LET'S GET YOU CHARTERED

GUIDE TO ASSESSMENTS

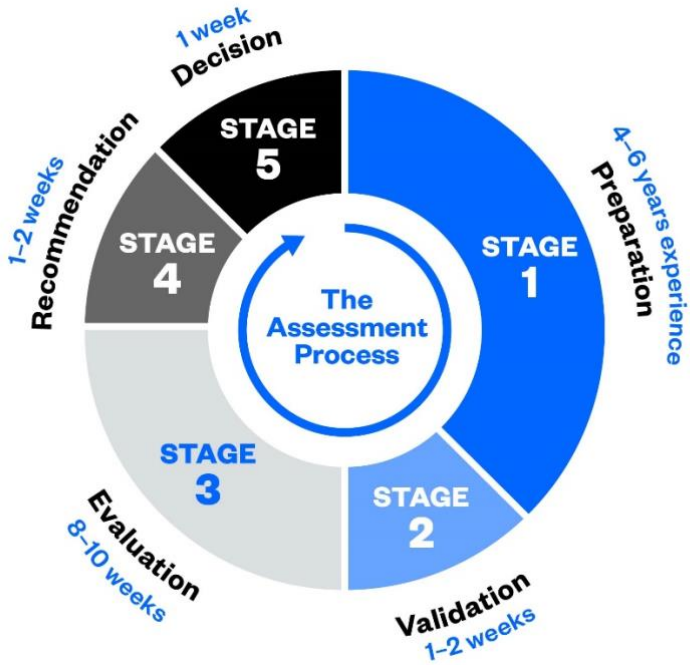
September 2021

engineering new zealand
te ao rangahau

CONTENTS

OUR PROCESS

If you're completing a Chartered assessment or a CPEng reassessment, your application will go through all five stages of our process.



STAGE 1: PREPARATION

Over 4–6 years you'll accumulate enough experience to be ready to apply for Chartership, and if you're CPEng you'll need to be reassessed at least once every 6 years. The easiest way to keep track of your development is to record your work and CPD in our member area online. When you're ready, complete every section of the required assessment online.

STAGE 2: VALIDATION

When your application is complete, submit it to our team for validation. One of our Competence Assessment Advisors will look after your application from start to finish. Your advisor will check the information you've provided and will aim to give you feedback within 10 working days. They'll let you know if you need to make any changes before submitting your application.

If you do need to make changes, try to get them done as soon as possible and then resubmit for validation.

STAGE 3: EVALUATION

Once your application is finalised, an assessment panel will be assigned to you. This is usually made up of a Lead Assessor and a Practice Area Assessor who has knowledge in an area of engineering relevant to your practice area.

They'll review your application over 8–10 weeks and as part of this may meet with you to discuss it as well. For Chartered assessments this meeting will be held in person, and for CPEng reassessments it's normally held via video chat or phone.

The panel will use the evidence you submit and the information from your meeting with them to evaluate your application. They might also ask you to supply further evidence to support your application.

STAGE 4: RECOMMENDATION

Once they've got all the information they need, the panel will make a recommendation to the Competency Assessment Board (CAB) about whether to approve your application. Your Lead Assessor will let you know their recommendation.

The CAB will consider the panel's recommendation and make a decision on your application at their monthly meeting. Occasionally the CAB asks for additional information. Your advisor will let you know if that happens.

STAGE 5: DECISION

Your advisor will let you know the outcome of your application. If successful, your name will appear on our 'find an engineer' search online which is available publicly.

If your application is unsuccessful or the CAB made an alternative decision, you can respond. Your advisor will talk you through your options.

BEFORE YOU START

- Have your credentials checked by our team – you can request this in our member area.
- Make sure your work and CPD records are up to date.
- Get familiar with the assessment criteria.
- Talk to people who have been through the process before.

Top tip: write in the first person, eg 'I' or 'me'.

COMPLETING YOUR APPLICATION

CHARTERSHIP & PRACTICE DETAILS

In this section you'll choose the membership and registrations you want to be assessed for, describe your practice area and select your practice field.

MEMBERSHIP AND REGISTRATIONS

Based on the type of assessment and your engineering class, you'll be shown the membership and registrations you can apply for.

