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ECSA

ENGINEERING COUNCIL OF SOUTH AFRICA

An Effective Regulator Assuring Engineering Excellence

Identification of Engineering work Rules

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ENGINEERING COUNCIL OF SOUTH AFRICA

NOTICE IN TERMS OF THE ENGINEERING PROFESSION ACT, 2000 (ACT NO. 46 OF 2000)

The Council for the Built Environment has under section 20(2) of the Council for the Built Environment Act, 2000 (Act No. 43 of 2000), read with The Scope of Work for Categories of Registration for the Professions Regulated by the Engineering Council of South Africa No. 43495 determined by the Council for the Built Environment under section 20(1)(a) of the Council for the Built Environment Act, 2000 (Act No. 43 of 2000),identified the scope of work for the Engineering Council of South Africa set out in the Schedule.

This Identification of Engineering Work Rules replaces the Identification of Work Regulations No. 44333, that we published for comment and gazette on 26 March 2021.

These Rules come into effect upon publication of the gazette.

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ABBREVIATIONS

CBE	Council for the Built Environment
CPD	Continuing Professional Development
DSTG	Discipline-specific Training Guideline
ECSA	Engineering Council of South Africa
IPD	Initial Professional Development
PCE	Professional Certificated Engineer
PE	Professional Engineer
PN	Professional Engineering Technician
PT	Professional Engineering Technologist
SC	Specified Category
TQM	Total Quality Management

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DEFINITIONS

In this notice, unless the context otherwise indicates, every word takes the meaning as defined in the Engineering Profession Act, 2000 (Act No.46 of 2000) and the Built Environment Act, 2000 (Act No.43 of 2000).

Academic Work means the process of applying engineering and scientific principles, concepts, contextual and engineering knowledge to the research, planning, design, teaching, learning, assessment, moderation, implementation and management of work in the higher learning institutions.

Candidate means a person registered in that category in terms of section 18(1)(a)(iii) of the Engineering Profession Act, 2000 (Act No.46 of 2000).

Competency Area means the performance area in which all the outcomes can be demonstrated at the level prescribed by the specific technology in an integrated manner.

Category Adjustment refers to the process of modifying or updating the classification or category under which a professional is registered or licensed within a regulatory or professional body.

Competency Indicator refers to the typifying guide to evidence indicating competence that is not normative.

Categories of Registration means the categories in which a person is registered in terms of section 18(1)(a)(b)(c) of the Engineering Profession Act,2000 (Act No.46 of 2000).

Continuing Professional Development means the systematic maintenance, improvement and broadening of knowledge and skills, and the development of personal qualities necessary for the execution of professional and engineering duties throughout an engineering practitioner's career.

Core Service means a service referred to in **section 3** of this document.

Discipline means the demarcation of the specific body of knowledge within a profession which is applied in a specific context.

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Engineering Activity refers to any professional service, consultation, investigation, evaluation, planning, design, implementation, or management requiring engineering principles, judgment, and expertise, the adequate performance of which is reliant on a qualification in engineering as defined in the Engineering Profession Act (EPA), 200 (Act No. 46 of 2000).

ECSA means the Engineering Council of South Africa established under section 2 of the Engineering Profession Act, 2000 (Act No. 46 of 2000).

Engineering Discipline means the body of knowledge which is applied in one of the following contexts:

(a) Aeronautical
(b) Agricultural
(c) Chemical
(d) Civil
(e) Computer
(f) Electrical or Electronic
(g) Industrial
(h) Mechanical
(i) Mechatronic
(j) Metallurgical
(k) Mining.

Engineering Infrastructure means infrastructure comprising engineering works that may include but are not limited to transport, water, energy, communications and waste management infrastructure.

Engineering Practice means a generally recognised or distinctive area of knowledge and expertise developed by an engineering practitioner by virtue of the path of education, training, and experience followed

Engineering Profession Act means the Engineering Profession Act, 2000 (Act No. 46 of 2000) as amended.

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Engineering Project means a project of which the scope comprises engineering work including engineering infrastructure.

Engineering Work: means the process of applying engineering and scientific principles, concepts, contextual and engineering knowledge to the research, planning, design, academic work, implementation and management of work in both the natural and built environments.

Ill-posed Problem means a problem for which the requirements are not fully defined or may be defined erroneously by the requesting party.

Practice Area means a generally recognised or distinctive area of knowledge and expertise developed by an engineering practitioner through the path of education, training and experience followed.

Principal Agent means the person or entity appointed by the client and who has full authority and obligation to act in terms of the construction contract.

Principal Consultant means the person or entity appointed by the client to manage and administer the services of all other consultants.

Profession means any of the professions regulated by the Professions' Acts.

Professional Certificated Engineer means a person registered in that category in terms of section 18(1)(a)(iii) of the Engineering Profession Act, 2000 (Act No. 46 of 2000.

Professional Engineer means a person registered in that category in terms of section 18(1)(a)(i) of the Engineering Profession Act, 2000 (Act No.46 of 2000).

Professional Engineering Technician means a person registered in that category in terms of section 18(1)(a)(iv) of the Engineering Profession Act, 2000 (Act No.46 of 2000).

Professional Engineering Technologist means a person registered in that category in terms of section 18(1)(a)(ii) of the Engineering Profession Act, 2000 (Act No.46 of 2000).

Service means a core service or a specialised service.

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Special Consent refers to a process through which individuals seek permission from ECSA to perform specific engineering work that ordinarily falls outside the scope of work for their registration category.

Specialised Service means a service that falls outside the standard competencies of a registered person who is a professional and which requires an additional qualification, experience, skill and/or registration with any other applicable Council for the Professions.

Specified Category means a registration category permitted in term of section 18(1)(c) and refers to an engineering discipline not originally prescribed in section 18(1)(a) and (b) but may be prescribed by Council form time to time in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000.

Specified Category Practitioner means a person registered in terms of section 18(1)(c) of the Engineering Profession Act, 2000 (Act No.46 of 2000) as approved by ECSA from time to time.

Suitably Qualified means being in possession of a qualification that is recognised by the three accords (Washington Accord for Engineers, Sydney Accord for Technologists and Dublin Accord for Technicians) or accredited by ECSA for purposes of registering a person in any of the categories referred to in Section 18(1)(a), (b) and (c) of the Engineering Profession Act, 2000 (Act No.46 of 2000) and possessing the necessary core competency in the competency areas to perform such core service as a Professional Engineer, Professional Engineering Technologist, Professional Certificated Engineer, Professional Engineering Technician or a Specified Category Practitioner.

Transitional authorisation refers to a temporary permission granted by the Engineering Council of South Africa (ECSA to a registered professional in a specific category. This authorisation allows the individual to perform work typically reserved for a different category of registered professionals, as outlined in clauses **6** to **15** of the relevant regulations.

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1. IDENTIFIED ENGINEERING WORK

1. For the purposes of this Notice, Identified Engineering Work is work that –

   (a) entails the engineering activities performed by a person registered in one of the categories of registration to differentiate one category of registration from another

   (b) requires for its performance the core competencies within the competency areas that a registered person must possess to perform engineering work in the appropriate category of registration

   (c) includes the core services performed by a registered person in any of the categories of registration in a particular engineering discipline

   (d) includes the practice areas of a particular engineering discipline within which a registered person performs engineering work

   (e) involves performing core services in any of the practice areas of an engineering discipline in accordance with the scope of services.

2. The elements of Identified Engineering Work contemplated in sub-clause (1) of this document are referred to in –

   (a) Clause **2**, which contains the criteria for category differentiation that is used to determine the engineering activities performed by a person registered in one of the categories of registration

   (b) Clause **3**, which contains the core competencies required for each competency area

   (c) Clauses **5** to **16**, which contain the core services and practice areas for each of the engineering disciplines

   (d) Clause **17**, which contains the scope of services for specific engineering work.

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2. CATEGORY DIFFERENTIATION AND ENGINEERING ACTIVITIES

1. The criteria for category differentiation are based on a distinction between –

   (a) a complex (engineers), a broadly defined (technologists and certificated engineers), well-defined (technicians) and a specifically defined engineering problem (specified category practitioners)

   (b) a complex (engineers), a broadly defined (technologists and certificated engineers), well-defined (technicians) and a specifically defined engineering activity (specified category practitioner).

   Further information is accessible in the following ECSA documents:

   - **R-02-STA-PE/PT/PN:** Competency Standard for Registration in Professional Categories as Professional Engineer, Professional Engineering Technologist and Professional Engineering Technician
   - **R-02-STA-PCE:** Competency Standard for Registration as a Professional Certificated Engineer
   - **R-02-STA-SC:** Competency Standard for Registration in a Specified Category.
   - Overarching code of Practice and Discipline-specific Codes of Practice

2. For the purpose of this Notice, a Professional Engineer is expected to demonstrate and apply the core competencies referred to in **Table 1** of this document.

3. For the purpose of this Notice, a Professional Engineering Technologist and a Professional Certificated Engineer are expected to demonstrate and apply the core competencies referred to in **Table 1** of this document**.**

4. For the purpose of this Notice, a Professional Engineering Technician is expected to demonstrate and apply the core competencies referred to in **Table 1** of this document.

5. For the purpose of this Notice, a Specified Category Practitioner is expected to demonstrate and apply the core competencies referred to in **Table 1** of this document**.**

6. ECSA has developed guidelines using the complex, broadly defined, well-defined (refer to documents **R-05-XXX-PE/PT/PN** and **R-05-XXX-PCE**) and specifically defined (refer to documents **R-05-XXX-SC**) criteria contemplated in this section to enable a client or

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employer to establish which category of registered person is required to perform the work of a specific nature.

