maintain structured safety systems that support learners in apprenticeships and traineeships. The Vocational Degree can utilise this existing capability by aligning supervision expectations with current practice, while recognising that additional support may be required for smaller employers or sites with limited workforce development experience.

Alignment with Industry Performance Frameworks

Industry frameworks, including those developed by the Minerals Council of Australia and major mining companies, emphasise innovation, continuous improvement, safety, cultural capability and community responsibility. These existing frameworks can be integrated into curriculum design, graduate attributes and professional behaviours expected of learners. This strengthens relevance and ensures that the qualification contributes to the sector's long term workforce and social licence objectives.

Leveraging these systems reduces duplication, supports consistent implementation, and aligns the qualification with real workforce conditions. By building on what the sector already does well, and by embedding these practices into both design expectations and implementation requirements, the Vocational Degree will be positioned as a credible and practical pathway for applied professional roles across the resources industry.

Ensuring equitable participation also requires that multiple education and employment pathways remain available for learners entering and progressing through the Vocational Degree. Many prospective learners will come through diverse routes including trade qualifications, internal organisational development pathways, non-accredited training or partial higher education study. Access and equity principles therefore require an approach that is inclusive, flexible and aligned with the realities of the contemporary workforce. This includes protecting existing internal routes into applied professional roles, enabling recognition of prior learning for experienced workers, and supporting transitions between VET and higher education. These considerations form the foundation for the Employment and Education Pathways section which outlines how the qualification will operate within a wider ecosystem of formal and informal pathways, ensuring that learners are not disadvantaged by their starting point, employment circumstances or background.

Industrial Relations Considerations

Industrial relations considerations are central to the feasibility and national scalability of the Vocational Degree. The qualification will be introduced into a complex, federally regulated industrial environment in which award coverage, union representation and role classification remain highly contested across states and sectors. Phase 2 consultation has confirmed that the existing award system is not readily configured for innovative qualifications of this type, and that decisions about classification or fit within the specific awards cannot be made without national agreement.

To ensure that the qualification can be implemented consistently across the country, a coordinated national industrial relations process is required. This should occur through an appropriate high level national mechanism to convene unions, employer associations, peak bodies and regulators to establish the authorising environment for the Vocational Degree. Engagement through this mechanism will allow industrial stakeholders to co design the implementation framework, address potential disputes regarding award coverage, and develop shared acceptance conditions for work integrated learning, classification and progression.

This national process is essential to avoid fragmented industrial outcomes, bilateral disputes or future challenges to the qualification's application in different states. It also supports equitable participation by ensuring that learners, employers and providers operate within a clear and nationally recognised industrial framework as the qualification enters the Training Package system.

Award Structures, Capability Frameworks and Applied Professional Role Classification

Industrial relations settings in the mining and resources sector are shaped by a mix of modern awards, enterprise agreements and organisational capability frameworks. These instruments determine employment conditions, job classifications, progression pathways and the recognition of qualifications across trade, technical and professional roles. Ensuring alignment with these arrangements is essential, but phase 2 advice has confirmed that award coverage for applied professional roles associated with the Vocational Degree cannot be assumed and must be resolved through national consultation.

Although several modern awards may be relevant to different segments of the mining workforce, the Professional Employees Award 2020 may provide an appropriate pathway for graduates, subject to national agreement on classification and role interpretation. The Mining Industry Award 2020 and other industry specific awards will continue to apply to operational, trade and technical employees undertaking training while employed in existing roles.

However, award coverage for emerging applied professional roles remains a contested national issue, with unions potentially holding different views across states and sectors. A coordinated national industrial relations process, involving unions, employer associations and peak bodies convened through an appropriate mechanism will be necessary to:

- confirm whether the Professional Employees Award 2020 is the appropriate industrial home for these roles
- avoid fragmented or competing interpretations of award coverage across jurisdictions
- ensure classification outcomes support portability and consistency for graduates
- provide clarity for employers as the qualification is implemented

Until this national agreement is reached, award alignment must be treated as indicative rather than definitive, and industrial arrangements should remain open for co designed resolution during Phase 3.

How Awards Operate in Practice Across the Sector

In the mining and resources sector, award coverage generally reflects long standing distinctions between operational, trade, technical and professional roles. However, consultation confirmed that applying these traditional structures to a new AQF Level 7 vocational qualification requires caution. Award operation in practice cannot be assumed to follow existing patterns without national industrial agreement.

Operational mining employees are typically covered by:

- the Mining Industry Award 2020, or
- a site based enterprise agreement derived from this award.

Applied professional and engineering roles are commonly covered by:

- the Professional Employees Award 2020, or
- staff based contracts referencing this award.

Contractors, OEMs and service providers draw upon:

- the Manufacturing and Associated Industries and Occupations Award 2020,
- the Electrical, Electronic and Communications Contracting Award 2020,
- the Vehicle Repair, Services and Retail Award 2020,
- the Building and Construction General On Site Award 2020, or
- enterprise agreements built upon these awards.

While these arrangements provide a useful indication of how the sector currently structures technical and professional roles, phase 2 work has highlighted that award coverage for graduates of the Vocational Degree remains unsettled. As a result, current award patterns can inform planning, but they cannot be relied upon as the final determination of coverage for this qualification.

Classification During Training

Learners undertaking the Vocational Degree are likely to continue to be employed under the industrial instrument that applies to their existing role. Modern awards and enterprise agreements already contain provisions that allow employees to participate in structured training and development while retaining their current classification and entitlements. These arrangements will likely remain the basis for learner participation during work integrated learning.

Classification After Graduation

The pathway for classification after graduation will be determined through national industrial consultation. While the Professional Employees Award 2020 has been identified as a potential industrial home for applied professional roles, including engineering technologists, Phase 2 consultation confirmed that this cannot be assumed. Differences in union coverage across jurisdictions and the contested nature of applied professional classifications require a nationally coordinated approach.

Graduates *may* transition into applied professional roles where classification reflects both the AQF Level 7 outcome and the Engineers Australia Stage 1 competency standard for technologists, once alignment is confirmed. The specific award or agreement pathway for recognising graduates will need to be settled through engagement with national unions, employer associations and peak bodies.

This will ensure that classification arrangements are consistent, portable and endorsed across the sector, supporting long term mobility and workforce stability.

Enterprise Agreements and Organisational Capability Frameworks

Enterprise agreements across the mining and resources sector contain detailed job family structures, classification levels and capability expectations that guide progression into technical, applied professional and supervisory roles. These frameworks vary between organisations but consistently emphasise applied judgement, autonomy, problem solving, communication and responsibility for safe and effective operation.

Phase 2 consultation confirmed that the capability expectations embedded within enterprise frameworks align closely with the functional analysis undertaken for this project. Organisations already recognise roles that reflect applied professional practice, although the pathways into these roles have historically relied on internal development, workplace experience and non-accredited training due to the absence of a suitable AQF Level 7 vocational qualification.

The introduction of the Vocational Degree is therefore expected to complement existing enterprise structures by providing a nationally consistent qualification that formalises the capabilities associated with applied professional roles. However, the way in which the qualification is integrated into enterprise agreements will need to be informed by national industrial consultation. This process will clarify how the qualification is recognised within job families, how progression structures interact with the new credential and how existing experiential pathways will sit alongside the qualification.

This approach preserves organisational flexibility while ensuring that graduates experience consistent and equitable recognition across mining operators, contractors and OEMs. It also supports the broader objective of improving mobility and transparency in progression pathways for mid-career workers, experienced tradespeople and other learners advancing into applied professional roles.

Implications for Workforce Mobility and Access

Workforce mobility and progression in the mining and resources sector are shaped by industrial instruments, job family structures and organisational capability frameworks. These arrangements determine how experience, qualifications and capability are recognised and therefore influence movement from trade and technical roles into applied professional and specialist positions. Phase 2 consultation confirmed that while many organisations already support progression into roles such as reliability engineer or technical specialist, these pathways vary significantly because they rely on internally developed training, workplace experience and supervisor assessment.

The Vocational Degree provides a nationally consistent qualification that can strengthen these pathways by formalising the applied professional capability required for progression. However, the way in which the qualification supports mobility will depend on national industrial alignment. Enterprise agreements and capability frameworks will need to recognise the Vocational Degree as one pathway into applied professional roles, alongside existing experiential routes.

Phase 2 consultation emphasised that these internal pathways should be maintained, particularly for workers who have progressed through on the job development, and that the qualification should expand rather than replace opportunities for advancement.

A nationally coordinated approach to classification and award alignment is essential to ensure that graduates experience consistent recognition across mining operators, contractors and OEMs. Without this coordination, there is a risk of fragmented or inequitable outcomes that limit portability and undermine the purpose of establishing a coherent AQF Level 7 vocational pathway. National consultation will therefore guide how the qualification interacts with enterprise classifications, how progression expectations align with applied professional capability and how graduates transition into appropriate roles across the sector.

This approach supports broader equity and workforce participation objectives by creating clearer, more transparent pathways into higher level technical roles for mid-career workers, experienced tradespeople, women, Aboriginal employees, migrants and others who have previously relied on informal or inconsistent development mechanisms. By embedding the qualification within nationally agreed industrial frameworks, the sector can strengthen mobility, support fair recognition of capability and promote more consistent career development opportunities across diverse employment contexts.

Work Integrated Learning and Industrial Obligations

Work integrated learning is a central organising element of the Vocational Degree and must be delivered in a way that aligns fully with industrial relations requirements. Workplace learning occurs within employment contexts governed by modern awards, enterprise agreements and workplace legislation. These instruments define the conditions under which learners can undertake supervised practice, including supervision obligations, rostering and shift requirements, fatigue management rules, training release provisions and employer duty of care responsibilities. These conditions directly influence learner participation, the design of placement arrangements and the feasibility of delivering higher level workplace learning across different sites and employment contexts.

Industrial instruments determine whether learners are paid during placement, the extent to which they can undertake real work activities, the boundaries between supervised learning and productive work, and the protections available to learners who raise safety or wellbeing concerns.

These instruments also interact with cultural safety and psychosocial safety obligations under work health and safety legislation, which require employers to provide learning environments that are free from discrimination, harassment and psychosocial harm. This is particularly important for Aboriginal learners, women in technical roles, migrants and other under-represented groups who may face barriers to raising concerns within workplace structures.

Roster patterns and shift arrangements create additional considerations. Many learners will participate in WIL while working FIFO or shift based rosters, meaning that supervision availability, access to mentors, and opportunities to undertake assessment aligned tasks must be compatible with operational requirements defined in enterprise agreements. Industrial instruments also influence whether learners can undertake academic activities during off shift periods, and how fatigue management requirements apply when balancing work and study obligations.

Enterprise agreements commonly include clauses related to training support, study assistance, competency development and training plans. These provisions will influence how WIL is structured for learners already employed in trade or technical roles. Clear expectations will be needed to ensure that learning activities are recognised within the boundaries of the agreement and that supervision provided by workplace mentors aligns with both industrial and academic requirements.

Industrial relations considerations also apply to learners hosted by contractors or original equipment manufacturers. These employers operate under different awards and enterprise agreements, which may affect supervision arrangements, training release, access to equipment, and the learner's ability to undertake tasks that demonstrate higher level applied professional capability. The implementation architecture must therefore allow for variability across employer types while maintaining consistent expectations for learner safety and learning quality.

Given the complexity of these arrangements, clear national guidance will be required to ensure that WIL delivery is consistent with industrial frameworks and that learners receive equitable protections regardless of employer. This includes establishing mechanisms for safe supervision, defining role expectations for learners, clarifying the responsibilities of employers and RTOs, and ensuring protections under cultural safety and psychosocial safety obligations. Collaboration with unions, employer associations and workforce regulators will be essential to develop WIL models that are safe, consistent and accessible for diverse learners across the sector.

Workforce Mobility, Progression and Career Structures

Workforce mobility and progression in the mining sector are strongly shaped by industrial relations settings, organisational capability frameworks and enterprise agreement structures. These instruments determine how experience, qualifications and capability are recognised and therefore influence movement from trade and technical positions into senior technical and applied professional roles. Across the sector, many organisations have developed internal progression pathways into roles such as reliability engineer or technical specialist. These pathways commonly combine enterprise based training, non-accredited training, workplace experience and supervisor assessment. Steering Committee and consultation feedback indicate that these pathways were created because no suitable qualification existed. The outcomes of these internal pathways are variable because they are applied inconsistently within and across organisations.

The introduction of the Vocational Degree provides a structured, nationally consistent pathway that complements the existing employer designed routes.

It is not intended to replace current progression mechanisms, but to strengthen them by providing a formal AQF Level 7 qualification that aligns with the applied professional capability described in both enterprise job families and the functional analysis developed for this project. Maintaining existing internal pathways will be important, particularly for employees who have progressed through experiential development and on the job capability building. The Vocational Degree offers an additional option that may be used alongside, rather than instead of, these organisation specific pathways.

For this qualification to support mobility, enterprise agreements and capability frameworks will need to recognise the Vocational Degree as evidence of applied professional capability. Such recognition will ensure that graduates experience consistent classification and fair progression across mining operators, contractors and OEMs.

Ensuring alignment between the Vocational Degree, enterprise agreement classifications and organisational capability frameworks is therefore essential. This alignment will provide graduates with a transparent progression pathway and support portability across employers. It will also maintain flexibility for organisations that wish to retain experiential or internal development routes, while ensuring these pathways sit alongside a recognised national qualification.

This approach supports equity by providing multiple supported pathways into applied professional roles for mid-career workers, experienced tradespeople, women, Aboriginal employees, migrants and others who may previously have relied on ad hoc or informal development processes.

Recognition of the Vocational Degree within Enterprise Agreements

Enterprise agreements are the primary mechanism through which mining organisations structure job classifications, remuneration arrangements and capability expectations for technical and applied professional roles. These agreements often contain detailed job family descriptions and progression criteria that reflect the increasing autonomy, complexity and judgement associated with higher level roles. Phase 2 consultation confirmed that the capability profile developed for the Vocational Degree aligns closely with the expectations already embedded in many of these organisational frameworks.

The Vocational Degree is therefore expected to complement existing enterprise arrangements by providing a nationally consistent credential that formalises applied professional capability. However, Phase 2 consultation also highlighted that recognition of the qualification within enterprise agreements will need to follow the outcomes of national industrial consultation. This process will clarify how the qualification is positioned relative to existing job families, how it interacts with experiential or organisation specific pathways and how progression into applied professional roles is structured across the sector.

The inclusion of the Vocational Degree as a recognised pathway within enterprise agreements may support clearer and more consistent mobility into applied professional and technologist classifications, once national alignment on award coverage and role interpretation is achieved. It will also provide a transparent mechanism for recognising the capability of mid career workers and experienced tradespeople who seek advancement into higher level roles.