Professional Engineer Complex engineering problems and activities	**Engineering Technologist** Broadly-defined engineering problems and activities	**Engineering Technician** Well-defined engineering problems and activities	**Engineering Geologist** Complex engineering geological problems and activities
Washington Accord (4 year BE) or equivalence	Sydney Accord (3 year BEngTech) or equivalence	Dublin Accord (2 year NZDE) or equivalence	Recognised post graduate qualification in Engineering Geology
Chartered Member IntPE(NZ)/APEC Engineer	Chartered Member (Eng. Technologist) IntET(NZ)	Chartered Member (Eng. Technician) IntETn(NZ)	Chartered Member (PEngGeol)
CPEng Design Verifier (Passenger Ropeways) Design Verifier (Cranes) Design Verifier (Pressure Equipment)			

If you're applying for Chartered Membership at the Professional, Technologist or Technician level, you can choose to also add on the international register. Joining an international register means your competence as an engineer is recognised to an international standard – building your credibility even more. It also provides opportunities and greater mobility around the world.

Read more on international registers

If you're applying at the Professional Engineer level, you'll be able to choose to be a Chartered Member, Chartered Professional Engineer (CPEng) or both. You'll also be able to add on any Design Verifier roles that you need for your work.

Chartered Member (CMEngNZ)	Registration (CPEng)
General quality mark of competence and professionalism	Quality mark of current New Zealand specific competence
Benefits of Engineering New Zealand membership	Independent of Engineering New Zealand and governed by CPEng Act 2002
Assessed once, with annual commitment to ongoing professional development and ethics	Re-assessment at least once every six years
Assesses general engineering competence to an internationally recognised standard	Assesses general engineering competence to an internationally recognised standard with New Zealand specific technical competence (must use work examples from the last six years)
Basis of eligibility for international registers (IntPE, IntET, IntETn)	May be required depending on your employer or type of work

PRACTICE AREA

This is the area that we'll assess your competence for. A short description helps us assign the right assessment panel to your application.

Practice area is not a full scope of your engineering practice or competence. You can practice in other areas or fields of engineering if you are undertaking work that you can complete successfully within your competence, as governed through self-regulation and your annual commitment to the Code of Ethical Conduct.

Describe the area you have engineering knowledge and skills in. Focus on your core current practice area. Keep it within 15 words. Avoid using personal pronouns such as 'I' or 'me', job titles or project names, company names, and any engineering activities that are not evidenced within your assessment.

Use the format: [Nature or actions] of/for/in [engineering knowledge or skills]. A few successful examples are:

- Design and construction monitoring of water and wastewater systems.
  OR
- Design of machines, load carrying and lifting equipment.
  OR
- Process engineering, operation and training for wastewater treatment plants.

PRACTICE FIELD

Selecting your practice field will also help us assign the right assessment panel to your application. Choose the one that best aligns with your practice are. You may choose an additional field if your practice is across more than one.

See appendix A for practice field descriptions

REFEREES

You need two referees to provide a recommendation on your application. They need to be current Chartered Members or Fellows of Engineering New Zealand (CMEngNZ or FEngNZ), Chartered Professional Engineers (CPEng), or equivalent.

If a referee declines your request, you'll need to provide another person.

Referees that accept your request will be asked:

- their relationship to you
- what they consider to be some of your strengths and weaknesses as an engineer
- if there is anything about your practice as an engineer that would raise concern.

SELF-ASSESSMENT

The self-assessment is where you write how you meet the competency standard. Your answer for each competency group should be around 500 words.

COMPETENCY GROUPS

Chartered Membership and CPEng

1. Engineering knowledge
2. Managing engineering work
3. Professional acumen
4. Developing technical solutions

Mutual recognition for Chartership

1. Engineering knowledge

CPEng reassessment

1. Changes in your practice area

Knowledge assessment

1. Natural sciences knowledge
2. Mathematical knowledge
3. Engineering fundamental knowledge
4. Specialised engineering knowledge
5. Design process knowledge
6. Engineering practice knowledge
7. Engineering in society
8. Research based knowledge

HOW WE DEFINE COMPLEXITY

Depending on the type of Chartership you're applying for, you'll need to show you can carry out engineering work at a particular level of complexity.