3. CORE COMPETENCIES REQUIRED TO PERFORM IDENTIFIED ENGINEERING WORK

1. A person who performs any Identified Engineering Work in a particular engineering discipline must, in addition to any other requirement contemplated in the Engineering Profession Act –

   (a) be suitably qualified
   (b) be registered by ECSA in the appropriate category (candidate or professional) applicable to the level of service performed
   (c) possess the necessary core competency in the competency areas referred to in this section to perform such core service as a Professional Engineer, Professional Engineering Technologist, Professional Certificated Engineer, Professional Engineering Technician or a Specified Category Practitioner.

2. For the purpose of sub-clause (1) "suitably qualified" means being in possession of a qualification that is recognised by one of the three accords or accredited by ECSA for purposes of registering a person in any of the categories referred to in section 18(1)(a), (b) and (c) of the Engineering Profession Act, 2000 (Act No.46 of 2000.

3. The competency areas referred to in sub-clause (1)(c) for a Professional Engineer, Professional Engineering Technologist, Professional Certificated Engineer, Professional Engineering Technician and a Specified Category Practitioner are the following:

   (a) Define, investigate and analyse engineering problems.
   (b) Design or develop solutions to engineering problems.
   (c) Comprehend and apply engineering, technological, technical and specific knowledge in the practice area.
   (d) Manage part or all of one or more engineering activities.
   (e) Communicate clearly with others in the course of the engineering activity.

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(f) Recognise and address, if applicable, the foreseeable social, cultural and environmental (not limited to the three, i.e., heritage, agricultural, visual etc.) impacts of engineering activities generally.

(g) Meet all legal and regulatory requirements and protect the health and safety of persons in the course of their engineering activities.

(h) Conduct engineering activities ethically.

(i) Exercise sound judgement in the course of engineering activities.

(j) Be responsible for making decisions on part or all of one or more engineering activities; and

(k) undertake initial and continuing professional development (IPD and CPD) or independent learning activities sufficient to maintain and extend their competence.

4. The core competencies referred to in sub-clause (1)(c) that a person registered as a Professional Engineer, Professional Engineering Technologist, Certificated Engineer, Professional Engineering Technician or Specified Category Practitioner must possess when performing any core service in a particular engineering discipline referred to in Clause 4 are as indicated by the competency area in **Table 1** of this document.

5. The purpose of a competency area is to limit the applicable knowledge required for each category of registration.

6. The core competencies must be assessed by utilising the competency indicators for each competency area referred to in **Table 1** of this document.

7. The competency indicators in **Table 2** of this document are only typifying and other competency indicators may be used provided such other competency indicators are clear indicators of competence.

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Table 1: Competency areas required of a person registered as a professional Engineer, Professional Engineering Technologist, Certificated Engineer, Professional Engineering Technician and Specified Category Practitioner to perform the core services

Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
			Note: The term specifically defined engineering below may be interchanged with the specific category designation, i.e., Lift Inspector, Lifting Machinery Inspector, Medical Equipment Maintainer, Fire Protection Systems Practitioner, or any future specified category prescribed by the Council.
Demonstration of Competence Competence must be demonstrated within complex engineering activities, defined below, by integrated performance of the Competency areas defined in clause **3** above at the level defined for each Competency area. Required contexts and functions may be specified in the applicable Discipline-specific Training Guidelines (DSTG). Characteristics of *complex engineering* problems are indicated in **R-02-STA-PE/PT/PN**.	**Demonstration of Competence** Competence must be demonstrated within broadly defined engineering activities, defined below, by integrated performance of the Competency areas defined in clause **3** above at the level defined for each Competency area. Required contexts and functions may be specified in the applicable DSTGs. Characteristics of *broadly defined engineering problems* are indicated in **R-02-STA-PE/PT/PN** and **R-02-STA-PCE**.	**Demonstration of Competence** Competence must be demonstrated within we//- *defined engineering activities,* defined below, by the integrated performance of the Competency areas defined in clause **3** above at the level defined for each Competency area. Required contexts and functions may be specified in the applicable DSTGs. Characteristics of *well-defined engineering problems* are indicated in **R-02-STA-PE/PT/PN**	**Demonstration of Competence** Competence must be demonstrated within *specifically defined engineering* activities, defined below, by integrated performance of the Competency areas defined in clause **3** above at the level defined for each Competency area. Required contexts and functions may be specified in the applicable DSTGs Characteristics of *Specifically defined engineering problems* are indicated in **R-02-STA-SC**.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
Competence Area 1: Define, investigate and analyse complex engineering problems.	**Competence Area 1:** Define, investigate and analyse broadly defined engineering problems.	**Competence Area 1:** Define, investigate and analyse well-defined engineering problems	**Competence Area 1:** Define, investigate and analyse specifically defined engineering problems (tasks)
Level Descriptor: Complex engineering problems have the characteristics indicated in **R-02-STA-PE/PT/PN**.	**Level Descriptor:** Broadly defined engineering problems have the characteristics indicated in **R-02-STA-PE/PT/PN** and **R-02-STA-PCE**.	**Level Descriptor:** Well-defined engineering problems have the characteristics indicated in **R-02-STA-PE/PT/PN**.	**Level Descriptor:** Specifically defined engineering problems have the characteristics indicated in **R-02-STA-SC**.
Range Statement: The problem may be the design of a component, system or process, or a recommendation of the remedy to a problematic situation.	**Range Statement**: The problem may be a design requirement, an applied R&D requirement or a problematic situation in an existing component, system or process. The problem is one amenable to solution by known technologies. This competency area is concerned with the understanding of a problem; competency area 2 is concerned with the solution.	**Range Statement**: The problem may be part of a larger engineering activity or may stand alone. The design problem is amenable to solution by established techniques practised regularly. This competency area is concerned with the understanding of a problem; competency area 2 is concerned with the solution.	**Range Statement**: The problem (task) may be part of a larger engineering activity or may be stand alone. The design (planning) problem is amenable to solution by established specific techniques practised regularly. This competency area is concerned with the understanding of a problem; competency area 2 is concerned with the solution.
Competency Area 2: Design or develop solutions to complex engineering problems	**Competency Area 2:** Design or develop solutions to broadly defined engineering problems	**Competency Area 2:** Design or develop solutions to well-defined engineering problems	**Competency Area 2:** Design or develop (plan) solutions to specifically defined engineering problems (tasks).
Range Statement: The solutions may be the design of a component, system or process or a recommendation of the remedy to a problematic situation.	**Range Statement:** Solutions are those enabled by the technologies in the broadly defined practice area.	**Range Statement:** The solution is amenable to established methods, techniques or procedures within the well-defined practice area.	**Range Statement:** The solution conforms to specific established methods, techniques or procedures within the specifically defined practice area.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
Competency Area 3: Comprehend and apply advanced and local knowledge of the widely applied principles underpinning good practice that is specific to the jurisdiction in which the Engineer practises.	**Competency Area 3:** Comprehend and apply the knowledge embodied in widely accepted and applied engineering procedures, processes, systems and methodologies that is specific to the jurisdiction in which the Engineering Technologist practises.	**Competency Area 3:** Comprehend and apply knowledge that is embodied in established engineering practices that is specific to the jurisdiction in which the Engineering Technician practises.	**Competency Area 3:** Comprehend and apply knowledge embodied in established specific engineering practices and knowledge specific to the field and scope in which he/she practises.
Range Statement: Applicable knowledge includes the following: a) Specialist knowledge has depth in the practice area and is underpinned by the fundamental knowledge of an engineering discipline or cross disciplinary area allowing a fundamentals-based, first principle, analytical approach to building models as required. b) A working knowledge of interacting disciplines (engineering and other) to underpin teamwork. c) Jurisdictional knowledge includes legal and regulatory requirements as well as locally relevant codes of practice, as required for the practice area: law of contract, contract administration, health and safety environmental, intellectual property, quality management, risk management,	**Range Statement:** Applicable knowledge includes the following: a) Technological knowledge that is well established and applicable to the practice area irrespective of location, supplemented by locally relevant knowledge, for example, established properties of local materials. Emerging technologies are adopted from form. b) A working knowledge of interacting disciplines (engineering and other) to underpin teamwork. c) Jurisdictional knowledge includes legal and regulatory requirements as well as locally relevant codes of practice, as required for practice area: law of contract, contract administration, health and safety, environmental, intellectual property, quality management, risk management, maintenance management, regulation,	**Range Statement:** Applicable knowledge includes the following: a) Technical knowledge that is applicable to the practice area irrespective of location, supplemented by locally relevant knowledge, for example established properties of local materials b) A working knowledge of interacting disciplines. Codified knowledge in related areas: financial, statutory, safety, management c) Jurisdictional knowledge includes legal and regulatory requirements as well as prescribed codes of practice.	**Range Statement:** Applicable knowledge includes the following: a) Technical knowledge that is applicable to the specific practice area irrespective of location, supplemented by locally relevant knowledge, for example, established properties of local materials. b) A working knowledge of interacting disciplines. Codified knowledge in related areas: financial statutory, safety, management. c) Jurisdictional knowledge includes legal and regulatory requirements as well as prescribed codes of practice.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
maintenance management, regulation, project management or construction management.	project management or construction management		
Competency Area 4: Manage part or all of one or more complex engineering activities.	**Competency Area 4:** Manage part or all of one or more broadly defined engineering activities.	**Competency Area 4:** Manage part or all of one or more well-defined engineering activities	**Competency Area 4:** Manage part or all of one or more specifically defined engineering activities
Competency Area 5: Communicate clearly using multiple media and collaborate inclusively with a broad range of stakeholders in the course of engineering activities.	**Competency Area 5:** Communicate clearly using multiple media and collaborate inclusively with a broad range of stakeholders in the course of engineering activities.	**Competency Area 5:** Communicate clearly using multiple media and collaborate inclusively with a broad range of stakeholders in the course of engineering activities.	**Competency Area 5:** Communicate clearly using multiple media and collaborate inclusively with a broad range of stakeholders in the course of engineering activities.
Range Statement: Management and communication in complex engineering involves: • planning activities • organising activities • leading activities • controlling activities. Communication relates to technical aspects and wider impacts of professional work. Audience includes peers, other disciplines, client and stakeholder audiences. Appropriate modes of communication must be selected.	**Range Statement:** Management and communication in broadly defined engineering involves: • planning activities • organising activities • leading activities • controlling activities. Communication relates to technical aspects and wider impacts of professional work. Audience includes peers, other disciplines, client and stakeholder audiences. Appropriate modes of communication must be selected. The Engineering Technologist is expected to	**Range Statement:** Management and communication in well-defined engineering involves: • planning activities • organising activities • leading activities • controlling activities. Communication relates to technical aspects and wider impacts of professional work. Audience includes peers, other disciplines, client and stakeholder audiences. Appropriate modes of communication must be selected. The Engineering Technician is expected to	**Range Statement:** Management and communication in specifically defined engineering involves: • planning activities • organising activities • leading activities • implementing activities • controlling activities. Communication relates to technical aspects and wider impacts of work. Audience includes peers, other disciplines, client and stakeholder audiences. Appropriate modes of communication must be selected. The Specified Category practitioner is