Importantly, Phase 2 consultation emphasised that the qualification should not replace existing internal development routes. Many organisations have established progression mechanisms based on workplace experience, supervisor assessment and enterprise based training. These pathways remain valued and should continue to operate alongside the qualification. The Vocational Degree offers an additional, nationally recognised option that strengthens capability development without constraining organisational flexibility.

Through nationally coordinated industrial consultation, the sector will be able to confirm how the qualification is treated within enterprise agreements, ensuring that recognition is consistent, portable and aligned with broader workforce mobility objectives.

Learning and Working Conditions for Learners on WIL

Learning and working conditions during WIL are shaped by the industrial instruments and workplace arrangements under which learners are employed. These settings include modern awards, enterprise agreements, roster structures, fatigue management requirements and work health and safety legislation. Together, they determine the conditions under which learners can safely undertake supervised practice and participate in workplace activities that contribute to higher level capability development.

Phase 2 consultation confirmed that these conditions will vary across mining operators, contractors and OEMs, and that assumptions about uniform WIL arrangements cannot be made.

Differences in roster cycles, supervision availability, workplace cultures and training support provisions mean that national guidance will be required to ensure that WIL is delivered consistently and equitably across the sector. This guidance will need to be developed through national industrial consultation to ensure that WIL requirements align with duty of care obligations, supervision rules, productive work boundaries and organisational expectations.

Roster patterns, including FIFO, DIDO and shift based arrangements, present particular challenges. Learners working these rosters may have limited access to supervisors during scheduled learning times, reduced opportunity for structured tasks and constraints imposed by fatigue management rules. Delivery models and assessment approaches must therefore be designed to align with industrial and operational realities, ensuring that learners can meaningfully participate in WIL without compromising safety, wellbeing or workplace obligations.

Industrial instruments also define the boundaries between supervised learning and productive work. Phase 2 consultation emphasised the importance of clear expectations so that learners are not placed in situations where responsibilities exceed their level of competence or conflict with their learner status. This is particularly important for cultural safety and psychosocial safety, where learners may be vulnerable to power imbalances, discrimination or unsafe reporting pathways. Nationally consistent expectations for supervision, escalation, and learner support will be necessary to ensure safe participation, particularly for women, Aboriginal learners, migrants and others who may experience barriers within workplace structures.

Enterprise agreements commonly include provisions for training support, study assistance and competency development. These provisions will continue to support employees progressing through internal development pathways, and WIL arrangements for the Vocational Degree will need to operate alongside these existing mechanisms. Phase 2 consultation made clear that the qualification should expand access to development opportunities, not limit or restructure existing organisational practices.

Given the diversity of industrial arrangements across the sector, national guidance will be required to:

- define supervision expectations for WIL
- clarify employer and provider responsibilities
- ensure compliance with cultural and psychosocial safety obligations
- support consistent access to learning opportunities across different roster structures and employment contexts

This national approach will ensure that learners have equitable access to high quality workplace learning environments and that WIL can be delivered in a way that is both industrially compliant and educationally robust.

Mining and Automotive Skills Alliance

Alignment with National Workforce Strategies and Tertiary System Expectations

Industrial relations settings intersect closely with national workforce strategies that emphasise clearer progression pathways, improved mobility between VET and higher education and stronger alignment across the tertiary system. Phase 2 consultation confirmed that the Vocational Degree supports these national objectives by creating a structured applied professional pathway at AQF Level 7, addressing a capability gap that sits between traditional trade classifications and bachelor degree qualified engineers.

The National Skills Agreement promotes a more integrated tertiary system in which qualifications at the same AQF level provide comparable opportunities for employment and further study. The Vocational Degree is well positioned to contribute to this objective, although the way in which graduates are industrially recognised will require confirmation through national industrial consultation. Once this alignment is achieved, the qualification is expected to sit alongside higher education programs at the same level and provide a clear route into applied professional roles across the sector.

Phase 2 consultation with universities indicates strong interest in developing bidirectional credit arrangements, including recognition of higher education AQF Level 7 units as electives within the Vocational Degree and the use of Vocational Degree units for credit into relevant higher education programs. These discussions support the broader tertiary harmonisation agenda and reinforce the application of AQF Level 7 outcomes across both sectors.

Achieving consistent workforce mobility, however, will require alignment between tertiary recognition and industrial arrangements. National industrial consultation will establish the classification and role expectations associated with the Vocational Degree, ensuring that graduates experience coherent and portable recognition across mining operators, contractors and OEMs. This coordination is essential to avoid fragmented interpretations and to enable the qualification to contribute effectively to national workforce capability, employment outcomes and long term career development pathways.

Industrial Relations Considerations for Access and Equity

Industrial relations settings have a direct influence on access and equity outcomes for learners who may enter the Vocational Degree. Many prospective learners work under industrial arrangements that include variable roster patterns, limited flexibility, or constraints arising from balancing work, family and study commitments. Phase 2 consultation confirmed that these conditions can significantly affect the feasibility of participating in structured learning and work integrated learning and that equitable participation will depend on aligning qualification delivery with the realities of industrial practice.

Learners from under-represented groups, including women, Aboriginal learners, migrants and people with disability, often experience additional barriers shaped by workplace structures and supervisory practices. Industrial protections related to cultural safety, psychosocial safety, anti-discrimination obligations and safe working hours are therefore central to supporting participation. Work integrated learning must operate within these protections and provide clear expectations for supervision, escalation pathways and learner support to ensure safe and inclusive participation.

Phase 2 consultation also emphasised that many organisations have existing internal development pathways for progressing into applied professional roles.

These pathways remain important for learners who have advanced through experiential development and workplace capability building. The Vocational Degree is intended to sit alongside these mechanisms, offering an additional structured pathway without diminishing access to organisational training support or existing progression opportunities.

Access and equity will also depend on the outcomes of national industrial consultation, which will establish consistent expectations for classification, role recognition and participation conditions across employers. Nationally agreed arrangements will support portability for learners progressing into applied professional roles and will reduce variability in how learners are supported during work integrated learning, particularly in workplaces operating under different awards or enterprise agreements.

By aligning work integrated learning with industrial protections, ensuring that supervisory practices support learner safety and maintaining flexibility for multiple progression routes, industrial relations settings can contribute to more equitable participation in the Vocational Degree. This alignment is essential to support diverse learners to progress into applied professional roles within a system that is culturally safe, psychologically safe and feasible within the constraints of their employment conditions.

Summary

Industrial relations frameworks are fundamental to the feasibility, safety and national consistency of the Vocational Degree in Reliability Engineering. Phase 2 consultation confirmed that the qualification will operate within a complex and contested industrial environment in which award coverage, classification pathways and work integrated learning arrangements cannot be assumed and will require coordinated national resolution. While existing awards and enterprise agreements provide important context, the appropriate industrial pathway for graduates must be settled through national consultation with unions, employer associations and peak bodies convened through an appropriate mechanism.

This national alignment process is essential to ensure that the qualification supports equitable learner participation, provides clear and portable recognition for graduates and operates coherently across the varied industrial settings of mining operators, contractors and OEMs. It will also guide how the qualification interacts with enterprise job families and existing internal development pathways, enabling the Vocational Degree to complement, rather than displace, organisational mechanisms for progressing into applied professional roles.

Industrial arrangements will shape how learners participate in work integrated learning, how employers meet duty of care obligations and how protections related to cultural safety, psychosocial safety and supervision are upheld. These considerations are central to supporting access and equity, particularly for learners from under-represented groups and those navigating shift based or remote working conditions.

Achieving coherent industrial alignment will strengthen workforce mobility, support tertiary harmonisation and ensure that the qualification contributes effectively to national workforce capability. Coordinated national engagement during Phase 3 will be essential to establish the conditions under which the Vocational Degree can be implemented safely, consistently and with the confidence of industry, unions and learners.

Employment and Education Pathways

National Evidence on the Importance of Education and Employment Pathways

National research consistently identifies clear, flexible and equitable pathways as essential to the effectiveness of Australia's tertiary education and training system. The Strengthening Skills Review, Australian Qualifications Framework Review and the Productivity Commission's Five Year Productivity Inquiry each highlight that fragmented and inconsistent pathways limit workforce mobility, restrict access to higher level learning and contribute to shortages in technical and applied professional roles. These reviews argue that Australia requires a more coherent tertiary system in which learners can move between VET, higher education and employment without unnecessary duplication or barriers created by sector based distinctions. They emphasise that well designed pathways support learner participation, improve retention and enable workers to progress into roles that require higher level analytical and technical capability.

Pathways are also identified as central to national commitments to tertiary harmonisation. The Australian Universities Accord Interim Report and the National Skills Agreement both call for stronger alignment between VET and higher education at comparable AQF levels, supported by transparent credit arrangements and recognition of prior learning. These reforms are intended to create a more integrated tertiary system in which qualifications at similar levels open similar opportunities for employment and further study. Jobs and Skills Australia reinforces this direction through workforce studies that show the need for tiered and stackable progression routes, particularly in technical and engineering related occupations that require a blend of vocational and higher education capability.

For the resources sector, national research confirms that pathways are essential for addressing persistent shortages in applied professional roles and for enabling mid-career transitions from trade and technical positions into jobs that require higher level diagnostic and analytical skills. Reports such as The Clean Energy Generation: workforce needs for a net zero economy and the many NCVER pathways research projects highlight that flexible progression routes are particularly important for learners who are working in regional areas, working variable rosters or returning to study after extended periods in the workforce. Embedding strong pathways into and from the Vocational Degree therefore aligns with national evidence and ensures that the qualification supports access, equity and workforce capability across a diverse learner population.

Purpose of Pathways in the Vocational Degree Context

Within this national policy environment, pathways are fundamental to the design and implementation of the Vocational Degree. As an AQF Level 7 qualification delivered in the VET sector for the first time, the degree must be accessible to learners entering from a wide range of starting points. Pathways provide the structure that allows these learners to enter, progress through and complete higher level vocational study in ways that are realistic, culturally safe and aligned with their employment circumstances.

Pathways also play a critical role in supporting workforce mobility and enabling transition into applied professional roles that require advanced analytical, diagnostic and technical capability. By recognising prior learning, providing flexible entry routes and ensuring that learners can move between VET and higher education at the same AQF level, the Vocational Degree strengthens the broader tertiary system and contributes to national priorities for harmonisation. At the same time, well designed pathways protect existing employer based development arrangements by ensuring that the qualification complements rather than replaces internal mechanisms already used to develop technical specialists and early career applied professionals.

Together, these pathways ensure that the Vocational Degree enhances rather than constrains opportunity. They create a clear, nationally consistent route into applied professional roles while preserving the flexibility and organisational discretion that industry values. They also ensure that learners are not disadvantaged by their background, prior training history, location or current employment arrangements. In this way, pathways operate as a foundational mechanism for equity, capability development and workforce readiness within the Vocational Degree.

Current Entry Pathways into Reliability Engineering Roles in the Sector

Australia's resources sector relies on a wide range of formal and informal pathways to develop workers into technical and applied professional roles. Figure 7 shows that structural progression and Engineering Australia (EA) recognition typically associated with the roles.

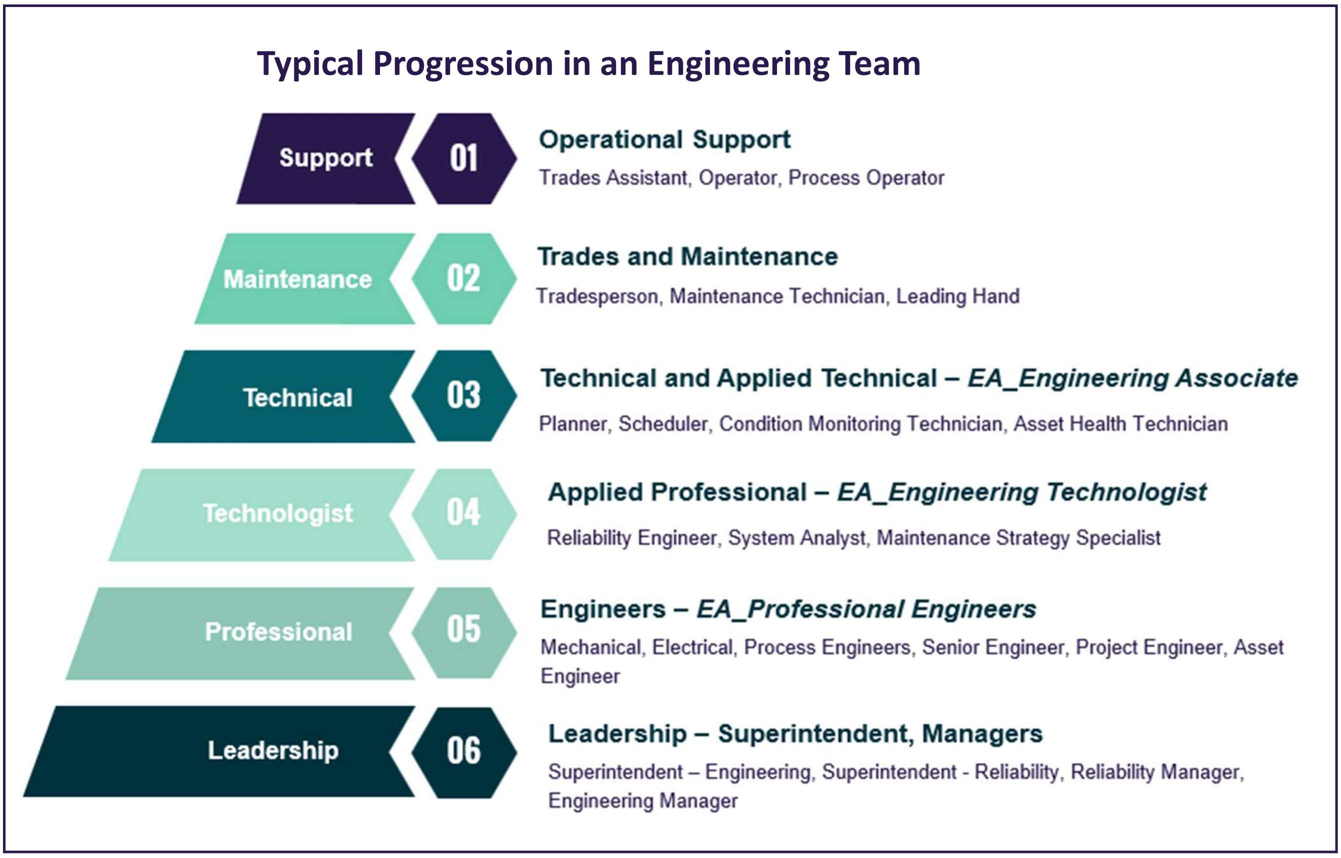


Figure 7 typical Progression in an Engineering Team

These pathways sit within the broader engineering team structure described earlier, where workers typically progress from operational, trade or applied technical roles into reliability focused positions. Over time, these pathways have evolved in response to workforce shortages, the absence of higher level vocational qualifications, and the specialised nature of mining operations.