Problem	Activity
Chartered Member and CPEng[1]	
Complex engineering problems Problems that include some or all of the following: • Wide-ranging or conflicting technical, engineering, and other related issues • No obvious solution, which means an original method of analysis is needed. • Can't be resolved without in-depth engineering knowledge • Issues not often experienced • Aren't covered by the standards and codes of practice for professional engineering • Diverse groups of stakeholders with a wide range of needs • Significant consequences in a range of contexts	**Complex engineering activities** Activities or projects that include some or all of the following: • Diverse resources, eg people, money, equipment, materials and technologies • Resolving critical problems that occur when a variety of technical, engineering and other related issues interact • New materials, techniques or processes, or the innovative use of existing materials, techniques, or processes • Significant consequences in a range of contexts
Chartered Member (Engineering Technologist)[2]	
Broadly-defined engineering problems Problems that include some or all of the following: • A variety of factors that may create conflicting constraints • Can be solved by applying proven analysis techniques • Knowledge of principles and applied procedures or methods • Belong to groups of familiar problems that are solved in well-accepted ways • May be partly outside problems covered by standards or codes of practice	**Broadly-defined engineering activities** Activities or projects that include some or all of the following: • A variety of resources, eg people, money, equipment, materials, information and technologies • Resolving occasional interactions between limited technical, engineering and other related issues where only a few conflict • Using new materials, techniques or processes in innovative ways • Consequences that are very important locally, but may have wider implications

[1] The wording of these definitions has been slightly simplified from the original Definitions for purpose of minimum standard for registration in the Chartered Professional Engineers of New Zealand Rules (No 2) 2002. Read them in their original form

[2] These definitions are a simplified version of those found in Schedule 1 of the Regulations for Election or Transfer to Engineering New Zealand Membership Classes. Read them in their original form

• Several groups of stakeholders with differing needs that occasionally conflict • Consequences that are important locally but may have wider implications • Are parts of, or systems within, complex engineering problems	• Knowledge of normal operating procedures and processes
Chartered Member (Engineering Technician)[2]	
Well-defined engineering problems Problems that include some or all of the following: • Several issues, but only a few that result in conflicting constraints • Can be solved using a systematic approach • Resolved with limited theory but extensive practical knowledge • Frequently experienced and so familiar to most practitioners in the practice area • Covered by standards and/or documented codes of practice • Limited range of stakeholders with differing needs • Consequences that are important locally but aren't far-reaching • Discrete components of engineering systems	**Well-defined engineering activities** Activities or projects that include some or all of the following: • Limited range of resources, eg people, money, equipment, materials, information and technologies • Resolving interactions between limited technical and engineering issues where wider issues have little or no impact • Using existing materials, techniques or processes in new ways • Consequences that are important locally but aren't far-reaching • Knowledge of practical procedures and practices for widely-applied operations and processes
Chartered Member (PEngGeol)[2]	
Complex engineering geological problems Problems that include some or all of the following: • Wide-ranging or conflicting engineering, engineering geological and other related issues • Not easily recognised, understood or solved, which means an original method of analysis is needed • A wide range of issues that might be in an unfamiliar setting • Aren't covered by guidelines, standards and codes of practice for professional engineering geology • Diverse groups of stakeholders with a wide range of needs • Significant consequences in a range of contexts	**Complex engineering geological activities** Activities or projects that include some or all of the following: • Diverse resources, eg people, money, equipment, materials and technologies • Recognising, understanding and resolving significant problems when wide-ranging or conflicting engineering, engineering geology and/or other related issues interact • New techniques or processes, or the innovative use of existing techniques or processes

EVIDENCE

Attach evidence which supports your responses in the self-assessment and reflects your practice area description. You should attach four to six records for Chartered or Knowledge Assessments, and two records for mutual recognition or CPEng reassessments.

You'll be able to choose from your existing work and CPD records, or add new ones. For each record you choose, you'll need to explain how that record supports your assessment application. Your explanation should discuss which of the competency groups the evidence is supporting and how it shows your competence as an engineer. If you're just referencing one competency group then aim to write 500–750 words. If you're referencing all groups, then you may write over 2,000 words.