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
	perform the communication functions reliably and repeatedly.	perform the communication functions reliably and repeatedly.	expected to perform the communication functions reliably and repeatedly.
Competency Area 6: Recognise the reasonably foreseeable economic, social, cultural, and environmental effects of complex engineering activities seeking to achieve sustainability.	**Competency Area 6:** Recognise the reasonably foreseeable economic, social, cultural, and environmental effects of broadly defined engineering activities seeking to achieve sustainability.	**Competency Area 6:** Recognise the reasonably foreseeable economic, social, cultural, and environmental effects of well-defined engineering activities seeking to achieve sustainability.	**Competency Area 6:** Recognise the foreseeable social, cultural, environmental and sustainability effects of specifically defined engineering activities generally.
Competency Area 7: Meet all legal and regulatory requirements and protect the health and safety of persons during all complex engineering activities.	**Competency Area 7:** Meet all legal and regulatory requirements and protect the health and safety of persons during all broadly defined engineering activities.	**Competency Area 7:** Meet all legal and regulatory requirements and protect the health and safety of persons during all well-defined engineering activities.	**Competency Area 7:** Meet all legal and regulatory requirements, protect the health and safety of persons and adhere to sustainable practices in the course of specifically defined engineering activities.
Range Statement: Impacts and regulatory requirements include: • direct and indirect, immediate and long-term effects of engineering solutions • application of principles of sustainability • regulatory requirements that are explicit for the context and are generally applicable • persons whose health and safety are to be protected are both inside and outside the workplace.	**Range Statement:** Impacts and regulatory requirements include the following: • Both explicit regulated factors and those that arise in the course of particular work. • Impacts that extend over the lifecycle of the project and include the consequences of the technologies applied. • Effects to be considered include direct and indirect, immediate and long-term related to the technology used. • Safe and sustainable materials, components and systems.	**Range Statement:** Impacts and regulatory requirements include the following: • Impacts to be considered are generally those identified within the established methods, techniques or procedures used in the practice area. • Regulatory requirements are prescribed. • Prescribed risk management strategies must be applied. • Effects must be considered and methods used must be defined.	**Range Statement:** Impacts and regulatory requirements include the following: • Impacts to be considered are generally those identified within the established methods, techniques or procedures used in the specific practice area. • Regulatory requirements are prescribed. • Prescribed risk management strategies must be applied. • Effects must be considered and methods used must be defined.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
	• Regulatory requirements that are explicit for the context in general. • Persons whose health and safety are to be protected are both inside and outside the workplace.	• Prescribed safe and sustainable materials, components and systems. • Persons whose health and safety are to be protected are both inside and outside the workplace.	• Prescribed safe and sustainable materials, components and systems. • Prescribed maintenance protocols. • Persons whose health and safety are to be protected are both inside and outside the workplace.
Competency Area 8: Conduct engineering activities ethically.	**Competency Area 8:** Conduct engineering activities ethically.	**Competency Area 8:** Conduct engineering activities ethically.	**Competency Area 8:** Conduct engineering activities ethically.
Competency Area 9: Exercise sound judgement by evaluating the outcomes, impacts and alternatives in the course of complex engineering activities.	**Competency Area 9:** Exercise sound judgement by evaluating the outcomes, impacts and alternatives in the course of broadly defined engineering activities.	**Competency Area 9:** Exercise sound judgement by evaluating the outcomes, impacts and alternatives in the course of well-defined engineering activities.	**Competency Area 9:** Exercise sound judgement in the course of specifically defined engineering activities.
Range Statement: Situations in which judgement must be applied involve interactions among wide-ranging or conflicting technical, engineering or other issues. Judgement in decision making involves: • taking diverse, wide ranging risk factors into account • significant consequences in a range of contexts; or • wide ranges of interested and affected parties with widely varying needs.	**Range Statement:** Judgement is expected both within the application of technologies, in their wider impacts and when dealing with interfaces to other disciplines and technologies. Judgement in decision making involves: • taking several risk factors into account • significant consequences in technology application and related contexts; or • ranges of Interested and affected parties with widely varying needs.	**Range Statement:** Judgement is expected both within the application of methods, techniques and procedures and in assessing their immediate impacts. Judgement in decision making involves: • taking limited risk factors into account some of which may be ill-defined • consequences are in the immediate work context; or • identified set of interested and affected parties with defined needs to be taken into account.	**Range Statement:** Judgement is expected both within the application of category specific methods, techniques and specific procedures and in assessing their immediate impacts. Judgement in decision making involves: • taking specific category risk factors into account some of which may be ill-defined • consequences are in the immediate work context; or • identified set of interested and affected parties with defined needs to be taken into account.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
Competency Area 10: Be responsible for making decisions on part or all of complex engineering activities.	**Competency Area 10:** Be responsible for making decisions on part or all of one or more broadly defined engineering activities	**Competency Area 10:** Be responsible for making decisions on part or all of all of one or more well-defined engineering activities.	**Competency Area 10:** Be responsible for making decisions on part or all of one or more specifically defined engineering activities.
Range Statement: Responsibility exercised for competency areas of significant parts of a one or more complex engineering activities.	**Range Statement:** Responsibility must be discharged for significant parts of one or more broadly defined engineering activities.	**Range Statement:** Responsibility must be discharged for significant parts of a one or more well-defined engineering activities.	**Range Statement**: Responsibility must be discharged for significant parts of one or more specifically defined engineering activities.
Note 1: While actual responsibility for the work may not have been taken, due to statutory or other requirements, for a Professional Engineer to take the responsibility, evidence must be shown of responsible recommendations and judgement.	**Note 1:** Demonstrating responsibility would work under the supervision of a competent engineering practitioner who takes the actual responsibility but is expected to perform as if he/she is in a responsible position.	**Note 1:** Demonstrating responsibility would be under supervision of a competent engineering practitioner but is expected to perform as if he/she is in a responsible position.	**Note 1:** Responsible for the evaluation of work output in a supervisory capacity.
Competency Area 11: Undertake sufficient professional development activities to maintain, extend competence and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.	**Competency Area 11:** Undertake sufficient professional development activities to maintain, extend competence and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.	**Competency Area 11:** Undertake sufficient professional development activities to maintain, extend competence and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.	**Competency Area 11:** Undertake sufficient professional development activities to maintain, extend competence and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.
Range Statement: Professional development involves: • taking ownership of own professional development	**Range Statement:** Professional development involves: • taking ownership of own professional development	**Range Statement:** Professional development involves: • taking ownership of own professional development	**Range Statement:** Development involves: • taking ownership of own development • planning own development strategy • selecting appropriate development activities

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category Practitioner
• planning own professional development strategy • selecting appropriate professional development activities • recording professional development strategy and activities, while displaying independent learning ability.	• planning own professional development strategy • selecting appropriate professional development activities • recording professional development strategy and activities, while displaying independent learning ability.	• planning own professional development strategy • selecting appropriate professional development activities • recording professional development strategy and activities, while displaying independent learning ability	• recording development strategy and activities, while displaying independent learning ability.