In practice, many employees move into roles such as reliability engineer or asset performance specialist through workplace based learning, on the job coaching, non-accredited training and the accumulation of experience across different operational contexts. These pathways remain important but are marked by inconsistency and limited portability, particularly for roles requiring higher level diagnostic and analytical capability.

Organisational Pathways and Enterprise Based Development

Most mining operators, contractors and original equipment manufacturers have created internal pathways that enable employees to move from trade or technical roles into reliability engineering functions. These pathways often involve non accredited training, OEM specific courses, supervised maintenance or diagnostic tasks, and increasing exposure to equipment performance analysis. Progression is commonly determined through supervisor endorsement or alignment with organisational capability frameworks.

However, industry consultations show that these internal pathways produce variable outcomes. The level of development provided can depend on site conditions, supervisor capability or access to equipment and technical mentors. Workers may receive extensive diagnostic exposure in some teams and limited development in others. This inconsistency limits portability and can create inequitable access to higher level roles for women, Aboriginal employees, regional workers and migrants. Although these pathways play a central role in developing capability, they cannot provide the consistency or transparency expected of a nationally recognised AQF Level 7 qualification.

Higher Education Pathways

Employees often progress into reliability engineering roles after completing degrees in mechanical engineering or engineering technology, however the content and learning outcomes of these programs are not consistently aligned with the day to day requirements of reliability roles in the resources sector.

Employers report that degree qualified engineers entering reliability positions often have strong theoretical knowledge but very limited preparation for the diagnostic reasoning, field based problem solving, equipment performance investigation, operational risk analysis, communication and collaboration that the job requires. As a result, outcomes are highly variable and many engineering graduates move out of reliability roles within a short period, often transitioning into planning, project engineering or office based technical positions. Higher education pathways also rarely include work integrated learning that reflects the realities of mining and industrial operations. The attendance expectations of university programs are difficult to reconcile with FIFO, shift based or remote work arrangements, and many mid-career workers are unable to participate in structured study that assumes predictable hours or campus based learning. These limitations restrict the suitability of current higher education programs as a primary pathway into reliability engineering.

Current pathways into reliability engineering and related roles are diverse but characterised by inconsistency and limited portability. They depend heavily on workplace opportunity, non-accredited learning and discretionary supervisor support. These pathways have evolved in the absence of a qualification targeted to the job role and do not provide a coherent route for learners who require formal recognition or structured development. The Vocational Degree in Reliability Engineering is designed to address that need and can sit alongside these existing pathways as a nationally consistent option that strengthens mobility, improves equity and provides a clear progression route for school leavers, tradespeople, technical workers and mid-career employees seeking to transition into reliability engineering and other applied professional roles.

Pathways Into the Vocational Degree

Learners will enter the Vocational Degree from a diverse range of starting points. Although a significant proportion of emerging talent comes from trade and technical backgrounds, the current reliability engineering workforce is predominantly degree qualified, with industry estimates indicating that approximately seventy per cent of practitioners hold higher education qualifications in engineering, engineering technology or a cognate discipline. Entry pathways into the Vocational Degree must therefore accommodate both groups. The qualification must be accessible to school leavers, technical workers and mid-career tradespeople who require a structured route into higher level roles, while also providing a practical, work integrated pathway for learners with partial higher education study or qualifications that have not provided the applied operational capabilities required in reliability engineering roles.

Pathways from a Trade Background

Although most current reliability engineers are degree qualified, the trade and technical workforce is expected to form the largest cohort entering the Vocational Degree. Industry consultations indicate strong demand for a structured higher level pathway for tradespeople who already perform complex machine based diagnostic work but lack the advanced capabilities required for reliability work, including diagnostic reasoning, field based problem solving, equipment performance investigation, operational risk analysis and professional communication. Employers consistently report that tradespeople with extensive operational experience, particularly in mechanical, electrical and mobile plant disciplines, have the contextual knowledge, equipment insight and practical problem solving capability that underpins much of the functional analysis for reliability engineering. As a result, this cohort is likely to become the most common entry pathway into the qualification once it is established

Entry for tradespeople must be supported by a robust recognition of prior learning framework that acknowledges their significant workplace experience, non-accredited training and exposure to condition monitoring, fault analysis and equipment performance investigation. Many learners in this group will have been away from formal study for extended periods and will therefore require embedded foundation skills support, including academic writing, digital literacy and technical communication. Industrial relations considerations, such as rostering patterns, training provisions and fatigue management requirements, must be taken into account to ensure that participation is feasible for workers on FIFO or shift based schedules. Culturally safe and inclusive entry pathways are essential, particularly for women, Aboriginal tradespeople, migrants and workers from culturally and linguistically diverse backgrounds who currently face barriers to accessing higher level technical roles.

Entry through technical officer or senior technical pathways

Technical officers, senior technical specialists and para professional workers represent another cohort pathway into the Vocational Degree. While they share many of the same participation considerations as tradespeople, their existing expertise is different and often more closely aligned with analytical, laboratory, diagnostic or systems based tasks. Many in this cohort already perform elements of reliability and asset performance work, including data collection, condition monitoring, equipment testing, interpretation of diagnostic outputs, laboratory analysis or maintenance planning. Their experience often reflects deeper exposure to analytical tools, software systems and cross functional communication than is common in trade roles.

Despite this capability, technical officers face similar structural barriers that limit progression into applied professional roles. Their learning histories are typically built on a combination of non-accredited training, OEM certifications, enterprise based development and workplace coaching. Like tradespeople, they have accumulated substantial capability without access to a structured qualification pathways. Entry arrangements for this cohort must therefore provide robust recognition of prior learning that captures their diagnostic, analytical and technical experience and enables them to focus their study on the higher order capabilities described in the functional analysis.

This group also shares the same industrial and equity considerations as tradespeople. Many technical officers work FIFO or shift rosters and need flexible delivery models that are compatible with their employment conditions. Access to development opportunities within organisations can be variable and dependent on supervisor support, which affects learners from under-represented groups including women, Aboriginal technical officers and migrants. Entry pathways must therefore be culturally safe, equitable, transparent and supported by clear preparatory resources to ensure that learners with strong technical backgrounds can transition confidently into AQF Level 7 study.

Entry from higher education

While higher education has traditionally been the most common route into reliability engineering roles, it is expected to be the least used pathway into the Vocational Degree. Industry feedback indicates, however, that these learners often require further development in work integrated and operationally focused capabilities, including diagnostic reasoning, equipment performance analysis, field based problem solving and operational risk assessment. For this reason, some degree qualified learners may choose to undertake selected elements of the Vocational Degree to strengthen their applied capability, but this is not expected to form a large volume entry pathway.

The more significant opportunity for this cohort lies in the development of bidirectional credit arrangements with universities. Early discussions with higher education providers indicate strong interest in recognising Vocational Degree units as credit towards relevant undergraduate programs and meeting entry requirements for postgraduate qualifications, including graduate certificates, graduate diplomas and masters programs in areas such as asset management, applied engineering and reliability engineering. There is also interest in enabling reverse credit, where completed AQF Level 7 higher education units may be recognised as electives within the Vocational Degree, allowing learners to transition between sectors without unnecessary duplication.

These arrangements support tertiary harmonisation and strengthen pathways for learners who require a combination of operationally grounded capability and higher level analytical knowledge. They also ensure that the Vocational Degree works in partnership with higher education rather than competing with existing bachelor level engineering programs. While direct entry from higher education into the Vocational Degree is likely to be small in number, the broader tertiary pathways created through credit recognition will be important for workforce development, professional mobility and the long term positioning of vocationally delivered AQF Level 7 qualifications within Australia’s tertiary system.

Entry from Secondary School Education

School leavers represent another potential cohort pathway into the Vocational Degree, particularly in jurisdictions or workforce settings where an apprenticeship style model may be adopted. The Vocational Degree creates an opportunity to attract young people directly into a higher level vocational pathway that is closely aligned with industry need.

This pathway may be especially relevant in regions where mining, resources or advanced manufacturing sectors offer structured employment based learning for early career entrants.

Entry arrangements for school leavers must recognise that many will transition directly from senior secondary schooling without prior exposure to technical work environments. These learners will therefore require substantial support at the point of entry, including orientation to workplace expectations, strong foundation skills development in academic writing, digital literacy and technical communication and clear guidance about the demands of work integrated learning. Where the qualification is delivered in an apprenticeship type model, school leavers will need structured pastoral support, culturally safe learning environments and transparent arrangements for supervision, safety and workplace learning that reflect their limited prior experience.

Industrial relations considerations are also relevant for this cohort. School leavers entering employment based delivery models will be covered by the industrial instruments that apply to early career workers, including provisions relating to training time, supervision, safe work requirements and progression arrangements. Ensuring that these settings are compatible with the expectations of AQF Level 7 learning is critical, particularly in relation to safe exposure to operational environments, capacity for reflective learning and access to appropriate mentors and technical supervisors.

Clear and supportive pathways for school leavers strengthen equity by creating opportunities for learners who may not pursue university study but have the interest and capability to progress into applied professional roles. This pathway also supports long term workforce development by enabling early entry into a nationally consistent higher level qualification that provides structured preparation for careers in reliability engineering, asset performance and related fields.

Entry for Indigenous learners, women, migrants and people with disability

Learners from under-represented groups, including Aboriginal learners, women, migrants and people with disability, may enter the Vocational Degree through any of the pathways described above. The considerations for these learners arise not from their entry route itself, but from the complexities of intersectionality, where multiple social, cultural and structural factors shape the conditions under which they access and participate in higher level vocational learning.

Many individuals in these groups experience overlapping barriers, including limited access to supervised development, reduced visibility in technical roles, experiences of discrimination or psychosocial harm, language and literacy challenges, difficulties navigating shift or FIFO rosters and restricted access to training provisions within industrial instruments. These intersecting factors influence both their readiness to enter the qualification and their capacity to sustain participation once enrolled.

Entry pathways for these learners must therefore include culturally safe, inclusive and flexible arrangements that recognise the realities of their employment, community responsibilities and lived experience. This includes clear and culturally informed orientation processes, embedded foundation skills support, options for preparatory or bridging learning and access to early mentoring or guidance that reflects cultural, linguistic or disability related needs. Ensuring that industrial settings do not disproportionately limit access for these groups is also essential, particularly where insecure work, variable rosters or limited study release provisions are present.

By recognising intersectionality and designing entry pathways that respond to the specific needs created by overlapping identities and circumstances, the Vocational Degree strengthens its commitment to equitable participation.

This approach ensures that all learners, regardless of background or starting point, can access the qualification on fair and culturally safe terms and progress into applied professional roles with confidence and support.

Progression Pathways Through the Vocational Degree

The Vocational Degree is implemented through a structured three year model (Figure 4) that integrates core units, elective units and compulsory work integrated learning in a scaffolded and cumulative way.

The Foundation Year, Development Year and Practising Year operate as the organising logic for unit of competency design, workplace learning and assessment progression. Each stage represents a distinct level of cognitive demand, workplace responsibility and professional capability, ensuring that learners move systematically from foundational concepts to independent applied professional practice.

Across all three years, learners complete a coordinated sequence of core units that build broad conceptual and technical capability, elective units that support contextual or emerging industry needs and structured work integrated learning that progressively increases in complexity and autonomy. This integrated approach ensures that academic learning and workplace learning reinforce one another, and that progression reflects the expectations of AQF Level 7 and the functional analysis for reliability engineering roles.

In the Foundation Year, learners focus on core theoretical knowledge, introductory engineering concepts and structured workplace exposure. In the Development Year, learning deepens through specialised units and supervised workplace tasks that require independent application of diagnostic and analytical techniques. The Practising Year brings these elements together through higher level assessments, integrated workplace projects and applied professional tasks that demonstrate readiness for engineering technologist level practice. This scaffolded structure ensures that learners entering from school, trade pathways, technical roles or partial higher education study can progress through the qualification in a coherent and supported way, with clear expectations at each stage.

Workplace Learning Progression

Workplace learning within the vocational degree is structured to progress from supported participation to independent applied practice. In the early stages, learners engage in supervised activities that build familiarity with site environments, operational processes and diagnostic tools. As learners advance, workplace learning moves toward applied tasks that require interpretation of data, contribution to investigations and participation in planning and reliability activities alongside trades and technical teams. By the final year, learners are expected to undertake substantial, authentic work based activities that require autonomous application of engineering judgement, integration of field information and communication of technical recommendations within multidisciplinary teams.

Assessment Progression

Assessment will also follow a clear progression from structured, guided activities to complex, independent applied tasks. Early assessment focuses on demonstrating foundational knowledge, safe practice and basic analytical skills through supervised tasks. Middle year assessment introduces real data sets, scenario based problem solving and collaborative analysis activities aligned with the work of technical planners, front line maintenance teams and condition monitoring personnel. In the final year, assessment requires learners to apply advanced diagnostics, evaluate system performance, lead components of investigations and justify improvement strategies with reference to evidence and industry standards. This progression ensures that assessment mirrors the increasing autonomy and professional judgement expected as learners transition from technical roles toward the applied professional engineering technologist roles targeted by the qualification.

As the implementation of the degree is planned, training providers will also need to consider how to support FIFO, shift based and regional learners to ensure that progression through the qualification remains equitable and achievable.

Managing Progression for FIFO and Shift Based Learners

Progression through the vocational degree must recognise the industrial realities of FIFO and shift based workforces, particularly the variability of rosters, extended periods on site and limited access to face to face delivery. These patterns create constraints on study time, assessment scheduling and access to supervised workplace learning activities.

To ensure equitable progression, the qualification will provide flexible learning options, including asynchronous online delivery, coordinated block release periods and the ability to gather workplace evidence across multiple swings. Assessment will be designed to accommodate night shift and compressed rosters, ensuring that learners are not disadvantaged by industrial arrangements that sit outside their control. This approach supports rigorous progression while remaining achievable for workers operating within complex rostering environments.

Supporting Progression for Regional Learners

Regional learners face additional access and equity challenges, including limited availability of local training providers, reduced access to specialist equipment, and significant travel requirements to participate in structured learning and assessment.

To support progression, the qualification will incorporate delivery models that minimise travel and time away from community, including online learning, virtual laboratory experiences where appropriate, and scheduled block release training that aligns with regional employment patterns. Workplace learning evidence may be collected in local operational contexts, regional maintenance facilities or through remote monitoring operations, ensuring that learners can demonstrate competence without needing continuous access to metropolitan sites. Assessment will allow evidence to be accumulated over longer timeframes and through multiple forms of verification, ensuring that regional learners are not hindered by geographic constraints and have equitable opportunities to progress through the degree.

Exit Points and Alignment with Workplace Roles

Analysis of the engineering team structure confirms that logical exit points are likely to occur within the vocational degree, recognising that not all learners will progress through all three years and that the qualification should support mobility across the engineering and maintenance system. The most coherent and defensible exit point aligns with the applied technical roles described in Figure 3, including technical officers, maintenance planner assistants, asset inspection technicians, condition monitoring technicians and asset health or monitoring centre technicians. These roles require more advanced diagnostic, data interpretation and systems capability than trade level occupations but do not require the full professional judgement expected at applied professionals- Engineers in Figure 3.