You also need to attach files at this stage to your records as sample evidence. These could include drawings, project plans, calculations etc. You can upload PNG, XLSX, PDF, JPG, JPEG and SNOTE file types under 42MB.

Make sure you guide assessors on where to find evidence of this information in your attached files. This could be page numbers, sections or particular file names.

Professional Engineer competencies

- Describe how you applied your engineering knowledge, eg engineering principles, local codes, standards or regulations, new knowledge, practices or technologies.
- Manage engineering work including how safety, sustainability and quality contribute to the final outcome. For this group you need to show evidence of complex engineering activities.
- Professional acumen that include dealing with an ethical dilemma; understanding and working within the limits of your competence; taking into account social, cultural or environmental factors; and communicating effectively with others.
- Design/develop technical solutions. For this group you need to show evidence of complex engineering problems.

Engineering Technologist competencies

- Describe how you applied your engineering knowledge, eg engineering principles, local codes, standards or regulations, new knowledge, practices or technologies.
- Manage engineering work including how safety, sustainability and quality contribute to the final outcome. For this group you need to show evidence of broadly-defined engineering activities.
- Professional acumen that include dealing with an ethical dilemma; understanding and working within the limits of your competence; taking into account social, cultural or environmental factors; and communicating effectively with others.
- Design/develop technical solutions. For this group you need to show evidence of broadly-defined engineering problems.

Engineering Technician competencies

- Describe how you applied your engineering knowledge, eg engineering principles, local codes, standards or regulations, new knowledge, practices or technologies.

- Manage engineering work including how safety, sustainability and quality contribute to the final outcome. For this group you need to show evidence of well-defined engineering activities.
- Professional acumen that include dealing with an ethical dilemma; understanding and working within the limits of your competence; taking into account social, cultural or environmental factors; and communicating effectively with others.
- Design/develop technical solutions. For this group you need to show evidence of well-defined engineering problems.

Engineering Geologist competencies

- Describe how you applied your engineering knowledge, eg engineering principles, local codes, standards or regulations, new knowledge, practices or technologies.
- Manage engineering work including how safety, sustainability and quality contribute to the final outcome. For this group you need to show evidence of complex engineering geological activities.
- Professional acumen that include dealing with an ethical dilemma; understanding and working within the limits of your competence; taking into account social, cultural or environmental factors; and communicating effectively with others.
- Design/develop technical solutions. For this group you need to show evidence of complex engineering geological problems.

APPLICATION STATUS

Started: you're compiling your assessment application

Payment pending: awaiting payment by credit card or invoice

Submitted: with our team for checking and validation

Editing: additional information required before being passed to an assessment panel

Assessors being assigned: we're finding your assessment panel

Assessment in progress: your assessment is being reviewed by the panel

Pending Board: waiting for a Competency Assessment Board to be available

Board assigned: Competency Assessment Board has been assigned

Complete: outcome of assessment finalised and shared with you

Withdrawn: application has been withdrawn

COMMON TERMS

Assessment criteria: the standard we use to assess engineers on their competence.

Assessment panel: usually made up of a Lead Assessor and a Practice Area Assessor, the panel evaluates reviews your assessment application, before providing recommendations to the Competency Assessment Board.

Chartered Assessment: evaluates if you meet the competence standard to become Chartered, either as a Chartered Member (CMEngNZ) of Engineering New Zealand or a Chartered Professional Engineer (CPEng).

Chartered Membership: the Engineering New Zealand class of membership for engineering professionals who have demonstrated their engineering competence to an internationally-recognised benchmark.

Chartered Member CMEngNZ: solves complex engineering problems and activities by applying specialist engineering knowledge and first principles to their work.

Chartered Member CMEngNZ (Engineering Technologist): solves broadly-defined engineering problems and activities by applying knowledge of engineering principles.

Chartered Member CMEngNZ (Engineering Technician): solves well-defined engineering problems and activities through knowledge and use of established analytical techniques and procedures.

Chartered Member CMEngNZ (PEngGeol): solves complex engineering geological problems and activities by applying in-depth engineering geology knowledge.