Table 2: Competency indicators to determine the competency in each competency area required of a person registered as a Professional Engineer, Professional Engineering Technologist, Certificated Engineer, Professional Engineering Technician and Specified Category Practitioner

Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category
Competency Area 1: Define, investigate and analyse *complex engineering problems*.	**Competency Area 1:** Define, investigate and analyse *broadly defined engineering problems*.	**Competency Area 1:** Define, investigate and analyse *well-defined engineering problems*.	**Competency Area 1:** Define, investigate and analyse *specifically defined engineering problems (tasks).*
Competency Indicator: A creative, systematic analysis of complex problems typified by the following performances is expected: 1. Define, investigate or analyse complex engineering problems. 2. Perform/assist in defining or formulating engineering problems, leading to an	**Competency Indicator:** A structured analysis of broadly defined problems typified by the following performances is expected: 1. Identify and formulate the problem, agreeing with client on a problem statement. 2. Analyse and evaluate information.	**Competency Indicator:** A structured analysis of well-defined problems typified by the following performances is expected: 1. Identify and interpret the activity, agreeing with client on a problem statement. 2. Analyse and clarify information, drawings, codes, procedures, etc.	**Competency Indicator**: An analysis of specifically defined engineering problems (tasks) typified by the following performances is expected: 1. Understand the activity, agreeing with the client. 2. Analyse and clarify information, drawings, codes, procedures, etc.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category
agreed definition to the problem to be addressed. 3. Perform/assist in investigating engineering problems including: a) collecting b) organising c) evaluating information. 4. Perform/assist in analysing engineering problems: a) Use conceptualisation, abstraction, modelling. b) Identify and justify assumptions, limitations, constraints, premises; using analytical methods both mathematical and non-mathematical. c) Evaluate result of analysis, using judgement. d) Express an understanding emerging from the analysis.	3. Use conceptualisation, abstraction and modelling. 4. Justify judgement and assumptions made. 5. Express understanding emerging from analysis.	3. Revise and agree on acceptance criteria if necessary.	
Competency Area 2: Design or develop solutions to complex engineering problems.	**Competency Area 2:** Design or develop solutions to broadly defined engineering problems.	**Competency Area 2:** Design or develop solutions to well-defined engineering problems.	**Competency Area 2:** Design or develop (plan) solutions to specifically defined engineering problems (tasks).
Competency Indicator: This competency area is normally demonstrated after a	**Competency Indicator:** This competency area is normally demonstrated after a	**Competency Indicator:** This competency area is normally	**Competency Indicator:** This competency area is normally

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category
problem analysis as defined in competency area 1. Working systematically to synthesise a solution to a complex problem, typified by the following performances is expected: 1. Analyse the design/ planning /solution requirement and draw up detailed requirements specification. 2. Synthesise a range of potential solutions to problem or approaches to developing a solution. 3. Evaluate the potential approaches against requirements, including cost, and impacts outside requirements. 4. Present reasoned arguments and proposal for preferred option. 5. Fully develop design of selected option. 6. Evaluate resulting solution. **7.** Produce design documentation for implementation.	problem analysis as defined in competency area 1. Working systematically to synthesise a solution to a broadly defined problem, typified by the following performances is expected: 1. Analyse the requirement drawing up a design specification. 2. Synthesise potential solutions or approaches and evaluate. **3.** Select the best complete solution and develop fully. **4.** Present reasoned arguments and proposal. **5.** Agree with client and produce design documentation for implementation.	demonstrated after a problem analysis as defined in competency area 1. Working systematically to synthesise a solution to a well-defined problem, typified by the following performances is expected: 1. Develop and analyse alternative approaches to meeting the problem specification. Check impacts. **2.** Select the best complete solution, seeking advice on aspects of the proposal or design process that fall outside established practice or standards. **3.** Agree with client.	demonstrated after a problem (task) analysis as defined in competency area 1. Working systematically to reach a solution to a specifically-defined problem (task), typified by the following performances is expected: 1. Develop and analyse alternative approaches to do the task. Check impacts. 2. Select the best complete plan, seeking advice on aspects of the proposal or plan that fall outside established practice or standards. 3. Agree with client.
Competency Area 3: Comprehend and apply advanced and local knowledge of the widely applied principles underpinning good practice that is specific to the jurisdiction in which the Engineer practises.	**Competency Area 3:** Comprehend and apply the knowledge embodied in widely accepted and applied engineering procedures, processes, systems and methodologies that is	**Competency Area 3:** Comprehend and apply knowledge that is embodied in established engineering practices that is specific to the jurisdiction in which the Engineering Technician practises.	**Competency Area 3:** Comprehend and apply knowledge embodied in established specific engineering practices and knowledge specific to the field in which he/she practises.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category
	specific to the jurisdiction in which the Engineering Technologist practises.		
Competency Indicator: This competency area is normally demonstrated in the course of design, investigation or operations. 1. Display mastery of understanding of engineering principles, practice and technologies in the practice area. 2. Apply general and underpinning engineering knowledge to support analysis and provide insight. 3. Use a fundamentals-based, first principles analytical, approach building models as required. 4. Display working knowledge of areas that interact with the practice area. 5. Display a working knowledge of interacting disciplines (engineering and other) to underpin teamwork. **6.** Apply related knowledge: financial, statutory, safety, management.	**Competency Indicator:** This competency area is normally demonstrated in the course of design, investigation or operations. 1. A thorough understanding and application of engineering principles to support analysis. **2.** The use of specialised knowledge in an analytical approach and application of related knowledge in broadly defined engineering activities.	**Competency Indicator:** This competency area is normally demonstrated in the course of design, investigation or operations. 1. The use of codified underpinning educational knowledge in practical well-defined activities. **2.** The understanding of knowledge expressed in well-defined procedures and techniques.	**Competency Indicator:** This competency area is normally demonstrated in the course of planning investigation or operations: 1. The use of codified underpinning educational knowledge in practical specifically defined engineering activities. **2.** The understanding of knowledge expressed in specifically defined procedures and techniques.
Competency Area 4: Manage part or all of one or more complex engineering activities.	**Competency Area 4:** Manage part or all of one or more broadly defined engineering activities.	**Competency Area 4:** Manage part or all of one or more well-defined engineering activities.	**Competency Area 4:** Manage part or all of one or more specifically defined engineering activities.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category
Competency Indicator: The display of personal and work process management abilities is expected: 1. Manage complex engineering activities. 2. Pian, organise, lead and control complex engineering activities. 3. Manage him- or herself. 4. Participate effectively in a team environment. 5. Manage people, and/or work priorities, and/or work processes and/or resources. 6. Demonstrate knowledge of finance as it is applied in engineering. 7. Demonstrate knowledge of the conditions and operations of contract. **8.** Demonstrate the ability to establish and maintain professional and business thinking.	**Competency Indicator:** The display of personal and work process management abilities is expected: 1. Manage broadly defined engineering activities. 2. Participate effectively in a team environment. 3. Manage self-people, and/or work priorities, and/or work processes and/or resources. 4. Demonstrate knowledge of finance as it is applied to engineering. 5. Demonstrate knowledge of the conditions and operations of contract. **6.** Demonstrate the ability to establish and maintain professional and business relationships.	**Competency Indicator:** The display of personal and work process management abilities is expected 1. Manage self, work priorities, processes & resources. **2.** Participate effectively in a team environment.	**Competency Indicator:** The display of personal and work process management abilities is expected: 1. Manage self, work priorities, processes and resources. **2.** Participate effectively in a team environment.
Competency Area 5: Communicate clearly using multiple mediums and collaborate inclusively with a broad range of stakeholders in the course of engineering activities.	**Competency Area 5:** Communicate clearly using multiple mediums and collaborate inclusively with a broad range of stakeholders in the course of engineering activities.	**Competency Area 5:** Communicate clearly using multiple mediums and collaborate inclusively with a broad range of stakeholders in the course of engineering activities.	**Competency Area 5:** Communicate clearly with others in the course of specifically defined engineering activities.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category
Competency Indicator: Demonstrates effective communicated by the following: 1. Writing clear, concise, effective, technically correct reports using a structure and style which meets communication objectives and user/audience requirements. 2. Reading and evaluating technical and legal matters relevant to the function of a Professional Engineer. 3. Receiving instructions and ensuring correct interpretation. 4. Issuing clear instructions to subordinates using appropriate language and communication aids, ensuring that language and other communication barriers are overcome. **5.** Making oral presentations using structure style, language, visual aids and supporting documents appropriate to the audience and purpose.	**Competency Indicator:** Demonstrates effective communication by the following: 1. Writing clear, concise, effective, technically correct reports using a structure and style which meets communication objectives and user/audience requirements. 2. Reading and evaluating technical and legal matters relevant to the function of a Prof Engineering Technologist. 3. Receiving instructions and ensuring correct interpretation. 4. Issuing clear instructions to subordinates using appropriate language and communication aids, ensuring that language and other communication barriers are overcome. **5.** Making oral presentations using structure, style, language, visual aids and supporting documents appropriate to audience and purpose.	**Competency Indicator:** Demonstrates effective communication by the following: 1. Writing clear, concise, effective, technically correct reports. **2.** Issuing clear instructions to subordinates and present point of view effectively.	**Competency Indicator:** Demonstrates effective communication by the following: 1. Writing clear, concise, effective, technically correct reports. **2.** Issuing clear instructions to subordinates and present point of view effectively.
Competency Area 6: Recognise the reasonably foreseeable economic, social, cultural, and environmental effects of complex	**Competency Area 6:** Recognise the reasonably foreseeable economic, social, cultural, and environmental effects of broadly defined	**Competency Area 6:** Recognise the reasonably foreseeable economic, social, cultural, and environmental effects of	**Competency Area 6:** Recognise the foreseeable social, cultural, environmental and sustainability effects of specifically