These roles already serve as the primary upstream pathway into reliability engineering and asset performance roles and represent a natural point at which learners may choose to continue working, return later through recognition of prior learning, or undertake further structured study. A clearly defined exit point at this level would support workforce mobility, improve consistency in the preparation of applied technical workers, and strengthen the pathway into the applied professional roles that form the focus of the vocational degree

Within the VET sector, any exit pathway must operate within the requirements of the Australian Qualifications Framework and the VET accreditation system, which do not permit exit-only qualifications. A formal qualification can only be issued if it is accredited and available for enrolment in its own right.

Determining whether an embedded AQF level qualification should be created at this point would require further analysis through AUSMASA's established workforce planning processes, particularly to assess national demand, portability, industrial relations impacts and alignment with the engineering team structure. In the interim, consideration could be given to alternative forms of recognition that comply with VET requirements, such as structured statements of attainment, milestone credentials or employer endorsed capability records. These mechanisms would allow learners who exit before completion to receive meaningful recognition of progress while preserving clear pathways for future re-entry through recognition of prior learning or further structured study.

Pathways From the Vocational Degree into Employment

The vocational degree is designed to align with established workforce structures and industrial arrangements, rather than to create new categories or alter existing organisational frameworks. The analysis completed during this phase demonstrates that graduates transition most directly into applied professional roles that sit within the Engineering Technologist classification recognised by Engineers Australia and widely reflected in enterprise agreements across the mining sector. These pathways reinforce existing organisational structures, preserve internal mobility and ensure that the qualification strengthens, rather than disrupts, established capability frameworks.

Applied Professional Roles Aligned to Engineers Australia Technologist Category

Graduate outcomes from the vocational degree align most strongly with applied professional roles that require well developed diagnostic capability, advanced systems knowledge and the application of engineering judgement in operational contexts. These roles have been validated through the functional analysis, benchmarking and industry consultation.

Key pathways include:

- **Reliability engineer**, with responsibility for asset performance analysis, condition monitoring interpretation, fault investigation and the development of reliability improvement plans.
- **Asset performance analyst**, focused on data driven interpretation of asset behaviour, predictive modelling and evaluation of equipment degradation patterns.
- **Other applied professional roles identified in the functional analysis**, including testing and validation engineer, maintenance strategy specialist, systems analyst and asset health technologist.

These roles correspond to the Engineers Australia Engineering Technologist category, which is the appropriate professional benchmark for the vocational degree. The alignment provides clarity for employers, reinforces professional identity for graduates and ensures that the qualification meets established national standards for applied engineering practice.

Recognition in Enterprise Agreements

Phase 2 consultation confirmed that enterprise agreements across the resources sector already contain applied professional and technologist classifications that could provide an appropriate industrial home for graduates of the Vocational Degree. However, stakeholders also emphasised that the way in which the qualification is recognised within these agreements cannot be assumed and will need to be determined through national industrial consultation. This process will clarify how graduates are positioned within existing job families, how the qualification interacts with experiential pathways and how progression into applied professional roles is structured across organisations.

Once national alignment on award coverage and role interpretation is achieved, integration of the Vocational Degree into enterprise agreements is expected to support clearer and more consistent recognition for graduates. This would strengthen portability across employers, reduce the need for organisation specific classification solutions and reinforce the value of the qualification for both employers and workers. Ensuring that recognition is nationally coordinated will also support equitable progression and align the qualification with broader workforce development and tertiary reform objectives.

Preservation of Internal Organisational Pathways

The vocational degree is designed to complement, rather than replace, existing organisational pathways used in mining operations. Most employers maintain well defined internal arrangements for progression from trade roles into technical, planning and reliability functions. The qualification strengthens these pathways by providing a structured, nationally recognised learning route for workers who would otherwise rely on informal progression, localised training or OEM based development.

Preserving internal pathways ensures mobility and fairness for workers and supports the integrity of employers' capability frameworks. The vocational degree enhances these frameworks by providing consistent preparation for applied professional roles, improving the readiness of candidates and reducing variability in capability across site based teams. This approach reinforces organisational coherence while supporting long term workforce development.

Pathways to Higher Education

Pathways into higher education were identified by the Steering Committee as essential to establishing the vocational degree as a genuine AQF Level 7 qualification. The ability for graduates to progress into postgraduate coursework programs, and for higher education providers to recognise the outcomes of the degree as equivalent to other AQF 7 qualifications, provides important confirmation that the vocational degree meets national expectations for breadth, depth and academic rigour at this level. Strengthening connections with universities also supports tertiary harmonisation, reinforces the applied professional character of the qualification, and ensures that learners can move confidently between vocational and higher education according to their career aspirations.

Bidirectional Credit

In the VET sector it is common for qualification structures to include core units, elective units and a defined allowance for a small number of units drawn from other qualifications at the same AQF level where these units are relevant to the qualification's intent. Applying this principle to the vocational degree creates a clear opportunity to recognise selected AQF Level 7 units from higher education providers as elective choices within the vocational degree.

This arrangement enables learners who have commenced, but not completed, bachelor level study to receive formal credit for prior learning and to avoid unnecessary duplication of equivalent AQF 7 content.

It also enables consideration of a prospective relationship where a VET provider and a university/HE Provider agree in advance that learners enrolled in the vocational degree may undertake selected higher education units concurrently as part of their elective choices and vice versa.

Application Example: *See full report for further details*

Recognition of Prior Learning

RPL plays a significant role in national workforce development and is recognised across Australian policy settings as an essential mechanism for improving participation, mobility and the utilisation of existing skills. In a labour market characterised by rapid technological change, increasing occupational complexity and persistent shortages in technical and applied professional roles, RPL enables experienced workers to have their capability formally recognised and supports efficient progression into higher level qualifications.

Phase 2 design work aligns with national skills policy settings that identify RPL as a critical mechanism for increasing labour mobility, accelerating training for experienced workers and improving access for under-represented cohorts. DEWR's national priorities emphasise the need for transparent, capability based RPL systems that reduce duplication, support progression into higher level qualifications and provide consistent recognition across providers. Embedding a nationally coordinated, capability based RPL approach within the qualification strengthens the integrity, portability and equity of the Vocational Degree and ensures alignment with broader tertiary system reform.

National research demonstrates that effective RPL systems strengthen workforce resilience by reducing duplication of training, accelerating upskilling, and supporting transitions for workers moving between industries, roles or regions. RPL is also a critical equity mechanism, providing fair access for mid-career workers, tradespeople, women, Aboriginal learners, migrants and regional learners who may possess substantial expertise but limited formal credentials. As such, the integration of RPL considerations into the design of the vocational degree is central to supporting both individual career progression and broader workforce capability development across the engineering and maintenance system.

Recognition of Prior Learning is a critical element in the design, development and implementation of an AQF Level 7 vocational degree and must be embedded from the earliest stages of qualification design rather than treated solely as an implementation matter.

In Phase 2, the primary task has been to ensure that the qualification structure, graduate outcomes and assessment expectations are expressed in ways that support defensible, equitable and nationally consistent RPL. Phase 3 will then translate these design principles into detailed development and operational requirements. Although the assessment of RPL is undertaken by providers during implementation, national research shows that RPL is only effective when the qualification is designed with clearly defined learning outcomes, explicit capability expectations and transparent pathways that allow learners to enter at the appropriate point without repeating learning they have already achieved.

Early design consideration of RPL is essential for this qualification because the target cohort includes experienced tradespeople, technical officers and mid-career workers who often demonstrate complex diagnostic, analytical and systems capabilities acquired through extensive workplace practice. Designing the degree to support capability based RPL ensures that these learners can have their existing expertise recognised while maintaining the integrity and cognitive expectations of AQF Level 7.

This design approach also provides meaningful entry points and progression pathways that align with real occupational mobility across the engineering and maintenance system. Phase 3 development work will build on this foundation by specifying the evidence requirements, mapping processes and assessment methods needed for consistent application by providers.

Recognition of Prior Learning is defined in the Australian Qualifications Framework as the assessment of skills and knowledge gained through formal, non-formal and informal learning against the requirements of a qualification. Evidence from national research identifies key principles that underpin high quality RPL. These include evidence based judgment, equivalence of outcomes, transparency and fairness, flexibility in the types of evidence considered and consistent application across providers. RPL is not a reduced standard but a confirmation that required outcomes have already been met, regardless of how the learning occurred. Ensuring that these principles are reflected in the qualification design is essential to support effective development and implementation in later phases.

Capability based RPL and how it differs from typical VET RPL processes

Recognition of Prior Learning is traditionally implemented in the VET sector through evidence requirements that focus on demonstrating competence against individual units of competency. In practice, this often results in task based or checklist style assessments, where learners must produce discrete items of evidence mapped directly to unit performance criteria. National research has shown that while this approach can confirm specific skills, it is less effective in recognising higher level capability, particularly where job roles require integrated judgement, problem solving and the ability to operate across complex systems.

A capability based RPL model takes a broader and more holistic approach that is better aligned with the expectations of AQF Level 7. Rather than starting with task level evidence, capability based RPL begins with the overall graduate outcomes and the higher order capabilities required for applied professional practice. These include areas such as diagnostics and systems reasoning, independent investigation, applied analysis, professional communication and the exercise of judgement in unpredictable contexts. Evidence is then considered in relation to how well the learner can demonstrate these integrated capabilities, drawing on a combination of workplace artefacts, reflective accounts, supervisor attestations, professional portfolios and, where necessary, structured assessment tasks that mirror real work problems rather than discrete training package criteria.

In this model, the assessment focuses on whether the learner can demonstrate the capability, not simply the completion of tasks. For example, a reliability technician with extensive experience conducting root cause investigations may provide evidence that shows an ability to analyse complex data, apply structured methodologies, communicate findings and make professional recommendations. This capability may span several units or learning outcomes within the degree and may be more appropriately recognised through integrated evidence than through multiple small, isolated tasks.

Capability based RPL is therefore more suitable for the vocational degree because it aligns with the applied professional orientation of AQF Level 7 and avoids the fragmentation that can occur in unit by unit assessment. It also recognises the reality of the engineering and maintenance workforce, where experienced mid-career workers often perform work at a high level of complexity without formal credentials.

Embedding capability based RPL in the qualification design ensures that the degree can meaningfully recognise this experience while maintaining the integrity and cognitive expectations of the qualification.

How capability based RPL works within VET requirements

Although the VET sector requires RTOs to assess and certify learners against individual units of competency, a capability based RPL approach can still operate effectively by changing how evidence is gathered, interpreted and mapped, rather than changing the underlying requirement to issue competence at the unit level. In this model, the qualification is designed to articulate integrated capabilities at AQF Level 7, while the RPL assessment process maps these broader capabilities back to the relevant units of competency.

The distinction is therefore not structural, but methodological. Capability based RPL does not replace unit by unit assessment. Instead, it strengthens it by recognising that higher level capability is often demonstrated through complex, holistic workplace practice rather than through discrete, task based evidence. The assessor still makes a unit level judgment, but the evidence used to inform that judgment comes from broader and more authentic demonstrations of capability.

This operates in practice through three mechanisms.

1. **Integrated evidence mapped to multiple units -** A single piece of evidence, such as a reliability investigation report, a condition monitoring portfolio or a supervisor attestation, may demonstrate capability across several units. The assessor reviews the evidence holistically and then maps it to the specific performance criteria and knowledge evidence within each unit. This avoids fragmentation while remaining fully compliant with the Standards for RTOs.
2. **Real world demonstrations of AQF 7 capability used as the primary evidence source -** Instead of collecting multiple small task examples, the RPL process focuses on evidence that demonstrates the learner's ability to analyse, investigate, communicate and apply judgement in authentic workplace conditions. These capabilities are then broken down and used to satisfy the requirements of the relevant units. The unit decision is still made, but it is informed by richer and more credible evidence.
3. **Supplementary assessment only where gaps remain -** Where holistic workplace evidence does not fully address the unit requirements; the assessor may use structured challenge tasks or professional discussions to complete the evidence set. These tasks are designed to mirror the complexity of real work rather than replicating entry level assessment activities. This ensures compliance without undermining the capability based approach.

Through this method, capability based RPL becomes a way of enhancing the quality and authenticity of evidence, while still producing defensible unit level judgments. This approach is particularly important for an AQF Level 7 vocational degree, where learners' workplace capability may span multiple outcomes and where traditional RPL processes would otherwise be too fragmented, burdensome or misaligned with the nature of applied professional practice.

How RPL considerations have been incorporated into the qualification design

The qualification design developed in Phase 2 already reflects several key features that enable defensible and capability based RPL. These features ensure that RPL can be applied consistently in Phase 3 development and later implementation, while maintaining the cognitive expectations of AQF Level 7.

Clear articulation of graduate outcomes and capability expectations

The qualification design expresses graduate outcomes in terms of applied professional capability, including diagnostics, systems reasoning, data interpretation, investigation, applied problem solving and professional judgement. These clearly defined outcomes create the foundation for assessing existing capability through RPL and ensure that any recognition is mapped to the same expectations as formal learning.

Coherent year by year progression that aligns with workplace roles

The structure of the degree aligns Year 1, Year 2 and Year 3 outcomes with the engineering team layers. This alignment supports capability based RPL by enabling experienced tradespeople, technical officers and condition monitoring specialists to enter the qualification at the point that reflects their demonstrated capability, without compromising the academic integrity of the AQF Level 7 award.

Integration of applied technical streams and workplace learning

The inclusion of substantial work integrated learning and applied technical streams recognises that much of the target cohort's capability has been developed in real workplaces. This creates a natural alignment between workplace evidence and the qualification outcomes, supporting the use of observation records, supervisor attestations, portfolios and workplace projects as evidence for RPL.

Embedded foundation skills expectations that support RPL pathways

The design includes explicit expectations for foundation skills in academic writing, digital literacy and technical communication. This supports RPL by ensuring that learners with strong technical capability but limited formal study experience can have their technical learning recognised while accessing preparation for higher level academic requirements.

Specialisation areas aligned to existing occupational practice

The specialisation streams in digital diagnostics, testing, energy systems and asset health reflect areas where significant non formal and informal workplace learning typically occurs. This makes it more feasible to recognise prior learning because the qualification outcomes mirror authentic industry practice.

Alignment with the engineering team structure and Layer 3 roles

The design recognises Layer 3 as a logical intermediate capability benchmark. This supports RPL by providing a clear and defensible point at which learners who are already functioning as technical officers, condition monitoring technicians or asset health technicians may receive recognition and progress into higher level study.

Modular structure that allows for pathway entry without repetition

The proposed organisation of core units applied technical units as electives and WIL enables partial entry or credit transfer based on demonstrated capability. This avoids unnecessary repetition of learning and supports RPL for experienced mid-career workers.