Chartered Professional Engineer (CPEng): solves complex engineering problems and activities, which requires applying specialist engineering knowledge and first principles to their work.

Competence Assessment Advisor: a member of the Engineering New Zealand team assigned to your application and your main point of contact once you submit your application for validation.

Competency Assessment Board (CAB): the group of senior engineers that accepts or rejects recommendations made by the assessment panel.

Complexity: one of the key ways we differentiate between the competence registers.

CPD record: information about the continuing professional development activities you've done to maintain currency as an engineer.

CPEng reassessment: evaluates if you have maintained current competence to meet the Chartered Professional Engineer standard.

Dublin Accord: the agreement for the international recognition of Engineering Technician qualifications.

Educational accord: an agreement that benchmarks educational standards. If you hold an Accord-accredited qualification, you'll benefit from mutual recognition of your qualification between signatory countries.

Engineering Geologist: deals with complex engineering geological problems and activities requiring specialist and in-depth geological engineering knowledge.

Engineering Professional: deals with complex engineering problems and activities requiring the application of specialist engineering knowledge and work from first principles.

Engineering Technologist: deals with broadly-defined engineering problems and activities that require knowledge and use of principles and applied procedures.

Engineering Technician: deals with well-defined engineering problems and activities requiring knowledge and use of established analytical techniques and procedures.

Knowledge assessment: evaluates if you have gained an appropriate level of technical knowledge and understanding through your work or study to practice at the level of a professional engineer.

Lead Assessor: Chartered Engineer in charge of managing the assessment process.

Practice area: a combination of the area in which you hold specialised engineering knowledge and the nature of the activities you perform. These may change over the course of your career but your competence will be assessed for your current area of engineering practice.

Practice Area Assessor: the volunteer technical expert on your assessment panel who has knowledge in an area of engineering relevant to your own practice area/field.

Practice field: indicates the nature of your engineering work.

Recognised external authorities: overseas engineering registration authorities that are signatories of International Engineering Agreements.

Sydney Accord: the agreement for the international recognition of Engineering Technologist qualifications.

Sample evidence: documents you include in your Work Record to provide evidence of your personal involvement in a project or activity.

Washington Accord: the agreement for the international recognition of engineering qualifications.

Work record: information about the projects or activities you've carried out in your engineering work, used in competence assessments to demonstrate the practical application of your engineering knowledge and skills.

FREQUENTLY ASKED QUESTIONS

What's the difference between Chartered Membership and Chartered Professional Engineer registration (CPEng)?

Chartered Members belong to Engineering New Zealand and get all the perks of being part of our community. CPEng is different from membership and is a registration under the CPEng Act 2002.

CPEng is only open to professional engineers, who must demonstrate an ability to deal with complex engineering problems and activities. Chartered Membership is also available to professional engineers, but additional categories provide recognition for engineering technologists, engineering technicians and engineering geologists.

Both require a similar assessment. The competence standard for both are effectively the same, but CPEng registration requires evidence of New Zealand-specific good practice and reassessment at least once every 6 years. This makes Chartered Membership more accessible for engineers practising overseas, and provides direct entry for engineers who have been assessed in an equivalent overseas jurisdiction, eg CEng (UK) or CPEng (Australia). Chartered Membership isn't reassessed because you'll be doing ongoing professional development to stay current.

Both CPEng and Chartered Membership are underpinned by the same Code of Ethical Conduct and a fair, robust and proportionate complaints and disciplinary process.

How many hours of professional development activity do I need to do each year?

You need to complete 40 hours of continuing professional development (CPD) each year to demonstrate you're actively keeping your engineering knowledge and skills up to date. For your assessment you'll need to have provided the last six years of CPD records.

I can't attach any documents because my work is highly confidential/the property of my employer. What should I do?

We take confidentiality seriously and have put processes in place to protect your application.

- Engineering New Zealand assessors sign a confidentiality agreement prohibiting them from disclosing any aspect of your assessment to anyone except the relevant Practice Area Assessors, Knowledge Assessors, Competency Assessment Board members or Engineering New Zealand staff.
- We accept Work Record files that have been redacted to protect confidential information.
- You'll be given the opportunity to review who we've assigned to your assessment panel. If you have any concerns, we'll be happy to assign an alternative panel member.