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category
engineering activities seeking to achieve sustainability.	engineering activities seeking to achieve sustainability.	well-defined engineering activities seeking to achieve sustainability.	defined engineering activities generally.
Competency Indicator: This competency area is normally displayed in the course of analysis and solution of problems, typically by the following: 1. Identifying interested and affected parties and their expectations. 2. Identifying interactions between technical and social cultural and environmental factors. 3. Identifying environmental impacts of the engineering activity. 4. Identifying sustainability issues. 5. Proposing and evaluating measures to mitigate negative effects of engineering activity. **6.** Communicating with stakeholders.	**Competency Indicator**: This competency area is normally displayed in the course of analysis and solution of problems, typically by the following: 1. Identifying interested and affected parties and their expectations. 2. Identifying interactions between technical and social cultural and environmental factors. 3. Identifying environmental impacts of the engineering activity. 4. Identifying sustainability issues. 5. Proposing and evaluating measures to mitigate negative effects of engineering activity. **6.** Communicating with stakeholders.	**Competency Indicator**: This competency area is normally displayed in the course of analysis and solution of problems, typically by the following: 1. Identifying affected parties and environmental impacts of the engineering activity. **2.** Proposing mitigating measures and communicating with stakeholders.	**Competency Indicator**: This competency area is normally displayed in the course of evaluating and planning tasks, typically by the following: 1. Identifying affected parties and environmental impacts of the engineering activity. **2.** Proposing mitigating measures and communicating on measures with stakeholders.
Competency Area 7: Meet all legal and regulatory requirements and protect the health and safety of persons during all complex engineering activities.	**Competency Area 7:** Meet all legal and regulatory requirements and protect the health and safety of persons during all broadly defined engineering activities.	**Competency Area 7:** Meet all legal and regulatory requirements and protect the health and safety of persons during all well-defined engineering activities.	**Competency Area 7:** Meet all legal and regulatory requirements, protect the health and safety of persons and adhere to sustainable practices in the course of specifically defined engineering activities.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category
Competency Indicator: 1. Identifying applicable legal, regulatory and health and safety requirements for the engineering activity. 2. Identifying health and safety requirements applicable for the engineering activity. 3. Assistance or awareness of the selection of safe and sustainable materials, components and systems. **4.** Assistance or awareness of recognising and identifying risk and applying accepted risk management strategies.	**Competency Indicator:** 1. Identifying applicable legal, regulatory and health and safety requirements for the engineering activity. 2. Identifying health and safety requirements applicable for the engineering activity. 3. Assistance or awareness of the selection of safe and sustainable materials, components and systems. **4.** Assistance or awareness of recognising and identifying risk and applying accepted risk management strategies.	**Competency Indicator:** 1. Identifying applicable legal, regulatory and health and safety requirements for the engineering activity. **2.** Managing risks and use safe and sustainable materials, components and systems, seeking advice when necessary.	**Competency Indicator:** 1. Identifying applicable legal, regulatory and health and safety requirements for the specifically defined engineering activity. **2.** Managing risks and use safe and sustainable materials, components and systems, seeking advice when necessary.
Competency Area 8: Conduct engineering activities ethically.	**Competency Area 8:** Conduct engineering activities ethically.	**Competency Area 8:** Conduct engineering activities ethically.	**Competency Area 8:** Conduct engineering activities ethically.
Competency Indicator: A professional approach must be demonstrated at all times by the following: 1. Knowledge of ECSA Code of Conduct. 2. Member/active participation in activities of a recognised VA. 3. Understanding of Professional Society structures/network/interaction.	**Competency Indicator:** A professional approach must be demonstrated at all times by the following: 1. Knowledge of ECSA Code of Conduct. 2. Member/active participation in activities of a recognised VA. 3. Understanding of Professional Society structures/network/interaction.	**Competency Indicator:** Sensitivity to ethical issues and the adoption of a systematic approach to resolving these issues is expected, typified by the following: 1. Identifying ethical problems and affected parties and their interests.	**Competency Indicator:** Sensitivity to ethical issues and the adoption of a systematic approach to resolving these issues is expected, typified by the following: 1. Awareness of ethical problems and affected parties and their interests. 2. Compliance with ECSA's Code of Conduct.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category
4. Sensitivity to ethical issues and the adoption of a systematic approach to resolving these issues is expected, typified by: a) identifying the central ethical problem b) identifying affected parties and their interest c) searching for possible solutions for the dilemma d) evaluating each solution using the interests of those involved accorded suitable priority e) selecting and justifying the solution that best resolves the dilemma.	4. Sensitivity to ethical issues and the adoption of a systematic approach to resolving these issues is expected, typified by: a) identifying the central ethical problem b) identifying affected parties and their interest c) searching for possible solutions for the dilemma d) evaluating each solution using the interests of those involved accorded suitable priority **e)** selecting and justifying the solution that best resolves the dilemma.	**2.** Compliance with ECSA's Code of Conduct.	
Competency Area 9: Exercise sound judgement by evaluating the outcomes, impacts and alternatives in the course of complex engineering activities.	**Competency Area 9:** Exercise sound judgement by evaluating the outcomes, impacts and alternatives in the course of broadly defined engineering activities.	**Competency Area 9:** Exercise sound judgement by evaluating the outcomes, impacts and alternatives in the course of well-defined engineering activities.	**Competency Area 9:** Exercise sound judgement in the course of specifically defined engineering activities.
Competency Indicator: Exhibition of sound engineering judgement is expected by the following: 1. Considering several factors, some of which may not be well-defined or may be unknown.	**Competency Indicator:** Exhibition of judgement is expected by the following: 1. Considering several factors, some of which may not be well-defined or may be unknown.	**Competency Indicator:** Exhibition of judgement is expected by the following: 1. Considering a limited number of factors and their independence.	**Competency Indicator:** Exhibition of judgement is expected by the following: 1. Considering specific factors applicable to the category and how they are interrelated.

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Professional Engineer	Professional Engineering Technologist and Professional Certificated Engineer	Professional Engineering Technician	Specified Category
2. Considering the interdependence interactions, and relative importance of factors. 3. Foreseeing consequences of actions. 4. Evaluating a situation in the absence of full evidence. **5.** Drawing on experience and knowledge.	2. Considering the interdependence interactions, and relative importance of factors. 3. Foreseeing consequences of actions. 4. Evaluating a situation in the absence of full evidence **5.** Drawing on experience and knowledge.	**2.** Foreseeing consequences of actions, evaluating a situation in the absence of full evidence.	**2.** Foreseeing consequences of actions, evaluating a situation in the absence of full evidence.
Competency Area 10: Be responsible for making decisions on part or all of complex engineering activities.	**Competency Area 10:** Be responsible for making decisions on part or all of one or more broadly defined engineering activities	**Competency Area 10:** Be responsible for making decisions on part or all of all of one or more well-defined engineering activities.	**Competency Area 10:** Be responsible for making decisions on part or all of one or more specifically defined engineering activities.
Competency Indicator: Responsibility is displayed by the following performance: 1. Having due regard to technical social, environmental and sustainable development consideration. 2. Seeking advice from a responsible authority on any matter considered to be outside area of competence. **3.** Making decisions on and taking responsibility for one or more complex engineering activity.	**Competency Indicator:** Responsibility is displayed by the following performance: 1. Having due regard to technical social, environmental and sustainable development consideration. 2. Seeking advice from a responsible authority on any matter considered to be outside area of competence. **3.** Making decisions on and taking responsibility for one or more broadly defined engineering activity.	**Competency Indicator:** Responsibility is displayed by the following performance: 1. Demonstrating a professional approach at all times by applying theory to justify solutions. 2. Taking advice from a responsible authority on any matter considered to be outside applicable standards and codes. **3.** Evaluating work output, revising as required and taking responsibility for this work output.	**Competency Indicator:** Responsibility is displayed by the following performance: 1. Demonstrating a professional approach at all times by applying knowledge to justify actions. 2. Taking advice from a responsible authority on any matter considered to be outside applicable standards and codes. **3.** Evaluating work output, revising as required and taking responsibility for this work output.

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Competency Area 11: Undertake sufficient professional development activities to maintain, extend competence and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.	**Competency Area 11:** Undertake sufficient professional development activities to maintain, extend competence and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.	**Competency Area 11:** Undertake sufficient professional development activities to maintain, extend competence and enhance the ability to adapt to emerging technologies and the ever-changing nature of work.	**Competency Area 11:** Undertake independent learning activities sufficient to maintain and extend his or her competence.
Competency Indicator: Self-development managed typically by the following: 1. Planning own professional development strategy. 2. Selecting appropriate professional development activities. 3. Keeping a record of professional. development strategy and activities. 4. Displaying independent learning ability. **5.** Completing professional development.	**Competency Indicator:** Self-development managed typically by the following: 1. Planning own professional development strategy. 2. Selecting appropriate professional developmental activities. **1.** Keeping record of professional development **2.** Displaying independent learning ability.	**Competency Indicator:** Self-development managed typically by the following: 1. Planning own professional development strategy. 2. Selecting appropriate professional development activities. **1.** Keeping record of professional development. **2.** Displaying independent learning ability.	**Competency Indicator:** Self-development is managed typically by the following: 1. Planning own development strategy. 2. Selecting appropriate development activities. **3.** Keeping record of development. **4.** Displaying independent learning ability

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4. PERFORMANCE OF CORE SERVICE IN PRACTICE AREA

1. Identified Engineering Work in any engineering discipline consists of core services in certain practice areas.

2. For the purposes of section 26(3)(a) of the Engineering Profession Act, 2000 (Act No.46 of 2000, work identified for persons registered in one of the categories in section 18(1)(a) or (c) of the Engineering Profession Act, 2000 (Act No.46 of 2000) includes the core services for the practice areas referred to in clauses 5 to 16.

3. The core services and practice areas outlined in clauses 5 to 16 are not exhaustive. Any similar activity undertaken to perform a core service within the scope of an agreement to provide engineering work in a relevant discipline even if not explicitly listed in clauses 5 to 16, is deemed a core service as identified in those clauses.

5. IDENTIFIED ENGINEERING WORK IN AERONAUTICAL ENGINEERING DISCIPLINE

1. The core services in the Aeronautical Engineering discipline consist of the analysis, planning, design and development, manufacture, construction, operation and maintenance, academic work of all types of flight vehicles, including fixed-wing aircraft, helicopters, sail planes, airships, spacecraft and missiles, based on engineering sciences underlying flight dynamics, aerospace structures and propulsion systems.