Strong industry alignment and evidence requirements

The co design process with Tier 1 miners and technical experts has ensured that the qualification outcomes reflect real workplace complexity. This strengthens RPL by providing authentic, industry validated criteria for assessing prior workplace capability.

The qualification has been deliberately designed to enable capability based RPL by ensuring clarity of outcomes, authentic alignment to workplace roles, defined progression pathways, and modular structures that reflect how capability develops in engineering and maintenance teams. These design features ensure that Phase 3 development can incorporate detailed RPL processes, tools and guidance, and that implementation can be undertaken consistently across providers.

Supporting Assessors to Deliver Capability Based RPL

A capability based RPL model does not need to create excessive burden for assessors if the qualification design, development and implementation stages all include structured supports that make judgments clearer, more consistent and easier to evidence.

The key principle is that assessors should not be expected to interpret complex workplace evidence alone or build their own mapping processes from scratch. Instead, the system must provide pre designed tools, templates, mappings and guidance that translate holistic capability into unit level outcomes in a systematic and defensible way.

To achieve this, the following supports should be incorporated into Phase 3 development and embedded in provider implementation frameworks.

Pre developed national evidence mapping guides

AUSMASA can develop national mapping guides that show how typical workplace capability aligns with specific units of competency.

These guides would include:

- examples of common workplace artefacts
- pre populated mapping tables showing how evidence aligns to performance and knowledge criteria
- examples of partial evidence and how to identify gaps
- guidance on when supplementary assessment is required.

This ensures assessors do not start with a blank page for each applicant.

Role specific evidence exemplars and templates

Provide assessors with ready to use templates for:

- reliability investigation reports
- condition monitoring portfolios
- supervisor attestations
- reflective practice templates.

These can be given to applicants and supervisors, so the evidence received is structured, consistent and aligned with RPL needs, reducing interpretation time.

National assessor guidance and decision rules

Develop structured decision rules that clarify:

- minimum evidence expectations
- criteria for accepting or rejecting evidence
- when challenge tasks must be applied
- how to interpret integrated capability for unit based judgments.

This supports consistency and reduces uncertainty for assessors.

Standardised challenge tasks for common gap areas

Rather than allowing each provider to create their own challenge tasks, Phase 3 can develop:

- a library of scenario based assessment tasks
- tasks that reflect real AQF 7 engineering problems
- tasks aligned to specific units or groups of units
- tasks designed to be used only where holistic evidence has gaps.

This reduces assessor workload and ensures assessments remain valid and nationally consistent.

Digital evidence collection and mapping tools

During Phase 3, AUSMASA can explore digital solutions that:

- allow applicants to upload evidence
- automatically map evidence to units where keywords or content matches
- allow assessors to annotate evidence
- record decisions against mapping tables.

This reduces administrative burden and ensures traceability for compliance.

Professional learning for assessors

Targeted support for assessors should include:

- training in capability based assessment
- training in interpreting workplace artefacts
- moderation across providers to standardise decisions
- communities of practice to share approaches and reduce individual workload.

This ensures assessors have the confidence and skill to make higher level judgments.

A staged RPL process with early screening

Assessors should not need to handle unsuitable applications or sort through large volumes of irrelevant evidence. A staged process can include:

- pre assessment interviews by RPL advisors
- initial screening of evidence by administrative or RPL support staff
- only progressed cases going to qualified assessors.

This protects assessor time and ensures quality.

Clear employer facing guidance and supervisor support

Because much evidence will come from workplaces, AUSMASA can provide:

- guidance for supervisors on the kinds of evidence required
- templates for structured attestations
- examples of high quality and low quality submissions.

This improves the quality of evidence that assessors receive.

Partnership Approach to RPL Support

A partnership model between RTOs and workplaces offers the strongest foundation for delivering high quality and defensible Recognition of Prior Learning. RPL at AQF Level 7 requires both an educational perspective on assessment standards and an informed understanding of how capability is demonstrated in real operational environments. Neither party alone holds the full picture. The RTO assessor brings expertise in qualification standards, assessment methodology, evidence requirements and the application of the Standards for RTOs. The workplace brings deep knowledge of the individual’s performance, technical scope, problem solving behaviours and professional judgement in genuine work settings.

A partnership approach ensures that these complementary forms of expertise are integrated to support accurate, efficient and equitable recognition.

Within this model, the RTO assessor retains responsibility for the final judgment of competence, ensuring that all decisions meet the requirements of the qualification, the AQF and the regulatory standards. The assessor provides structured guidance to applicants, applies evidence based assessment methods, and ensures that any RPL outcome is defensible, consistent and aligned with the cognitive expectations of AQF Level 7. Their role includes determining the sufficiency of evidence, conducting professional conversations or challenge tasks where needed and maintaining the rigour and integrity of the assessment process.

Workplace RPL advisors play a complementary and enabling role. These advisors may be supervisors, senior technicians, engineering team leads or other professionals who are familiar with the applicant's day to day work. Their contribution is not to make assessment decisions but to support evidence quality by identifying relevant workplace artefacts, validating the authenticity of work undertaken, and providing structured attestations that describe how the individual demonstrates the capabilities required at AQF Level 7. Workplace advisors help bridge the gap between real work practice and assessment evidence, ensuring that assessors receive material that is accurate, contextualised and reflective of the complexity of engineering and maintenance environments.

The partnership between RTO assessors and workplace RPL advisors strengthens the overall RPL process by combining educational rigour with workplace authenticity. This approach reduces the administrative burden on assessors, improves the clarity and relevance of evidence, and supports a more transparent and equitable recognition process for learners. It also reinforces the broader intent of the vocational degree: to create a qualification that is grounded in real industry capability while maintaining the academic and professional standards expected of an AQF Level 7 award.

RPL Risk Considerations for an AQF Level 7 Vocational Degree

Designing and implementing a capability based RPL framework at AQF Level 7 introduces several system, process and equity risks that must be anticipated and addressed through qualification design and Phase 3 development.

The following risk considerations outline the conditions that require attention to ensure RPL remains defensible, equitable and aligned with the cognitive expectations of the qualification.

Risk: Insufficient verification of authenticity and individual contribution

Much workplace evidence is produced in team based environments. Without clear mechanisms to verify authenticity and individual contribution, there is a risk of inaccurate recognition. Structured attestations, verification interviews and triangulation processes will be essential safeguards.

Risk: Over recognition or under recognition of higher level capability

Assessors may unintentionally recognise task level experience as evidence of AQF 7 capability (over recognition) or require unnecessary volumes of evidence due to uncertainty (under recognition). National assessor guidance, decision rules and moderation arrangements are required to mitigate both risks.

Risk: Equity impacts for under-represented learners

Learners from under-represented cohorts may be disadvantaged by limited documentation skills, inconsistent access to high quality evidence or weaker supervisor attestations. Without structured supports, these learners risk being under recognised. Templates, coaching, and clear guidance for employers are required to promote equitable outcomes.

Risk: Inconsistent interpretation of what WIL components can be recognised

There is a risk that providers may apply RPL to components of work integrated learning that are intended to build professional identity, not just technical capability. Clear distinction between WIL elements that can be recognised and those that must be experienced in situ will reduce this risk.

Risk: Lack of national moderation and QA mechanisms

Without cross provider moderation and system level calibration, RPL decisions may vary significantly across providers, affecting the credibility of the qualification. A national quality assurance process, including evidence exemplars and annual calibration, is required to maintain defensibility.

Risk: Poor communication leading to inappropriate or low quality submissions

If learners and employers are not clearly informed about RPL expectations, evidence requirements and the level of capability needed, there is a risk of incomplete, irrelevant or low quality submissions that burden assessors and undermine learner confidence. High quality learner and employer guidance materials are needed to mitigate this risk.

Risk: Misalignment between RPL and occupational pathways within the engineering team structure

Without pathway guidance, learners and employers may not understand how existing roles map to potential entry points within the qualification. This creates a risk of inconsistent or unrealistic RPL expectations. Pathway mapping aligned to Layers 2, 3 and 4 of the engineering team structure will support clarity.

Risk: Insufficient documentation for audit defensibility

If providers lack clear expectations about documenting judgments, mapping decisions, challenge tasks and authenticity checks, the risk of non-compliance during audit increases. Documented processes and standardised record keeping templates are required to ensure defensibility.

The benefits of high quality Recognition of Prior Learning are well established in national policy research and are central to the purpose of the vocational degree. RPL increases access to higher level qualifications for mid-career and under-represented learners, including women, Aboriginal learners, migrants and regional students, and enables experienced workers to transition into applied professional roles without unnecessary duplication of learning.

It strengthens workforce capability, supports progression into higher level engineering and reliability roles, and builds learner confidence by recognising the substantial expertise developed through workplace practice. Embedding RPL considerations into the design of the vocational degree ensures that these benefits can be realised through a structured, nationally consistent and capability based approach that will be further developed in Phase 3 and applied during implementation.

This approach, supported by strong partnerships between RTO assessors and workplace advisors, ensures that the qualification remains equitable, defensible and aligned with the applied professional capability expected at AQF Level 7 and with the realities of the engineering and maintenance workforce.

Credit

In the VET sector, credit transfer refers to the process by which a learner is granted recognition for a unit of competency they have already completed, provided it is the *same unit* or a unit deemed *equivalent* through the national training package. Because the vocational degree introduces a suite of new AQF Level 7 units that do not yet exist elsewhere, the availability of credit transfer will be limited during the early years of implementation. Learners entering the degree from existing VET qualifications will not meet equivalence requirements for these new units, meaning credit transfer will not be a significant pathway for recognition at the outset.

Given this context, Recognition of Prior Learning will serve as the primary mechanism for acknowledging a learner's prior expertise. RPL enables recognition of formal, non-formal and informal learning, including extensive workplace capability developed through engineering and maintenance roles. As the vocational degree becomes integrated within the broader training package ecosystem over time, opportunities for credit transfer may expand. Units may be adopted into other qualifications, or the vocational degree may incorporate selected units from existing training package products as elective options. In these circumstances, learners completing related qualifications could later access credit transfer where equivalence is established, creating a more interconnected and flexible system of recognition across the engineering and maintenance workforce.

Provider Readiness – Feasibility Planning

The introduction of an AQF Level 7 Vocational Degree in Reliability Engineering requires early planning to understand what supports, tools and system settings will be needed to enable delivery within the VET sector. VET providers were not established to operate as higher education institutions, and their governance and delivery models are designed to support occupationally focused, industry aligned learning. The purpose of feasibility planning is therefore not to assess current readiness or impose higher education governance structures, but to determine what practical steps must be taken in Phase 3 to ensure that providers can deliver the qualification confidently, safely and in line with AQF Level 7 expectations.

Although a number of RTOs already deliver qualifications over two or three years, the Vocational Degree in Reliability Engineering introduces features that are not typical in current VET program structures. The distinction is not the duration, but the requirement for a scaffolded curriculum where capability development builds cumulatively across three levels of complexity, and where substantial Work Integrated Learning is an organising principle rather than an optional component. Learners must demonstrate applied professional capability consistent with AQF Level 7, including complex analysis, structured reasoning and professional judgement based on real operational conditions. These design features create delivery requirements that extend beyond the modular and flexible sequencing normally associated with VET qualifications.

Reliability engineering is performed in complex industrial environments and requires learners to engage with analytical tasks, apply structured methodologies and develop sound professional judgement. To support this, providers will need capability in curriculum coordination, staff expertise, assessment oversight and collaboration with employers who can host substantial and authentic Work Integrated Learning. These requirements do not alter the purpose of the VET sector, but they do require careful planning to ensure that existing systems can support higher level learning and that providers have access to the tools and guidance necessary for consistent national delivery.

The feasibility planning draws on national policy settings for vocational degrees, the requirements of the Standards for RTOs and insights from higher education engineering programs. Stakeholder feedback from industry, universities and the Discipline Panel highlighted the need for strengthened academic oversight of curriculum, culturally safe delivery practices, reliable digital infrastructure and targeted support for learners transitioning from technical roles into more analytical professional practice. Providers will require support to build or adapt these capabilities, and Phase 3 will focus on developing the national tools, partnership arrangements and guidance required to enable delivery.

This section identifies the capability domains that require attention in Phase 3, including academic governance, staffing and technical expertise, assessment integrity, digital systems, equity and learner support, WIL infrastructure and partnerships with employers. It also considers feasibility factors such as geographic location, existing industry relationships and provider access to staff with both vocational and technical reliability engineering expertise. These findings will inform the development of national provider guidelines, readiness planning tools and collaborative industry arrangements that will support successful implementation of the vocational degree.

Academic Governance and Higher Level Delivery Capability

Feasibility planning for academic governance focuses on identifying the specific supports, tools and processes required to enable providers to deliver an AQF Level 7 qualification within the purpose and regulatory settings of the VET sector. The Standards for RTOs already provide a strong foundation for quality, industry relevance and assessment integrity, and these standards remain the primary governance mechanism for the Vocational Degree in Reliability Engineering. The aim is not to introduce higher education governance structures, but to ensure that providers can apply existing RTO requirements rigorously and confidently in the context of a three year qualification supported by substantial WIL.

A significant feasibility consideration is the level of curriculum coordination required for this qualification. The qualification has been intentionally designed so that units scaffold across three years, with each year building on the analytical and conceptual capability developed in the previous year. This level of structured sequencing is not typical of VET qualifications, which are usually organised around discrete units that can be delivered flexibly and in varied sequences. Delivering the degree therefore requires providers to have processes for planned sequencing, coherent integration of WIL with academic learning and active monitoring of learner progression to ensure that students do not enter advanced units or workplace tasks without the necessary foundational capability.

Phase 3 and the preparation for implementation will need to focus on co designing and developing the guidance, tools and planning processes that support this structured sequencing. AUSMASA, providers and industry partners will work collaboratively to ensure the intended developmental pathway is applied consistently during delivery. These supports will help maintain the integrity of the qualification structure and safeguard the learner experience.

For further detail please see full report

Taken together, these considerations indicate that academic governance for the Vocational Degree in Reliability Engineering requires focused and collaborative development work in Phase 3. Providers will rely on strengthened tools, clear planning processes and shared system level supports to apply existing RTO Standards at the level required for an AQF Level 7 qualification. Preparation for implementation will therefore involve refining and developing these supports so that providers can deliver the qualification confidently while maintaining the applied and industry connected identity of vocational education.

Staffing and Technical Expertise

Feasibility planning for staffing focuses on identifying the capability requirements and system supports needed to enable providers to deliver the Vocational Degree in Reliability Engineering. The qualification will operate within the established purpose and regulatory environment of the VET sector, where trainers and assessors are expected to demonstrate current industry knowledge and skill, vocational competence and the pedagogical capability required under the regulatory standards.