What if I don't have any files to attach to my work records?

Because our competence assessments are evidence-based, you need to provide files as evidence of your experience. Email correspondence can be used as evidence.

How many evidence files can I attach?

Our general guidance is quality over quantity. One to four files are usually enough to provide sufficient evidence of your work. Give your assessors only the relevant information and be specific about where your evidence is in the Work Record files. For example, specify page numbers, sections, calculations, photograph titles, chart details etc.

When am I due to submit my CPEng reassessment? Can I extend the due date?

You'll receive a reminder email three to six months before your CPEng reassessment is due. If you don't hear from us, get in touch and we'll confirm the date. Extensions are determined on a case by case basis, and are only available within the calendar year of your CPEng reassessment being due.

How much does assessment, membership and registration cost?

You can find the latest prices on our website. There's a one-time charge for Chartered assessments and knowledge assessments. The fee for CPEng reassessment is included in your annual registration fee.

What's expected of me when I meet with the panel to discuss my application?

The meeting is a professional conversation and is your chance to show you have a clear understanding of the work you're presenting. The Practice Area Assessor will ask you questions about the evidence you submitted in your application to verify your technical expertise. You can prepare by reviewing your application and being confident about the work you are presenting.

If I'm successful, when will my name appear on the 'find an engineer' search online?

Your name will be added to the relevant register as soon as possible after the Competency Assessment Board has approved your application.

I don't have two referees that meet the criteria. Can I still apply?

Your referees need to be current Chartered Members or Fellows or Engineering New Zealand (CMEngNZ or FEngNZ), Chartered Professional Engineers (CPEng), or equivalent. They don't have to be in your practice field. If you're struggling to find referees, try attending Engineering New Zealand events and branch meetings and start networking now.

APPENDIX A: PRACTICE FIELD DESCRIPTIONS

Engineering practice fields are loosely defined terms and are used as an indication of the nature of engineering work carried out by engineers in a certain field.

AEROSPACE ENGINEERING

Aerospace engineering is the design, development, and production of aircraft (aeronautical engineering), spacecraft (astronautical engineering) and related systems. Aerospace engineers may specialise in aerodynamics, avionics, structures, control systems or propulsion systems. It may involve planning maintenance programmes, designing repairs and modifications and exercising strict safety and quality controls to ensure airworthy operations.

BIOENGINEERING

Bioengineering draws heavily on the Chemical engineering discipline and involves the engineered development of raw materials to produce higher value products, using biological systems (biological catalysts). The description also encompasses the general application of engineering to biological systems to develop new products or solve problems in existing production processes. As examples, bioengineers are found in medical research, genetic science, fermentation industries and industries treating biological wastes.

BUILDING SERVICES

Building Services engineering is the application of mechanical or electrical engineering principles, and an understanding of building structure, to enhance all aspects of the built environment from air conditioning and mechanical ventilation, electrical light and power, fire services (e.g. sprinklers and alarms), water and waste services, data and communications, security and access control, vertical transportation, acoustics and energy management.

CHEMICAL ENGINEERING

Chemical engineering is concerned with the ways in which raw materials are changed into useful and commercial end products such as food, petrol, plastics, paints, paper, ceramics, minerals and metals. Often these processes are carried out at large scale plants. Research of raw materials and their properties, design and development of equipment and the evaluation of operating processes are all part of chemical engineering.

CIVIL ENGINEERING

Civil engineering is a broad field of engineering concerned with the, design, construction, operation and maintenance of structures (buildings, bridges, dams, ports) and infrastructure assets (road, rail, water, sewerage). The Civil engineering discipline underpins several engineering fields such as Structural, Mining, Geotechnical and Transportation engineering, in which civil engineers often specialise. General Civil engineers are likely to be competent to undertake work that relates to one or more of these areas.

ELECTRICAL ENGINEERING

Electrical engineering is the field of engineering which deals with the practical application of electricity. It deals with the aspects of planning, design, operation and maintenance of electricity generation and distribution, and use of electricity as a source of energy within major buildings, industrial processing complexes, facilities and transport systems. It includes the associated networks and the equipment involved such as switchboards, cabling, overhead lines/catenaries, earthing, control and instrumentation systems.