2. The core services in the Aeronautical Engineering discipline are performed in the following practice areas:

   (a) Aircraft design
   (b) Aircraft structures
   (c) Aircraft propulsion systems
   (d) Aerodynamics
   (e) Avionics
   (f) Aero-elasticity
   (g) Stability and control
   (h) Aircraft systems including hydraulic, pneumatic and avionic systems

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(i) Wind tunnel testing
(j) Flight testing
(k) Aircraft performance monitoring
(l) Airport/airfield management
(m) Certification and safety programmes
(n) Fire risk management in aircraft, engines, and fuel systems

6. IDENTIFIED ENGINEERING WORK IN AGRICULTURAL ENGINEERING DISCIPLINE

1. The core services in Agricultural Engineering consist of the analysis, planning, design and development, manufacture, construction, management, operation, and maintenance of agricultural machinery, mechanisation, production and processing, academic work and natural resource management through the application of engineering sciences.

2. The core services in the Agricultural Engineering discipline are performed in the following practice areas:

(a) Agricultural Energy Engineering
(b) Agricultural Renewable Energy Engineering
(c) Agricultural Product Processing Engineering
(d) Agricultural Structures and Facilities Engineering
(e) Agricultural Waste Handling and Management
(f) Aquaculture Engineering
(g) Mechanisation Engineering
(h) Irrigation Engineering
(i) Hydrology and Agricultural Water Use Management
(j) Natural Resources Engineering
(k) Food Engineering
(l) Environmental Engineering
(m) Rural Infrastructure Engineering
(n) Fire Risk Management to prevent wildfires and protect agriculture infrastructure.

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7. IDENTIFIED ENGINEERING WORK IN CHEMICAL ENGINEERING DISCIPLINE

1. The core services in Chemical Engineering consist of the analysis, planning, design and development, manufacture, construction, management, operation, academic work and maintenance of industrial-scale processes that convert raw and recycled materials to products through chemical and physical processes.

2. These core services in the Chemical Engineering discipline are performed in the following practice areas:

   (a) Processes where hazardous substances are present in significant quantities
   (b) processes where chemical reactions present particular hazards
   (c) processes involving advanced water and wastewater treatment
   (d) extractive metallurgy and mineral processing.

3. In the following practice areas:

   (a) Research and Development
   (b) Process Design and Development
   (c) Product Development and Quality Control
   (d) Plant Operations and Management
   (e) Environmental Protection
   (f) Process control and Optimisation.

   Some details of these practice areas are given in section **6** below. A registered person is required to approve and take responsibility for any critical decisions related to changes in conditions that may result in increased risk associated with the decision.

4. In the ideal case, a registered person is involved in the training and development of junior/candidate engineers.

5. Any Chemical Engineer operating in a position of responsibility in the practice area of Construction and Project Management will need to be adequately qualified in construction and project management otherwise they would only participate in a specialist role.

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6. Details of practice areas:

(a) Research and development:

(i) Conducting research, advising on and developing broadly defined, commercial-scale processes to produce substances and items such as petroleum derivatives, chemicals, food and drink products, pulp and paper, pharmaceuticals and synthetic materials such as polymers, plastics and cement, in addition to incorporating energy and mineral processing and water treatment.

(ii) Performing tests throughout stages of production to determine degree of control over process variables, which include composition, temperature, density, specific gravity and pressure.

(iii) Performing laboratory studies of steps in the manufacturing of new products and testing proposed processes by employing small-scale operations such as a pilot plant. This type of work may be performed in research and product-development centres of business organisations or at academic institutions. Applicants must undertake research and development work that is predominantly Chemical Engineering in nature, and this work should include an in-depth application of the various aspects of Chemical Engineering.

(b) Safety Engineering:

(i) Participating in and leading risk assessment studies such as hazard and operability (HAZOP) studies during phases of design or operation of equipment, systems and plants.

(ii) Establishing control standards and procedures to ensure the safety of production operations and the safety of workers operating equipment or working in close proximity to on-going chemical reactions or processes.

(iii) Developing and implementing safety protocols and procedures to ensure compliance with regulatory standards.

(c) Process Design and Development

(i) Designing process plants and equipment and devising processes for manufacturing products while meeting targeted efficiencies.

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(ii) Optimising processes for efficiency, safety and sustainability.

(iii) Specifying chemical production methods, equipment, materials and quality standards and ensuring that all conform to specifications and accepted industry practices and standards.

(iv) Collaborating with cross-functional teams, including engineers, scientists and technicians within Chemical Engineering and within other engineering disciplines to develop and implement process improvements.

(v) Conducting economic evaluations and feasibility studies for new projects or process modifications.

(d) Product Development and Quality Control

Performing laboratory studies of steps in the manufacturing of new products and testing proposed processes by employing small-scale operations such as a pilot plant.

(e) Plant Operation and Management

(i) Developing operating procedures to be employed during design and operating phases, including start-up, shutdown and emergency procedures, preparing of cost estimates such as (CAPEX, OPEX and lifecycle) and production progress reports for management.

(ii) Overseeing plant operation and/or management.

(iii) Optimising processes and products for improvement of prescribed performance indices such as profitability, sustainability, energy consumption, environmental sustainability and carbon efficiency.

(iv) Conducting process troubleshooting and problem-solving to identify and resolve operational issues.

(v) Providing technical support and guidance to production personnel to ensure efficient and safe operation of chemical processes.

(vi) Developing and implementing process optimisation strategies to improve product quality, yield and efficiency.

(vii) Monitoring and analysing process data to identify trends, deviations, and opportunities for improvement.

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(viii) Developing and managing budgets and costs associated with engineering works.

(ix) Training and mentoring junior staff members.

(x) Evaluating social, environmental, statutory and legal considerations or the modification of existing plants.

(f) Environmental Protection

Conducting environmental impact assessments and developing strategies for waste management and pollution prevention.

(g) Process Control and Optimisation

Developing broadly defined process control philosophies and/or advanced process control systems.

(h) Consulting and Entrepreneurship

(i) Managing projects, including coordinating and overseeing the work of technicians, operators and other external service providers such as suppliers to ensure adherence to project timelines and budgets.

(ii) Conducting economic evaluations and feasibility studies for new projects or process modifications.

(i) Construction and Project Management

Construction process, managing projects and ensuring that designs are implemented correctly according to scope. This can involve coordinating with contractors, conducting site inspections and managing budgets and timelines.

8. IDENTIFIED ENGINEERING WORK IN CIVIL ENGINEERING DISCIPLINE

1. The core services in the Civil Engineering discipline consist of the analysis, planning, design and development, manufacture, construction, management, maintenance, academic work and operation of works comprising of the following:

(a) **Structural systems**: These include buildings, dams, bridges, roads, highways, runways, harbours and railways.

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(b) **Geotechnical systems**: These include township services, earthworks, excavations, soil conservation and geotechnical processes. •

(c) **Transportation systems**: These include the roads, railway, airport runways and all the combinations of elements and their interactions, which produce the demand for travel within a given area and wastewater treatment.

(d) **Hydraulic engineering systems**: These include water resources and supply, pipelines, canals, water treatment, storm water and drainage, sewer systems, sanitation waste Management and coastal engineering.

2. Typical tasks that Civil Engineers, Technologists and/or Technicians may undertake include the following:

(a) Conducting research and developing new or improved theories and methods related to Civil Engineering.

(b) Advising on and designing infrastructures such as bridges, dams, harbours, roads, airports, stadiums, railways, canals, pipelines, treatment works, waste-disposal and flood-control systems and residential, commercial, industrial and other large buildings.

(c) Determining and specifying construction methods, materials and quality standards and directing construction work.

(d) Establishing control systems to ensure efficient functioning of infrastructure as well as safety and environmental protection.

(e) Organising and directing maintenance and repair of existing Civil Engineering infrastructure.

(f) Analysing the behaviour of soil and rock when placed under pressure by proposed structures and designing structural foundations.

(g) Analysing the stability of structures and testing the behaviour and durability of materials used in their construction.

(h) Managing finances which involves preparing the budget, control line items in the budget and proper financial control.

(i) Executing the design elements according to the specifications and approved construction drawings during the construction stage.

(j) Wet Services (plumbing and drainage) for buildings.

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3. Practising Civil Engineers, Technologists and/or Technicians generally concentrate in one or more of the following areas:

   (a) Structural Engineering
   (b) Geotechnical Engineering
   (c) Transportation Engineering
   (d) Roads Engineering
   (e) Materials Science Engineering
   (f) Coastal Engineering
   (g) Forensic Engineering
   (h) Environmental Engineering
   (i) Railway Engineering
   (j) Site development and Planning
   (k) Surveying Water Engineering.

More specialised fields may be in Transportation and Urban Planning, Biosystems Engineering, GIS, Costal or Marine Engineering and Land-use Management.

9. IDENTIFIED ENGINEERING WORK IN COMPUTER ENGINEERING DISCIPLINE

1. The core services in the Computer Engineering discipline consist of defining, investigating and analysing engineering problem, designing solutions and applying relevant knowledge of programming languages, software engineering, data structures and algorithms, computer organisation and architecture, operating systems, database systems and computerised enterprise integration systems related to the following:

   (a) New or improved theories and methods relating to Computer Systems Engineering.
   (b) Computer-based systems or components, systems equipment, software and distribution centres.
   (c) Production or installation methods, specifying materials, quality and safety standards and directing production and installation of computer-based products, software and systems.

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(d) Operation and maintenance of computer-based systems, software, networks and equipment.

(e) Test procedures for computer-based systems, software, networks, programmes and equipment.

(f) Organising and directing the maintenance and repair of existing computer-based systems, programmes and equipment.

(g) Computer-based equipment and software.

(h) Computer-based communication networks.

(i) Computer-based systems.