To deliver the qualification, trainers and assessors may need to extend their pedagogical capability beyond what is typically required in VET delivery. This includes facilitating higher level analytical learning where learners interpret complex information, apply structured reasoning and justify professional judgements. Trainers and assessors will require capability in guiding learners through inquiry based and problem solving approaches, not only procedural or task based instruction.

Trainers and assessors also need pedagogical skills that support conceptual understanding over time through scaffolded learning. This includes sequencing learning to build durable knowledge structures, supporting cumulative skill development and designing activities that reinforce retrieval, transfer and application across multiple contexts. Higher level delivery will also require educators to provide feedback that addresses reasoning quality and clarity of explanation, and to facilitate reflective practice that supports learners transitioning from technical roles into analytical and judgement based learning.

Reliability engineering is a specialised field that requires knowledge of diagnostic methods, structured investigation processes, data interpretation and asset performance principles. Providers will need access to trainers and assessors who understand these concepts sufficiently to support learners in developing applied professional capability. The intent is not to require providers to employ research focused academics, but to ensure that trainers and assessors have access to the technical context, industry expertise and pedagogical support necessary for AQF Level 7 delivery.

For further details please see the full report

Technical expertise can be supported in several ways that align with the strengths of the VET sector. Providers may draw on specialist staff with engineering backgrounds, industry practitioners as guest presenters or workplace mentors and professional partnerships that ensure trainers and assessors maintain contact with current practice. Phase 3 feasibility work will need to consider how providers, especially in regional and remote areas, can access specialist expertise and strengthen professional networks.

Assessment at AQF Level 7 introduces additional staffing considerations. Assessors will need to make judgements about analytical capability, reasoning quality and interpretation of workplace generated evidence. These tasks build on existing assessor requirements but require additional guidance and calibration to ensure consistency. Phase 3 will therefore need to focus on developing assessor support materials, moderation frameworks and sector wide moderation activities to ensure that assessment is defensible, authentic and nationally consistent.

Preparation for implementation must also consider the role of workplace supervisors and mentors. Supervisors play a central role in guiding learners, modelling analytical reasoning and verifying authenticity.

Feasibility planning will need to support providers and employers to implement the workplace supervision expectations defined in the WIL section. This includes ensuring supervisors understand their role and have access to tools and guidance.

Mining and Automotive Skills Alliance

Phase 2 scoping indicates that staffing for the qualification will rely on a blend of vocational educators, industry practitioners, workplace supervisors and technical specialists. Phase 3 will play a critical role in co designing the professional development pathways, system tools and partnership models needed to support providers in accessing and developing the necessary expertise.

Assessment Readiness

Feasibility planning for assessment readiness focuses on how providers will apply existing RTO assessment requirements to the higher level analytical and judgement based outcomes expected in the Vocational Degree in Reliability Engineering. The regulatory standards require validity, reliability, fairness, sufficiency and authenticity, and these principles remain the cornerstone of assessment. However, assessors will need additional support to apply these principles to evidence that demonstrates structured reasoning, applied professional judgement and interpretation of complex operational information consistent with AQF Level 7.

A key feasibility consideration is the complexity of evidence learners will generate. Evidence will often involve analysis of operational data, interpretation of system behaviour, structured investigation of reliability issues and explanation of reasoning processes. Assessors will therefore require tools, prompts and assessment models that guide learners to express their reasoning in ways that can be assessed consistently.

The Steering Committee identified authenticity and consistency of workplace generated evidence as areas requiring strengthened assessment approaches. In team based environments, assessors will require reliable mechanisms to verify individual contribution and interpret workplace artefacts that vary between sites. Feasibility planning must therefore consider tools for triangulating evidence, obtaining supervisor attestations and ensuring that assessment focuses on the learner’s capability rather than team output.

Phase 3 will need to focus on co designing practical assessment supports, including analytical tasks, guidance for assessing reasoning quality, structured moderation processes and system tools for capturing workplace evidence. These supports will help ensure that assessment remains defensible, authentic and nationally consistent while remaining proportionate to the expectations of the VET sector.

Quality Systems Readiness

Quality systems readiness concerns the processes, data and oversight mechanisms providers will need to support delivery of an AQF Level 7 qualification. The regulatory standards already require RTOs to monitor training and assessment strategies, validate assessment, engage with industry and support continuous improvement. These responsibilities provide a foundation for the qualification. However, delivery of the Vocational Degree in Reliability Engineering will require providers to extend their quality systems in specific areas to support higher level learning and multi-year progression.

An important feasibility consideration is how providers will monitor learner progression across the three year scaffolded structure. Unlike most VET qualifications, where units are discrete, the qualification requires learners to build conceptual and analytical capability over time.

Quality systems will therefore need to support early identification of learners requiring additional support in academic literacy, analytical tasks or WIL access. Providers may also require tools that help them track learner progress across academic and workplace contexts and ensure readiness for each stage.

The Steering Committee identified digital infrastructure, data management and system reliability as areas requiring feasibility planning. Providers will need secure systems that support the storage, management and verification of workplace generated evidence and digital tools that enable assessors and supervisors to record observations, attest to authenticity and maintain clear communication. Phase 3 will need to consider the extent to which shared or national tools can support these functions, particularly for providers in regional or connectivity constrained areas.

Quality oversight for the qualification will also require processes that support moderation, internal review and shared approaches to interpreting assessment outcomes across providers. While validation is already required, AQF Level 7 delivery may necessitate more structured moderation plans, clearer documentation and sector wide moderation activities that enable providers to align their assessment judgements. Feasibility planning must consider how these activities can be co designed in Phase 3 to support national consistency while remaining proportionate to the purpose and regulatory settings of the VET sector.

Overall, quality systems readiness will rely on strengthening existing RTO processes. Phase 3 will therefore develop tools, guidance and shared system supports that help providers meet the oversight and monitoring expectations associated with higher level delivery while preserving the efficiency and vocational purpose of the sector.

Equity, Cultural Safety and Learner Support Capability

While RTOs already have obligations to provide equitable access, cultural safety and learner support, the Vocational Degree in Reliability Engineering introduces additional considerations that extend beyond typical VET practice. These differences arise from the analytical expectations of AQF Level 7, the diversity of the target learner cohort and the requirement for substantial Work Integrated Learning in complex industrial environments. Feasibility planning must therefore focus on the system supports and delivery arrangements needed to address these elevated requirements.

The first key difference is the level of cognitive and analytical support required. Many learners entering the degree will be experienced tradespeople or technical workers returning to formal study after long periods. They may require targeted preparation in academic literacy, structured analytical writing and conceptual reasoning, which are not commonly needed in most VET qualifications. Providers will need to support learners to transition from predominantly hands on work to higher level analytical capability, which is a requirement specific to AQF Level 7.

The second difference relates to the environments in which WIL will take place. Reliability engineering roles exist in remote, regional and FIFO industrial settings where cultural safety, psychological safety and workplace inclusion vary significantly. While RTOs already ensure safe environments for training, this qualification will require providers to assure safety and inclusion across diverse employer sites, including mines, processing plants and remote operational centres. This introduces new feasibility considerations such as verifying the cultural safety of WIL hosts, supporting learners working on Country and ensuring that supervisors can support under-represented learners in real operational settings.

A third point of difference is the need for structured approaches to supporting under-represented groups in advanced technical and analytical roles. Industry feedback indicates that women, migrants, Aboriginal learners and neurodiverse learners can face barriers in mining and asset intensive environments that are not typically encountered in other VET contexts. Providers will require systems that enable early identification of equity risks during WIL planning and culturally informed approaches to problem solving when issues arise.

Digital equity is another distinct challenge for this qualification. Learners will often be based in remote operational environments with limited connectivity, shift patterns or unpredictable access to digital tools. Providers will need to design digital learning and support systems that accommodate these constraints, including options for asynchronous learning, low bandwidth access and alternative pathways for submitting evidence generated in the workplace.

Finally, supporting learners through a three year scaffolded program introduces a level of sustained wraparound support that differs from most VET qualifications. Providers will need to monitor learner progression across academic and workplace contexts, identify emerging risks early and maintain ongoing cultural, psychosocial and academic support over an extended period. This level of continuity is not common in shorter or modular VET qualifications.

Overall, the equity, cultural safety and learner support requirements for the Vocational Degree in Reliability Engineering do not replace existing RTO responsibilities, but they do extend them in ways that require coordinated system level supports. Phase 3 will therefore need to develop the tools, guidance and partnership models that help providers to meet these elevated requirements while preserving the applied and industry connected identity of the VET sector.

Facilities, Equipment and Technical Resources

Feasibility planning for facilities, equipment and technical resources must recognise that, within the VET sector, providers are responsible for establishing arrangements that enable access to the resources required to deliver and assess a qualification. These arrangements may differ across providers depending on their existing infrastructure, regional context and industry partnerships. The purpose of feasibility planning is therefore not to prescribe a single facilities model, but to identify what learners must be able to access and to ensure that providers have clear guidance on how access can be achieved through a combination of onsite resources, partnerships and workplace environments.

Initial work with the Discipline Panel has produced a consolidated list of facilities, software and diagnostic tools that underpin the delivery of the Vocational Degree in Reliability Engineering, along with an initial assessment for one potential provider. This work confirms that delivery requires access to environments and tools that support failure analysis, condition monitoring, systems thinking, data interpretation and structured investigation processes. While some foundational equipment may be held by providers, much of the authentic learning will occur in operational workplaces through Work Integrated Learning. It is therefore neither practical nor necessary for providers to replicate full industrial environments.

A key feasibility consideration is that access pathways will legitimately vary across providers. Some providers may choose to invest in on campus facilities, while others may rely more heavily on industry partnerships, shared regional hubs or digital simulation environments. The determining factor is not where the equipment is located, but whether learners can access the full range of experiences and tools required to meet the outcomes of the qualification and the expectations outlined in the providers Training and Assessment Strategy.

Because delivery models will differ, Phase 3 should not set rigid minimum equipment thresholds. Instead, it should focus on developing clear guidance that describes:

- the types of facilities and tools that learners must be able to access across the three years
- examples of acceptable provider held resources, shared arrangements and workplace accessed equipment
- expectations for ensuring access is reliable, safe and sufficient for assessment purposes
- approaches for managing access in regional, remote or low connectivity environments.

Providers will also need clarity on digital and data related resources. Reliability engineering requires access to representative datasets, diagnostic tools and asset performance software. Feasibility planning must therefore identify secure, feasible and pedagogically sound mechanisms for learners to engage with real or simulated data, especially where live employer systems cannot be accessed for privacy or operational reasons.

Regional and remote providers may face additional challenges in accessing specialist equipment or diagnostic tools. Phase 3 will need to consider whether system level solutions, such as regional shared equipment hubs, digital labs or employer hosted technical environments, can support consistent access for all learners.

Overall, the facilities and equipment requirements for the Vocational Degree in Reliability Engineering should be met through flexible and locally appropriate arrangements. The focus of Phase 3 will be on refining the consolidated resource list, developing practical guidance for providers and supporting the establishment of partnerships that ensure all learners can access the tools and environments necessary to develop the applied professional capability expected at AQF Level 7.

Regional and Remote Delivery Feasibility

Feasibility planning for regional and remote delivery must consider the unique constraints faced by providers operating outside metropolitan areas. While regional RTOs deliver a broad range of vocational programs, most do not currently deliver applied engineering qualifications at Certificate IV, Diploma or Advanced Diploma level. As a result, the staffing profiles, facilities, technical infrastructure and industry partnerships that support engineering related delivery are less established in regional contexts than in metropolitan centres. These factors create additional feasibility considerations for the Vocational Degree in Reliability Engineering, which requires sustained analytical learning, access to authentic technical environments and strong Work Integrated Learning arrangements.

Regional and remote providers may therefore begin from a different baseline of organisational capability. Specialist engineering trainers and assessors, technical equipment, diagnostic software, and relationships with engineering teams or asset performance functions may be limited or absent. Feasibility planning must recognise these structural differences and identify system level supports that enable regional providers to participate, rather than expecting each provider to independently replicate metropolitan capability. This may include shared delivery models, regional partnerships with employers, visiting specialist trainers and assessors, or access to centralised technical resources developed during Phase 3.

Digital access is a further consideration. Many remote regions experience variable connectivity that affects access to data analysis software, online learning platforms and communication with educators. While VET providers already adapt delivery for low bandwidth environments, the analytical and data driven nature of this qualification requires stable and reliable digital capacity. Feasibility planning must therefore explore low bandwidth delivery options, asynchronous alternatives, offline analytical tools and campus based digital access points to ensure that remote learners can meet AQF Level 7 expectations.

Equitable participation in Work Integrated Learning also presents heightened challenges in remote and FIFO contexts. While remote locations often provide rich operational learning opportunities, placement quality varies significantly depending on workplace culture, supervision capability and operational conditions. Some remote sites may have limited staff available to support learners, unpredictable task availability or heightened safety and cultural risks. Providers will require robust processes for assessing placement suitability and supporting learners who undertake WIL in more isolated or higher risk settings. Phase 3 must co design tools and agreements that guide providers and employers to ensure physical, psychosocial and cultural safety during WIL.

Supporting Aboriginal learners and learners working on or near Country is another key difference for regional delivery. Providers must ensure that WIL involving Country is guided by the relevant Traditional Owner group and that learners have access to culturally informed support. Feasibility planning must consider how providers will develop local cultural partnerships and embed culturally safe practices within delivery, especially where providers do not have existing experience with applied engineering pathways.

Staff capability also presents a distinct feasibility consideration for regional providers. Unlike metropolitan RTOs, many regional campuses do not have existing engineering or reliability specialists on staff and have limited access to trainers and assessors with experience in applied engineering pathways. Feasibility planning must therefore consider practical models for accessing the required expertise, including co delivery with local industry practitioners, shared staffing arrangements across campuses or providers, visiting specialist trainers and assessors and digitally supported engagement with professional networks. These approaches will enable regional providers to deliver the qualification without replicating metropolitan staffing capabilities.

Finally, logistical barriers for remote learners are more significant than in metropolitan areas. Travel to WIL sites, accommodation availability, shift and roster patterns, family responsibilities and community obligations all affect participation. Providers will require structured support systems that allow learners to navigate these constraints while maintaining academic progress and safety.

Overall, regional and remote delivery of the Vocational Degree in Reliability Engineering is feasible, but it requires deliberate system level planning that recognises the different starting points of regional providers. Phase 3 will need to develop guidance, shared infrastructure models, partnership arrangements and tools that support digital access, staffing capability, WIL quality, cultural safety and access to technical resources. This will help ensure that regional and remote learners can participate on an equitable basis and achieve the applied professional capability expected at AQF Level 7.