Areas of specialisation within the wider electrical engineering discipline, such as electronics and telecommunications are usually concerned with using electricity to transmit information rather than energy. For this reason, electronics and radiocommunications/telecommunications are captured under the field of Information engineering.

ENGINEERING ACADEMIC

The Academic practice field is defined for engineering academic staff members from tertiary education including engineering researchers.

In tertiary education, academic staff members may be involved in engineering activities in various roles, from building engineering prototypes, to contributing to knowledge in engineering. Engineering academic staff members may not be directly involved in the engineering design process but undertaking cutting edge engineering research to lead and enhance engineering activities. Examples of work samples of engineering academic staff members may be their authored quality assurance publications in engineering disciplines, and/or their authored quality assurance engineering reports at NZQA level 7, 8, 9 or 10 (gradate or postgraduate level). Academic staff members who are teaching an engineering programme without quality assurance publications in engineering disciplines or quality assurance engineering reports, may not qualify for academic practice field.

ENGINEERING MANAGEMENT

Engineering Management is a field of practice where engineers from any technical engineering background exercise engineering judgement in making decisions on the application and optimisation of physical, human and financial resources to achieve engineering outcomes in related processes or business activities. Engineering Managers may not be directly involved in the engineering design process.

General management – where engineering knowledge is of benefit or essential and covering many engineering disciplines.

- Qualifies as Management practice field.
- Example: Chief Executive or Director of an engineering or construction company.

Engineering management of a multi-disciplinary team where engineering knowledge is essential but specific discipline knowledge is not essential.

- Qualifies as Management practice field.
- Example: Engineering manager of a local authority or manufacturing company. A judgement may be necessary, but err towards including the management field – the candidate is appropriate for both management and discipline fields. *(Note: an example grey area is the general manager of a lines company where electrical engineering knowledge may be essential for the role).*

Management or leadership of a team, however large, where the candidate must have engineering knowledge to do the job competently. This management is part of the skills and knowledge of the discipline.

- Would not normally qualify as Management practice field.
- Example: Chief structural engineer of a large consultancy or compliance authority. A judgement may be necessary but err towards including the management field if management activities are beginning to dominate – the candidate may be appropriate for both management and discipline fields.

Part time management of a small practice or branch of a consulting practice managing budgets and staff and clients while carrying out frontline engineering or being the responsible person signing off compliance certificates.

- Would not normally qualify for the Management practice field, as a certain amount of management is part of the engineering function, and is 'business as usual' for an engineer in this situation. *(Note: Grey area accepted as to the boundary between 'business as usual' and the management becoming dominant. As an acid test, ask "could they give up their discipline practice field?". If not, then Management should not apply. If so, then in theory they need to go through a full review to justify the change in practice field/area description. A balanced decision may lead to having the two practice fields).*

Full time engineering role where the applicant claims that they "do management", as well as advising clients, planning other workloads, training staff etc.

- Would not qualify for the Management practice field, as management is part of their normal engineering activity. This includes project management, unless it is dominant, in which case the practice field is still their engineering knowledge (discipline), and project management is written into the practice area description (ie they use their discipline skills to do project management).

ENVIRONMENTAL ENGINEERING

Environmental engineering draws on the Civil and Chemical engineering disciplines to provide healthy water, air and land to enhance human habitation. Environmental engineers devise, implement and manage solutions to protect and restore the environment, within an overall framework of sustainable development. The role of the environmental engineer embraces all of the air, water and soil environments, and the interactions between them.

FIRE ENGINEERING

Fire engineering draws on knowledge from the range of engineering disciplines to minimise the risk from fire to health and safety and damage to property through careful design and construction. It requires an understanding of the behaviour of fires and smoke, the behaviour of people exposed to fires and the performance of burning materials and structures, as well as the impact of fire protection systems including detection, alarm and extinguishing systems.

GEOTECHNICAL ENGINEERING

Geotechnical engineering involves application of knowledge of earth materials in the design of structures, such as foundations, retaining walls, tunnels, dams and embankments. Geotechnical engineers assess the properties and performance of earth materials such as their stability and strength, and the impact of groundwater.