(j) Implementing these computer-based systems through appropriate choice of hardware and managing the development of the necessary software.

(k) Manufacturing methods for computer-based systems, networks and equipment.

10. IDENTIFIED ENGINEERING WORK IN ELECTRICAL ENGINEERING DISCIPLINE

1. The core services in the Electrical Engineering discipline consist of the analysis, planning, design and development, manufacture, construction, management, operation, academic work and maintenance of materials, components, plant and systems for generating, storage, transmitting, distributing and utilising –

   (a) electrical energy (solar, wind, thermal)

   (b) electronic devices, apparatus and control systems for industrial systems, bio- medical and consumer products and processes

   (c) computing, communication and software for critical applications instrumentation and control of processes, through the application of electrical, electromagnetic and information engineering sciences.

2. The core services in the Electrical Engineering discipline are performed in the following primary practice areas:

   (a) Electrical Power Engineering work

   (b) Electronic Engineering work (mechatronic vs robotics)

   (c) Telecommunications and Network Engineering work

   (d) Computer and Software Engineering work.

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3. Electrical Power Engineering work includes the following practice areas:

(a) Conducting research and developing new or improved theories and methods related to Electrical Power Engineering.
(b) Advising on and designing power stations and systems which generate, transmit, distribute and reticulate electrical power.
(c) Specifying instrumentation, measurement and control of equipment for the monitoring and control of electrical generation, transmission and distribution systems.
(d) Supervising, controlling, developing and monitoring the operation and maintenance of electrical generation, transmission and distribution systems.
(e) Advising on and designing systems for electrical motors, electrical traction and other equipment or electrical domestic appliances.
(f) Specifying electrical installation and application in industrial and other buildings and objects.
(g) Establishing control standards and procedures to monitor the performance and safety of electrical generating and distribution systems, motors and equipment.
(h) Determining manufacturing methods for electrical systems, as well as the maintenance and repair of existing electrical systems, motors and equipment or user-equipment to safeguard life.
(i) Design and development of electrical apparatus.

4. Electronic Engineering work includes the following practice areas:

(a) Conducting research and developing new or improved theories and methods related to Electronic Engineering.
(b) Advising on and designing electronic devices or components, circuits, semi-conductors and systems.
(c) Specifying production or installation methods, materials and quality standards and directing production or installation work of electronic products and systems.
(d) Supervising, controlling, developing and monitoring the operation and maintenance of electronic equipment and systems.
(e) Establishing control standards and procedures to ensure efficient functioning and safety of electronic systems and equipment.

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(f) Organising and directing maintenance and repair of existing electronic systems and equipment.

(g) Designing electronic circuits and components for use in fields such as aeronautical guidance and propulsion control, acoustics or instruments and control, including fire detection engineering.

(h) Determining manufacturing methods for electronic systems as well as the maintenance and repair of existing electronic systems and equipment.

(i) Researching and advising on radar, telemetry and remote-control systems, microwaves and other electronic equipment.

(j) Designing and developing signal processing algorithms and implementing these through appropriate choice of hardware and software.

(k) Developing apparatus and procedures to test electronic components, circuits and systems.

(l) Designing, specifying and implementing control and instrumentation of plant and processes.

(m) Designing, specifying, control and monitoring of equipment for fire and safety in plant and factories.

(n) Robotics/mechatronic and process control of manufacturing plant.

(o) Energy efficiency photovoltaic/solar power (PV) systems and integration to power grids and associated earthing and protection schemes.

5. Telecommunications Engineering work is a broad specialisation of Electronic Engineering encompassing the design, construction and management of systems that carry out the transmission, processing and storage of information as electrical or optical signals and the control services based on this capability and includes the following practice areas:

(a) Conducting research and developing new or improved theories and methods related to Telecommunications Engineering.

(b) Advising on and designing telecommunications devices or components, systems, equipment and distribution centres.

(c) Specifying production or installation methods, materials, quality and safety standards and directing production or installation work of telecommunications products and systems.

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(d) Supervising, controlling, developing and monitoring the operation and maintenance of telecommunication systems. Networks and equipment.

(e) Determining manufacturing methods for telecommunication systems as well as the maintenance and repair of existing telecommunication systems, networks and equipment.

(f) Organising and directing maintenance and repair of existing telecommunication systems, networks and equipment.

(g) Researching and advising on telecommunications equipment.

(h) Planning and designing communications networks based on wired fibre optical and wireless communication media.

(i) Designing and developing signal processing algorithms and implementing these through appropriate choice of hardware and software.

(j) Designing telecommunications networks and radio and television distribution systems, including both cable and over-the-air.

(k) Determining manufacturing methods for computer-based systems as well as the maintenance and repair of existing computer-based systems, networks and equipment.

(l) Fire detection engineering work is a broad specialisation of Electronic Engineering encompassing the design, construction and management of life protection systems that carry out the transmission, processing and storage of information as electronic signals and the control services based on this capability, programming of logic systems to automatically apply the fire rational for safe building evacuation and includes knowledge of the following sub-practice areas:

(i) Fire engineering or fire rational as functionally directed by Fire Chief
(ii) Electronics and usage of applicable equipment, and limitations
(iii) Occupation Health and Safety Act, and SANS
(iv) Taking account environmental factors, and
(v) Access control and evacuation routes for automation.

(m) Lectures, teaching staff, trainers and mentors to be registered and have the applicable skill and knowledge to enable the training of students, trainees and

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mentees and be guided by a registered person, including specialisation courses such that the ECSA outcomes are highlighted within the course.

6. Clinal Engineering work. applies engineering principles and problem solving to optimise healthcare delivery by managing medical technology, ensuring safety and improving patient care:

   (a) Advising and designing medical technology devices, systems and distribution centres and contributing to the development of new medical technologies and techniques.
   (b) Research and evaluate hardware and software options and weigh the cost/benefit analysis before procuring services and products on behalf of the business.
   (c) Specifying production and installation of medical devices/equipment as per required needs.
   (d) Advising and managing procurement and commissioning of medical equipment.
   (e) Configuring, calibrating and performing safety checks on new medical equipment.
   (f) Supervising, controlling, developing and monitoring the operation and maintenance of medical equipment.
   (g) Carrying out maintenance, repair and safe disposal of medical devices.
   (h) Ensuring medical devices meet the current regulations from governing agencies.
   (i) Advising and contributing on medical equipment policy development in different agencies.
   (j) Identifying, managing and resolving risks involved with medical devices/equipment.

7. Computer and Software Engineering work is the analysis, planning, design and development, manufacture, construction, management, maintenance, academic work and operation of works related to computer and software systems that enable and support the core services in the Electrical Engineering discipline, and includes the following practice areas:

   (a) Conducting research and developing new or improved theories and methods relating to Computer Systems in the Electrical Engineering Discipline.
   (b) Advising on and designing computer-based systems or components, systems equipment, software and distribution centres.

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(c) Specifying production or installation methods, specifying materials, quality and safety standards and directing production and installation of computer-based products, software and systems.

(d) Supervising, controlling, developing and monitoring the operation and maintenance of computer-based systems, software, networks and equipment.

(e) Developing and implementing test procedures for computer-based systems, software, networks, programmes and equipment.

(f) Organising and directing the maintenance and repair of existing computer-based systems, programmes and equipment.

(g) Researching and advising on computer-based equipment and software.

11. IDENTIFIED ENGINEERING WORK IN INDUSTRIAL ENGINEERING DISCIPLINE

1. The core services in the Industrial Engineering discipline consist of the following practice areas, underpinned by the interdisciplinary nature of the field, which requires a strong foundation in mathematics, science and engineering principles.

a) **Work Design and Measurement:** South African Industrial Engineers focus on optimising labour-intensive environments such as agriculture, textiles and manufacturing. Time studies, method improvements, and productivity metrics are used to enhance output while complying with local labour laws and safety standards.

b) **Operations Research and Analysis:** Industrial Engineers use linear programming, simulation and forecasting to solve complex problems in mining, healthcare and logistics. Operations research is critical for addressing systemic inefficiencies in public utilities.

c) **Engineering Economic Analysis:** Cost-benefit analysis supports capital project justifications in industries impacted by currency fluctuations and high borrowing costs. Industrial Engineers play a vital role in ensuring project feasibility in both private-sector investments and government tenders.

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d) **Facilities Engineering and Energy Management:** In South Africa, Facilities Engineers tackle space optimisation in high-rent metros and energy efficiency amid frequent load-shedding. Projects often involve solar integration, alternative power sources and water conservation technologies.

e) **Quality and Reliability Engineering**: Industrial Engineers implement Total Quality Management (TQM), Six Sigma, and ISO systems to meet global export standards, particularly in automotive, food, and pharmaceutical sectors. Reliability Engineering is key to reducing downtime in resource-constrained environments.

f) **Economics and Human Factors**: Ergonomics is essential in South Africa's manufacturing and mining sectors, where manual labour remains prevalent. Industrial Engineers work to reduce injury risks and improve worker comfort through better workstation design and task rotation strategies.

g) **Operations and Engineering Management:** Industrial Engineers manage lean manufacturing, inventory control, and scheduling for sectors affected by seasonal demand or unreliable utilities. Local case studies include FMCG production optimisation and warehousing for large retailers.

h) **Supply Chain Management:** Industrial Engineers enhance visibility, responsiveness and cost-efficiency in supply chains across the SADC region. This includes planning under infrastructural constraints, border delays and varying levels of distributor sophistication.

i) **Engineering Management:** South African Industrial Engineers often serve in cross-functional leadership roles, managing technical projects, stakeholder expectations and regulatory compliance. They help align engineering outputs with national priorities such as localisation and industrialisation.

j) **Safety:** Industrial Engineers implement risk assessments, safety protocols and behaviour-based safety programmes, particularly in high-risk industries like mining, petrochemicals and construction. Compliance with the

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Occupational Health and Safety Act, 85 of 1993, and the Mine Health and Safety Act, 29 of 1996, is non-negotiable.

k) **Information Engineering:** Industrial Engineers design and improve digital systems for manufacturing execution, data analytics, and enterprise resource planning. In local contexts, this includes digitising manual processes and developing low-cost monitoring tools for SMEs.

l) **Design and Manufacturing Engineering:** Industrial Engineers optimise production processes using CAD/CAM, CNC, the incoming Digital technologies, IoT, AI, Additive Manufacturing, etc, for example, in tooling, packaging and component assembly. They often collaborate with artisans and technicians to drive innovation on the factory floor.

m) **Product Design and Development:** Product design integrates customer feedback, market needs, and production capabilities. In South Africa, this often means developing robust, affordable solutions for underserved communities, including water purification systems and Agri-tech equipment.

n) **Systems Design and Engineering:** Industrial Engineers apply systems thinking to coordinate complex projects, from public health supply chains to integrated transport systems. This includes balancing technological, social and economic constraints for long-term sustainability.