Funding and Sustainability

The introduction of an AQF Level 7 Vocational Degree in Reliability Engineering requires careful consideration of the funding settings, cost structures and sustainability arrangements needed to support delivery within the VET sector. The qualification is designed to address nationally significant workforce needs in mining and asset intensive industries and is expected to operate across metropolitan, regional and remote locations. The current VET funding architecture was not designed for three year higher level qualifications that combine substantial academic learning with extensive Work Integrated Learning. A sustainable model will require a coordinated approach across jurisdictions, providers and industry partners, with funding settings that recognise both the cost structure of the qualification and the workforce development purpose it serves.

VET and Higher Education Funding Considerations

The funding environment for the Vocational Degree in Reliability Engineering sits at the intersection of VET and higher education expectations. Higher education funding is structured to support multi-year programs that incorporate academic governance, scaffolded learning, research informed curriculum design and sustained student support. In contrast, VET funding is typically linked to discrete units of competency and nominal hours, with far less structural support for multi-year sequencing, academic coordination or substantial workplace learning.

The qualification remains firmly within the VET sector and will be delivered under VET legislation. However, its three year duration, scaffolded learning design and AQF Level 7 expectations require a funding approach that is sensitive to extended analytical learning, Work Integrated Learning coordination, moderation requirements and ongoing learner support. Without adjustments to current funding arrangements, providers may face significant challenges in sustaining delivery, particularly in disciplines such as reliability engineering, where technical expertise, WIL supervision and industry connected delivery are essential.

Cost Structure

A key sustainability consideration is the cost structure associated with AQF Level 7 delivery. Providers will require access to specialised staff, advanced digital systems, structured industry partnerships, and the capacity to coordinate substantial Work Integrated Learning across three years. These requirements introduce additional costs compared to typical VET qualifications, including:

- coordination and quality assurance of Work Integrated Learning
- workplace supervisor training, induction and support
- digital platforms for data analysis, communication and evidence management
- professional development for educators and assessors
- mechanisms to ensure cultural, psychosocial and physical safety in workplace settings
- access to specialist equipment or technical environments, either onsite or through partnership arrangements
- sustained academic and learner support over a multi-year program

These cost drivers must be reflected in funding models to ensure that delivery is financially viable, particularly for regional and remote providers who may have higher operational costs and fewer economies of scale.

Industry involvement is central to the sustainability of the qualification. Reliability engineering capability is formed in operational environments, and employers will contribute supervision, equipment access, data access and workplace learning opportunities. Industry may also contribute through co funded delivery arrangements, provision of specialist expertise, allocation of staff time and investment in regional training ecosystems. Feasibility planning must therefore identify mechanisms to formalise industry contributions and ensure consistency across employers, while recognising the differences between Tier 1 miners, mid-tier companies, OEMs and contractors.

Implications for Learner Access, Affordability and Equity

Funding settings will directly influence the accessibility and equity of the qualification. Many prospective learners are mid-career workers balancing full time employment, family responsibilities and community obligations. Learner participation may be influenced by tuition costs, time away from work, travel requirements for WIL and digital access constraints. Feasibility planning must therefore consider mechanisms that reduce financial barriers, such as employer co contribution, flexible study pathways, recognition of prior learning, income support alignment and predictable scheduling that allows learners to continue working while studying.

A further sustainability factor is the variability of demand across regions. Strong interest is likely in areas with concentrations of mining and asset intensive operations, but demand may fluctuate based on labour market conditions, employer priorities and workforce mobility. The qualification will need to be supported by ongoing workforce planning led by AUSMASA to ensure that delivery volumes remain aligned with industry need and do not create volatility in provider viability.

Opportunities for Targeted Funding

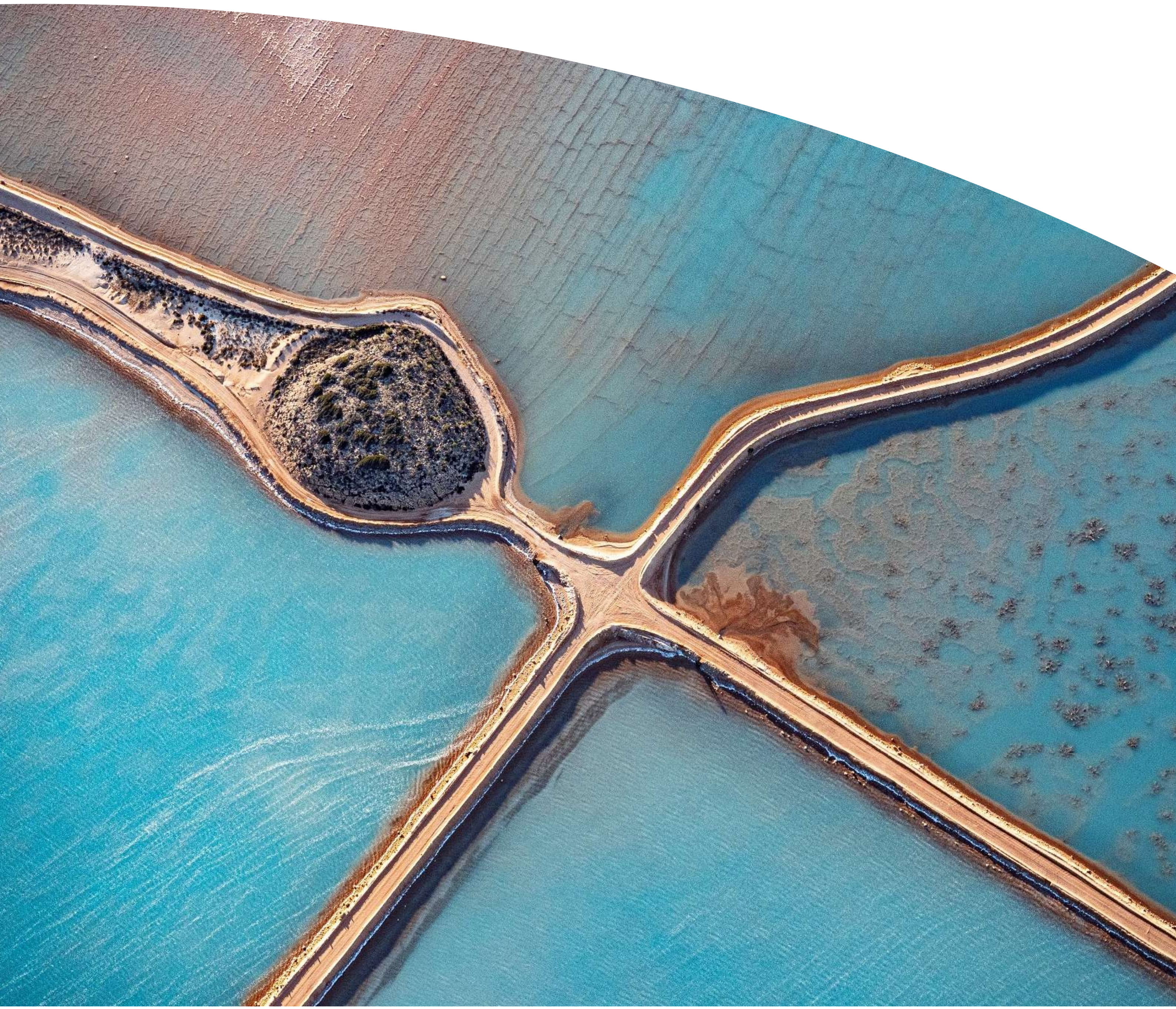
Jurisdictions have several funding mechanisms available within the VET system that could support sustainable delivery of the qualification. These include priority occupation funding classifications, advanced VET qualification categories, and specialised workforce development initiatives designed to address critical industry shortages. The Vocational Degree in Reliability Engineering aligns with national policy priorities and has the potential to be recognised as a strategic response to persistent shortages in reliability engineering capability.

Government investment may be required during the early implementation phase to ensure national uptake and maintain equity of access. This may include:

- transitional funding to support initial provider capability building
- Targeted funding for foundation skills, particularly academic literacy and numeracy and digital skills development
- support for digital infrastructure enhancements in regional and remote areas
- targeted subsidies to ensure workplace learning can occur safely and consistently
- funding for shared tools, WIL coordination resources and system wide moderation processes
- support for regional delivery models and shared technical resource hubs
- mechanisms that reduce learner cost and opportunity cost, particularly for mid-career workers

Phase 3 will need to explore these options in consultation with state and territory training authorities and develop a detailed cost model to inform funding decisions.

Overall, the sustainability of the Vocational Degree in Reliability Engineering depends on coordinated planning across governments, providers and industry. Phase 3 will need to identify viable funding pathways, clarify expectations for industry contribution, develop implementation tools that reduce provider cost burdens and support equitable access for learners across all regions. These arrangements will ensure that the qualification can be delivered confidently, safely and to the standard expected of an AQF Level 7 program while maintaining the applied, industry connected identity of vocational education.



Evaluation Framework for the Vocational Degree in Reliability Engineering

A structured and comprehensive evaluation framework is required to ensure that the Vocational Degree in Reliability Engineering is developed and implemented in a way that maintains quality, integrity and equity and delivers on the national objectives for higher level vocational education. Evaluation must extend beyond qualification outcomes to examine the effectiveness of the design process, the suitability of delivery approaches, the learner experience, provider capability, employer engagement and overall system readiness. This aligns with national expectations for transparency, accountability and continuous improvement across the tertiary system.

Phase 2 has established the foundations for evaluation by defining the capability expectations, work integrated learning requirements, industrial relations considerations and tertiary pathways that must be achieved for the qualification to operate as an AQF Level 7 award within the VET sector. Phase 3 will build on these foundations by developing a coordinated evaluation architecture that operates at both provider and system level and generates evidence to guide refinement, scaling and national approval processes.

Evaluation will therefore have two core components:

1. Evaluation of the qualification development process, and
2. Evaluation of early implementation and learner outcomes.

These components will be supported by consistent data collection, shared tools and national moderation to ensure comparability across providers and to inform tertiary system planning.

Evaluation of the Qualification Development Process

Evaluation of the development process will ensure that the qualification proceeds in a way that is transparent, collaborative and aligned with sector expectations. This component will examine:

- the effectiveness of co design processes, including the involvement of employers, industry experts, unions, professional bodies and providers
- the clarity and defensibility of the qualification structure, learning outcomes and assessment expectations
- the extent to which industrial relations, WIL, equity and RPL requirements have been integrated into the design
- the suitability of governance arrangements and the adequacy of stakeholder engagement
- the alignment of the qualification with national tertiary priorities and regulatory settings
- system level readiness, including provider capability, employer willingness to host learners and pathways into and beyond the qualification.

This evaluation will generate lessons that inform finalisation of the qualification, provide assurance to DEWR and regulators, and support national consultation during phase 3.

Evaluation of Early Implementation and Learner Experiences

Pilot delivery and early implementation will provide essential evidence on how the qualification operates in real learning and workplace environments. Evaluation will focus on:

- learner access, participation and progression, including the experiences of women, Aboriginal learners, migrants and mid-career workers
- the quality, safety and authenticity of work integrated learning, including supervision, site suitability and learner protections
- the clarity and effectiveness of assessment, including the use of capability based RPL and alignment with AQF Level 7 expectations
- employer and supervisor experiences, including feasibility, workload, and alignment between academic and workplace expectations
- provider delivery capability, governance, workforce capacity and integration of academic and workplace learning
- alignment with industrial relations settings, including classification during learning, conditions of participation and post qualification recognition
- the extent to which graduates demonstrate the capability required for applied professional roles within engineering team structures.

Evidence from these areas will support refinement prior to broader rollout and will inform future guidance for providers.

System Level Monitoring and Continuous Improvement

Evaluation will also require an ongoing system level monitoring function to track:

- access and equity outcomes
- site availability and regional participation
- quality and safety within WIL environments
- consistency of recognition and classification of graduates across enterprise agreements
- RPL consistency and defensibility
- the effectiveness of tertiary pathways and articulation into higher level qualifications
- overall sustainability and scalability of delivery models.

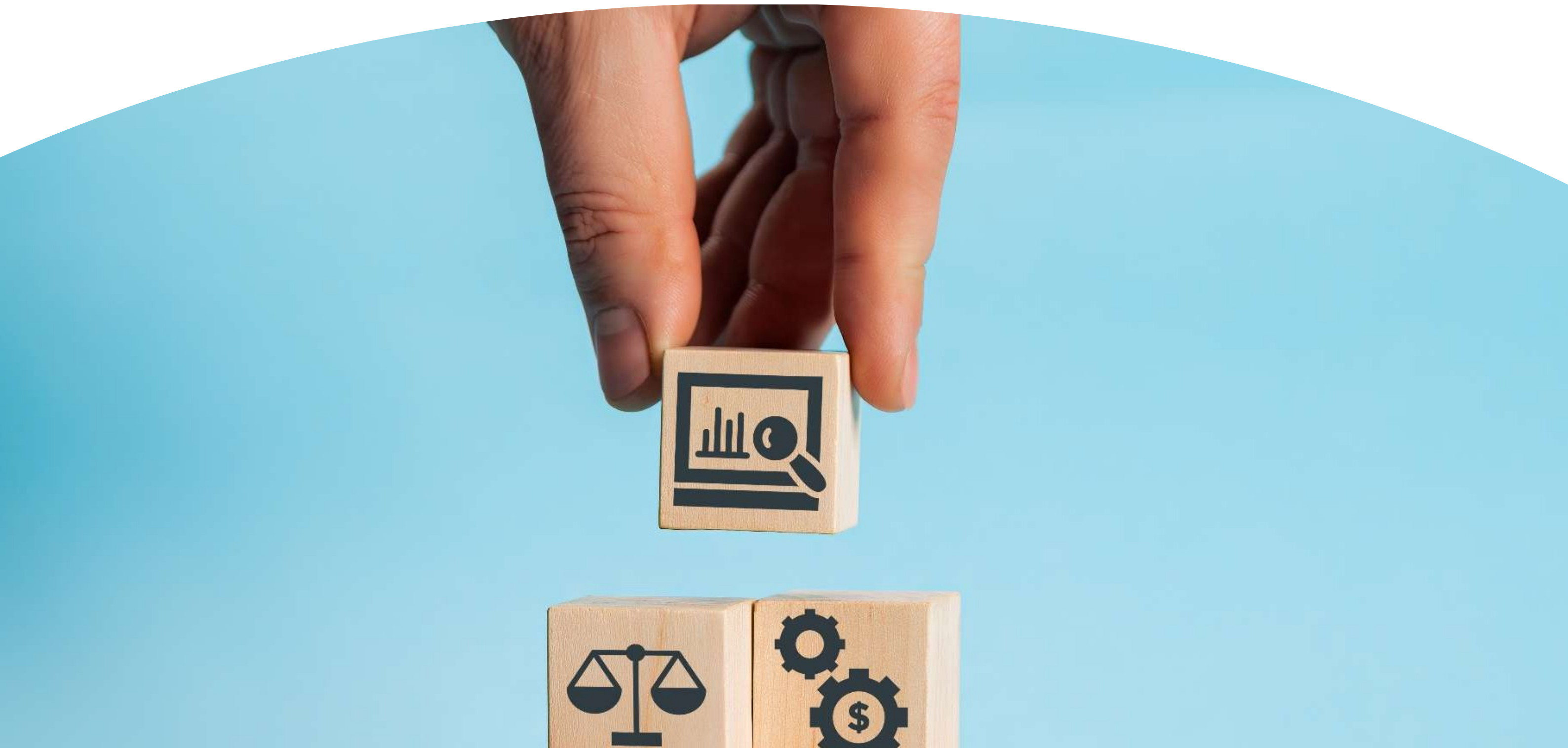
This monitoring function ensures the qualification remains aligned with workforce needs, supports portability and strengthens tertiary system harmonisation. It will enable AUSMASA and DEWR to identify risks early, adjust implementation settings and support providers to maintain quality over time.