INDUSTRIAL ENGINEERING

Industrial engineering is the application of mechanical and electrical engineering principles to the design and operation of production equipment, production lines and production processes for the efficient production of industrial goods. Industrial engineers understand plant and procedural design, the management of materials and energy, and human factors associated with worker integration with systems. Industrial engineers increasingly draw on specialised knowledge of robotics, mechatronics, and artificial intelligence.

INFORMATION ENGINEERING

Information engineering is based on the Electrical engineering discipline but also draws heavily from Computer Science. Three areas of further specialisation can be identified:

1. **Software engineering** – the development and operation of software-intensive systems that capture, store and process data.
2. **Telecommunications engineering** – the development and operation of systems that encode, transmit and decode data via cable systems (including fibre optics) and wireless systems (radiocommunications).
3. **Electronics engineering** – the design, development and testing of electronic circuits and networks that use the electrical and electromagnetic properties of electronic components integrated circuits and microprocessors to sense, measure and control processes and systems.

MECHANICAL ENGINEERING

Mechanical engineering involves the design, manufacture and maintenance of mechanical systems. Mechanical engineers work across a range of industries and are involved with the design and manufacture of a range of machines or mechanical systems, typically applying principles of hydraulics (fluid control), pneumatics (air pressure control) or thermodynamics (heat energy transfer). Mechanical engineers may specialise in the Building Services or Industrial engineering field.

MECHATRONICS ENGINEERING

Integrates specialist knowledge in mechanics, electronics and computer systems to design and develop integrated automated systems, such as chassis-stabilising systems, anti-lock brakes, engine control units, disk drives, cameras, service and surgical robots and medical devices. Often these systems are largely mechanical in nature but could not function without their essential electronic and computer control system components.

MINING ENGINEERING

Mining engineering involves extracting and processing minerals from the earth. This may involve investigations, design, construction and operation of mining, extraction and processing facilities.

PETROLEUM ENGINEERING

Petroleum engineering is a field of engineering relating to oil and gas exploration and production. Petroleum engineers typically combine knowledge of geology and earth sciences with specialised Chemical engineering skills, but may also draw on Mechanical engineering expertise to design extraction and production methods and equipment. Petroleum engineering activities are divided into two broad categories:

1. **Upstream** – locating oil and gas beneath the earth's surface and then developing methods to bring them out of the ground.
2. **Downstream** – the design and development of plant and infrastructure for the refinement and distribution of the mixture of oil, gas and water components that are extracted.

SOFTWARE ENGINEERING

Software engineers apply the process of analysing user needs and designing, constructing, and testing end user applications that will satisfy these needs through the use of software programming languages. A fundamental aspect is the application of engineering principals to software development. In contrast to simple programming, software engineering is used for longer and more complex software systems, which are used as critical systems for business and organisations.

STRUCTURAL ENGINEERING

Structural engineering is a specialised field within the broader Civil engineering discipline that is concerned with the design and construction of structures. Structures might include buildings, bridges, in-ground structures, footings, frameworks and space frames, including those for motor vehicles, space vehicles, ships, aeroplanes and cranes, composed of any structural material including composites and novel materials.

TRANSPORTATION ENGINEERING

Transportation engineering is a specialised field of practice in the civil engineering discipline relating to the movement of goods and people by road, water, rail and air.

A transportation engineer might specialise in one or more of: pavement design, asset maintenance/management, construction/project management, traffic operations and control, transportation planning and systems analysis, freight transportation and logistics, road safety, railways or public transport systems.

WATER ENGINEERING

Water engineers specialise in water based projects; many will have a civil engineering or environmental background. Water engineers generally deal with the provision of clean water from sources or treatment plants, return of waste water and treated sewage to the environment and the handling of stormwater including the prevention of flood damage. Asset management may be a major part in a water engineer's job. This involves design, operation, maintenance and construction of infrastructure for water resources as well as planning for the maintenance and replacement of three waters assets to maintain performance and minimise whole of life costs. These can include but are not limited to pipes, treatment devices, pump stations and reservoirs.