Use of Evaluation Findings

Evaluation findings will be used to:

- refine qualification content and assessment requirements
- inform improvements to WIL frameworks, supervision guidance and equity supports
- strengthen national moderation and quality assurance arrangements
- support system readiness for expansion and multi provider delivery
- guide industrial relations engagement and recognition of the qualification
- inform ongoing co design with industry, unions, providers and universities
- contribute to national tertiary reform by demonstrating the effectiveness and scalability of AQF Level 7 qualifications in the VET sector.

Evaluation is essential to ensuring that the Vocational Degree in Reliability Engineering is credible, evidence based and capable of operating at scale within the national training system. A structured evaluation approach will generate insight into the effectiveness of the qualification's design, the quality and safety of early implementation, the experiences of learners, employers and providers, and the extent to which the degree supports workforce capability and tertiary system harmonisation. Findings will provide the evidence needed to refine the qualification, strengthen delivery models, support industrial and regulatory alignment and inform decisions about broader rollout. Through this process, evaluation becomes a continuous improvement mechanism that safeguards integrity, equity and workforce relevance across the life of the qualification.



Recommendations for Phase 3 and Implementation

1. DEWR and AUSMASA Progress to Phase 3 Qualification Development

It is recommended that the Department of Employment and Workplace Relations and the Mining and Automotive Skills Alliance endorse progression to Phase 3, the development of the Vocational Degree in Reliability Engineering for inclusion in the national Training Package system

2. Establish a Comprehensive Evaluation Framework Covering Qualification Development and Implementation

It is recommended that a comprehensive evaluation framework be established to assess both the development and the implementation of the Vocational Degree in Reliability Engineering. The evaluation should generate evidence on the effectiveness of the qualification development process and the experiences of learners, employers, providers and stakeholders during pilot delivery and early rollout.

3. Develop a National Work Integrated Learning Framework for the Vocational Degree in Reliability Engineering

AUSMASA should co design a national WIL framework that sets expectations for purpose, structure, progression, supervision, safety, accessibility and authenticity. The framework should require substantial WIL (30% minimum), define minimum site suitability criteria and provide clear guidance for employers and providers on planning, supervision and learner readiness.

4. Create National WIL Tools, Templates and Partnership Arrangements

Phase 3 should produce national WIL learning plans, supervisor guides, site suitability tools and evidence collection resources. Partnership models such as rotations, shared employer networks, project based WIL and regional collaborations should be formalised to ensure all learners can access the full range of reliability engineering tasks.

5. Establish System Level Moderation and Monitoring for WIL Quality and Equity

AUSMASA should lead sector wide moderation of WIL based assessment to ensure authenticity, individual attribution and alignment with AQF Level 7 expectations. A national monitoring mechanism should track WIL access, safety, equity participation and employer engagement to drive continuous improvement.

6. Build an Access and Equity Centred Implementation Architecture

Phase 3 should create an implementation architecture that embeds cultural safety, psychosocial safety, trauma aware practice, universal design and inclusive delivery expectations across curriculum, assessment and workplace learning. This must include clear expectations for foundation skill supports and flexible participation arrangements.

7. Embed Foundation Skills Support as a Core Requirement of Delivery

Foundation skill supports should be developed and integrated into the qualification design and implementation to address both confidence and/or capability gaps in academic writing, numeracy, digital literacy and technical communication for learners returning to study or entering from diverse backgrounds.

8. Strengthen System Capability for Inclusive and Culturally Safe Delivery

System level capability needs to be strengthened to ensure educators, employers and supervisors can support diverse learners. This includes cultural safety training, gender inclusion, neurodiversity inclusion, safe leadership and equity focused partnership models with Aboriginal organisations and community bodies.

9. Develop a National Capability Based RPL Framework

AUSMASA should create a nationally consistent capability based RPL framework that translates the qualification's design principles into clear processes, tools and evidence expectations for providers. The framework should align with DEWR's national priorities for high quality skills recognition by supporting accelerated pathways for experienced workers, ensuring equitable access and increasing transparency and defensibility of RPL decisions. This should include workplace attestation templates, structured evidence prompts, staged submission options and guidance to support consistent, rigorous and learner centred RPL practice.

10. Establish National Moderation and Quality Assurance for RPL

AUSMASA should coordinate sector wide moderation and quality assurance of RPL decisions to ensure national consistency, integrity and alignment with AQF Level 7 expectations. This process should reflect DEWR's priority for trusted and high quality skills recognition by using shared exemplars, cross provider review activities and common evidence sets to support defensible, fair and transparent RPL outcomes. Moderation arrangements should also monitor equity and participation trends to ensure RPL processes remain accessible and inclusive across regions and workforce cohorts.

11. Engage National Industrial Stakeholders to Support Implementation

AUSMASA should engage unions, employer associations and industry representative bodies through a coordinated national process to establish industrially acceptable conditions for the introduction of the Vocational Degree in Reliability Engineering and ensure consistent recognition as development progresses.

12. Clarify the Industrially Compliant Requirements for WIL

National guidance should be developed to support industrially compliant WIL arrangements, including supervision boundaries, roster and fatigue considerations, cultural safety, psychosocial protections and conditions for learner participation across awards and enterprise agreements.

13. Protect Existing Internal Organisational Pathways and Align with Award Classifications

Implementation of the Vocational Degree in Reliability Engineering should complement, not replace, existing employer pathways. The qualification should be mapped to existing applied professional and technologist classifications in enterprise agreements, supporting portability and consistent industrial recognition.

14. Strengthen Tertiary Harmonisation Through Cross Sector Recognition

AUSMASA should facilitate agreements with universities for credit and postgraduate entry recognition and provide guidance to support providers seeking Engineers Australia accreditation at the Engineering Technologist level.

15. Develop National Guidance for Provider Academic Governance and Higher Level Teaching Capability

Phase 3 should produce clear national guidance for academic governance, scaffolded curriculum sequencing, monitoring learner progression and integrating WIL with academic learning. A national skills audit and professional development program should be undertaken to support educators and assessors in analytical teaching and AQF Level 7 capability evaluation.

16. Provide Guidance on Facilities, Equipment and Technical Resources

AUSMASA should refine the consolidated list of facilities and equipment and create guidance on acceptable access arrangements for providers. This should include examples of provider held resources, shared infrastructure models, equipment hubs and workplace accessed facilities, without imposing rigid minimums.

17. Support Regional, Remote and FIFO Delivery through Strengthened Partnership and Shared Resource Models

Phase 3 should co design delivery arrangements for regional and remote contexts, including shared staffing models, visiting specialists, regional partnerships with employers and shared technical resource hubs. These supports should reflect the different structural capability of regional providers.

18. Develop a Sustainable Funding Model that Reflects WIL, Employer Contribution and Higher Level Delivery Requirements

AUSMASA should work with jurisdictions to establish the appropriate funding classification, develop a national cost model for delivery and identify mechanisms for equitable learner participation. Employer contribution expectations for WIL should be formalised, and targeted transition funding should support early implementation and system readiness.

19. Develop a Pathway Communication Strategy for Learners, Employers and Stakeholders

AUSMASA should develop clear communication materials outlining employment pathways, industrial alignment, internal organisational progression routes and higher education opportunities. This will assist learners, employers, training providers, Schools and the community to understand the value, purpose and long term mobility associated with the vocational degree.

20. Monitor and Review Pathway Effectiveness Through Early Delivery

Pathway outcomes, including employment transitions, classification outcomes, credit arrangements and postgraduate progression, should be established and monitored during the first years of delivery. This will ensure that pathways operate as intended and provide an evidence base for future refinement.

Next Steps

Immediate Actions

The completion of Phase 2 confirms the qualification design, workforce rationale and system requirements for the Vocational Degree in Reliability Engineering. The next stage of work will focus on co designing and developing the national arrangements that will enable consistent, safe and high quality implementation across the VET sector. These activities will ensure that providers, employers and learners can participate with confidence and that delivery meets the expectations of AQF Level 7.

Immediate post Phase 2 activity will involve structured engagement with state and territory training authorities, employers, unions and regulatory stakeholders to confirm funding classification, recognise the qualification within industrial structures and secure commitment to the collaborative development work required in Phase 3. AUSMASA will also establish governance arrangements for Phase 3, including continued involvement of the Discipline Panel, providers, industry partners, Aboriginal organisations and higher education representatives.

A central focus of Phase 3 will be the development and writing of the units of competency that will comprise the qualification. This work will translate the capability based design intent into national competency standards that reflect the analytical, technical and professional expectations of reliability engineering practice at AQF Level 7. Units will be drafted, validated and refined through structured co design processes involving employers, technical experts, vocational educators and higher education partners to ensure consistency with the qualification outcomes, work integrated learning model and assessment requirements.

Phase 3 will also develop the broader implementation architecture needed to support delivery. This includes industrial acceptance conditions, the national WIL framework, site suitability criteria, workplace learning plan templates, supervisor resources, the capability based RPL framework, assessment guidance and sector wide moderation arrangements. Work will extend to provider readiness guidance, digital infrastructure requirements for regional and remote delivery and the development of tools that support cultural safety, psychosocial safety and inclusive learning practices.

Before implementation, AUSMASA will prepare a suite of national resources to support provider readiness, including curriculum sequencing guidance, staffing and professional development pathways, facilities and equipment guidance and mechanisms for monitoring learner progression and safety outcomes. These resources will enable providers to undertake readiness planning in a structured and supported manner, ensuring that the Vocational Degree in Reliability Engineering is delivered with integrity and strong alignment to workforce needs.

Together, these next steps will position the qualification for successful national adoption, support the development of an applied professional reliability engineering workforce and strengthen the contribution of the VET sector to meeting Australia’s long term engineering capability requirements.

Ongoing Engagement and Dissemination

To ensure national impact and long term sustainability, Phase 3 will include a structured dissemination and engagement strategy that extends beyond the mining and resources sector. Reliability engineering is an increasingly cross sector capability, with relevance to Defence, energy, transport, advanced manufacturing, infrastructure and emerging clean energy industries. Broader engagement will ensure that the Vocational Degree in Reliability Engineering is understood, recognised and supported across the full range of industries that rely on applied professional reliability capability.

AUSMASA will develop a coordinated communication and dissemination approach that includes targeted outreach to industry associations, government agencies, professional bodies and relevant regulatory authorities. This will include Defence and Defence industry partners, where reliability engineering capability is a recognised workforce need, as well as the energy, utilities and transport sectors where asset intensive operations require similar diagnostic and systems based skills.

Sector wide engagement will also involve sharing the qualification design principles, work integrated learning model and capability based assessment approaches with VET providers, higher education institutions and other Jobs and Skills Councils. This cross sector dissemination will support consistent understanding of the qualification type, strengthen tertiary harmonisation and promote portability of capability across industries.

As units of competency, WIL frameworks and implementation tools are finalised in Phase 3, AUSMASA will provide national briefings, technical guides and communication materials that support providers, employers and regulators to understand the purpose, requirements and workforce alignment of the Vocational Degree in Reliability Engineering. Dissemination activities will include webinars, national forums, industry roundtables, case studies and targeted engagement with peak bodies.

Ongoing dissemination will continue beyond Phase 3 as the qualification is implemented. AUSMASA will monitor adoption patterns, identify opportunities for cross sector collaboration and continue engaging with industries such as Defence that have related capability needs. This will ensure the vocational degree becomes a recognised national pathway for applied professional reliability roles across multiple sectors, supporting Australia’s long term engineering workforce capability and strengthening alignment between education, industry and national skills priorities.

Appendices

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Acronym Glossary

Acronym	Full Name
ABS	Australian Bureau of Statistics
ACTU	Australian Council of Trade Unions
AHRI	Australian HR Institute
AI	Artificial Intelligence
AMGC	Advanced Manufacturing Growth Centre
AMWU	Australian Manufacturing Workers' Union
ANZSCO	Australian and New Zealand Standard Classification of Occupations
AQF	Australian Qualifications Framework
ASCED	Australian Standard Classification of Education
AS/NZS	Australian/New Zealand Standards
ASU	Australian Services Union
ASTM	American Society for Testing and Materials
AUSMASA	Mining and Automotive Skills Alliance
CAE	Computer-Aided Engineering
CEPU	Communications, Electrical and Plumbing Union
CMMS	Computerised Maintenance Management System
COE	Centre of Excellence
DAQ	Data Acquisition
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEWR	Department of Employment and Workplace Relations
DISR	Department of Industry, Science and Resources
DMAIC	Define, Measure, Analyse, Improve, Control
ESD	Energy Source & Distribution (industry publication)
ETU	Electrical Trades Union
EV	Electric Vehicle
FIFO	Fly-In Fly-Out
FMEA	Failure Mode and Effects Analysis
FRACAS	Failure Reporting, Analysis, and Corrective Action System
FWC	Fair Work Commission
FWO	Fair work Ombudsman
ICT	Information and Communications Technology
IEC	International Electrotechnical Commission
IET	Institution of Engineering and Technology
IIoT	Industrial Internet of Things
ISO	International Organization for Standardisation
JSA	Jobs and Skills Australia
KPI	Key Performance Indicator
LGEA	Local Government Engineers' Association
LMI	Labour Market Insights

Acronym	Full Name
MAxxxxx	Modern Award Code (Fair Work Australia award identifiers)
MCA	Minerals Council of Australia
MIL-STD	United States Military Standards
ML	Machine Learning
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
NEC	Not Elsewhere Classified
OEM	Original Equipment Manufacturer
OSCA	Occupation Standard Classification for Australia
OSL	Occupation Shortage List
PLC	Programmable Logic Controller
PRA	Probabilistic Risk Assessment
RCA	Root Cause Analysis
RCM	Reliability-Centred Maintenance
RTO	Registered Training Organisation
SAT	Site Acceptance Test
SCADA	Supervisory Control and Data Acquisition
SPC	Statistical Process Control
TAFE	Technical and Further Education
TLEA	Tianqi Lithium Energy Australia
TRL	Technology Readiness Level
VELG	Vocational Education and Learning Group
VET	Vocational Education and Training
WHS	Work Health Safety
WIL	Work Integrated Learning

Mining and Automotive Skills Alliance

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