12. IDENTIFIED ENGINEERING WORK IN MECHANICAL ENGINEERING DISCIPLINE

1. The core services in the Mechanical Engineering discipline consist of the analysis, planning, design and development, manufacture, construction, management, academic work, operation and maintenance of materials, structures, components, machines plant and systems for:

   (a) lifting, hoisting and materials handling. turbines, pumps and fluid power, heating, cooling, ventilating, air conditioning; and vertical transportation (lifts and pneumatic tube systems)

   (b) fuels, combustion, engines, steam plant, turbines

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(c) automobiles, trucks and special vehicles

(d) fire protection and rational design

(e) nuclear energy generation

(f) steel structures, through the application of engineering sciences: mechanics, solid mechanics, thermodynamics, fluid mechanics.

2. The core services in the Mechanical Engineering discipline are performed in the following practice areas:

(a) Advising on and designing machinery and tools for manufacturing, mining, construction, agricultural and other industrial purposes.

(b) Advising on and designing steam, internal combustion, and other non-electric motors and engines used for propulsion of railway locomotives, road vehicles, or aircraft or for driving industrial or other machinery.

(c) Advising on and designing hulls, superstructures, and propulsion systems of ships; mechanical plants and equipment for the release, control, and use of energy, heating, ventilation, and refrigeration systems, steering gear, pumps, pipe work, valves and other associated mechanical equipment.

(d) Advising on and designing airframes, undercarriages and other equipment for aircraft in addition to suspension systems, brakes, vehicle bodies and other components of road vehicles.

(e) Advising on and designing non-electrical parts of apparatus or products such as computers, precision instruments and consumer appliances.

(f) Establishing control standards and procedures to ensure efficient functioning and safety of machines, machinery, tools, motors, engines and industrial plant equipment or systems.

(g) Ensuring equipment operation and maintenance comply with design specifications and safety standards.

(h) Fire risk management by designing and maintaining mechanical systems.

(i) Design of piping systems, pressurised piping systems.

(j) Design of vessels for storage of liquids or gases, including pressure vessels.

(k) Dredging or floatation devices for mining applications.

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13. IDENTIFIED ENGINEERING WORK IN MECHATRONIC ENGINEERING DISCIPLINE

1. The core services in the Mechatronic Engineering discipline consist of defining, investigating and analysing engineering problems, designing solutions and applying relevant knowledge of materials, components, plant and systems for the following:

   (a) Mechatronic Devices
   (b) Factory Automation
   (c) Process Automation.

2. **Primary Practice Areas:** The core services in the Mechatronic Engineering discipline are performed in the following primary practise areas:

   (a) Mechatronic Devices Control Systems
   (b) Factory Automation
   (c) Process Automation

3. **Other Practice Areas** include the following:

Factory Automation

Factory Automation Engineering work is a broad specialisation of Mechatronics Engineering encompassing the design, construction and management of instrumentation, measurements, automation, optimisation, control and optimisation of industrial factories which includes all discrete industrial processes such as automotive manufacturing etc.

It includes the following practice areas:

(a) New or improved theories and methods related to the instrumentation, measurement, control and automation within factory automation.
(b) Production or installation methods, materials and quality standards production or installation work of automation products and systems.
(c) Operation and maintenance of automation equipment and systems.
(d) Control standards and procedures to ensure efficient functioning and safety of automation systems and equipment.

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(e) Automation systems of factories.

(f) Automation systems and processes of manufacturing plants.

(g) Automation systems for fire and safety in process plants.

(h) Intelligent fire detection systems, robotics for firefighting or hazardous environment response, and automated fire suppression controls by embedding Fire Engineering principles into mechatronic systems.

Process Automation

Process Automation Engineering work is a broad specialisation of Mechatronics Engineering encompassing the design, construction and management of instrumentation, measurements, automation, optimisation, control and optimisation of industrial process plants, which includes chemical, petrochemical and nuclear power generation facilities etc.

It includes the following practice areas:

(a) New or improved theories and methods related to Process Automation Engineering.

(b) Process automation devices or components, systems, equipment and distribution centres.

(c) Production or installation methods, materials, quality and safety standards and production or installation work of process automation products and systems.

(d) Process automation systems. networks and equipment.

(e) Manufacturing methods for process automation systems, control standards and procedures to ensure efficient functioning and safety of automation systems and equipment, also in classified areas.

(f) Process automation configurations for the optimisation of process plants, control strategies, instrumentation and configurations.

(g) Manufacturing methods for process automation systems and equipment.

(h) Process control strategies, configurations, instrumentation, automation strategies, and remote control and monitoring systems.

(i) Signal processing algorithms, apparatus and procedures to test process automation components, circuits and systems.

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(j) The automation, control and instrumentation of process plants.

(k) Automation systems for fire and safety in process plants.

(l) Communications networks for all instruments, control and automation devices in a process plant.

(m) Intelligent fire detection systems, robotics for firefighting or hazardous environment response, and automated fire suppression controls by embedding fire engineering principles into mechatronic systems.

Mechatronic Devices

Mechatronic devices are systems that synergistically combine Mechanical Engineering, Electronics, Computer Science and Control Engineering to create functional and adaptable products. These devices typically involve the integration of sensors, actuators, microcontrollers and software to perform complex tasks with precision and efficiency. The goal of Mechatronics is to improve the functionality and performance of mechanical systems by embedding them with electronic and computational intelligence. Examples of mechatronic devices include robotic arms, automated guided vehicles and modern automotive systems like anti-lock braking systems (ABS) and electronic stability control (ESC).

It includes the following practice areas:

(a) New or improved theories and methods related to improve the functionality and performance of mechanical systems.

(b) Production or installation methods of automated mechatronic devices and systems.

(c) Mechatronic equipment and systems.

(d) Control standards and procedures to ensure efficient functioning and safety of mechatronic systems and equipment.

(e) Intelligent fire detection systems, robotics for firefighting or hazardous environment response, and automated fire suppression controls by embedding fire engineering principles into mechatronic systems.

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14. IDENTIFIED ENGINEERING WORK IN METALLURGICAL ENGINEERING DISCIPLINE

1. The core services in the Metallurgical Engineering discipline consist of either:

   (a) Physical Metallurgical Engineering, which is the analysis, design and development, academic work production, characterisation, failure analysis and application of materials, including metals, for engineering applications based on an understanding of the properties of matter and engineering requirements; or

   (b) Extractive Metallurgical Engineering, which is the research, planning, design and development, academic work, developing and operating commercial-scale processes for the extraction of metals or intermediate compounds from ores by chemical or physical processes, including those at high temperatures, the operation and optimisation of process plants, through the application of Metallurgical Engineering sciences.

2. The core services of a Physical Metallurgical Engineer in the Metallurgical Engineering discipline are performed in the following practice areas:

   (a) Developing, controlling and advising on processes used for casting, alloying, heat treating or welding of metals, alloys and other materials to produce commercial metal products or developing new alloys, materials and processes, evaluating and specifying materials for engineering applications, and doing quality control and failure analyses.

   (b) Investigating properties of metals and alloys, developing new alloys and advising on and supervising technical aspects of metal and alloy manufacture, processing, use and manufacturing.

   (c) Doing residual life evaluations and predictions, failure analyses and prescribing remedial actions to avoid material failures.

3. The core services of an Extractive Metallurgical Engineer in the Metallurgical Engineering discipline are performed in the following practice areas:

   (a) Conducting research and developing methods of extracting metals from their ores and advising on their application.

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(b) Designing, developing and implementing complex process projects.

(c) Operating and optimising process plants or commercial-scale processes.

15. IDENTIFIED ENGINEERING WORK IN MINING ENGINEERING DISCIPLINE

1. The core services in the Mining Engineering discipline consist of the analysis, planning, design and development, manufacture, construction, management, academic work, operation, maintenance and rehabilitation of works for the extraction of minerals from natural deposits on the earth's surface underground or under water through the application of Mining Engineering science.

2. A person who performs the identified work holds a statutory certificate of competency issued in terms of the Mine Health and Safety Act, 29 of 1996, as amended.

3. The core services in the Mining Engineering discipline are performed in the following practice areas:

(a) Conducting fundamental or operational research and advising on occupational health and safety and environmentally responsible mineral excavation methodology, excavation technology selection, excavation equipment specification, processes and systems.

(b) Designing and specifying mineral excavation processes, application of mining resources and mining technical support services required, occupational health, safety and environmental considerations and quality assurance.

(c) Establishing production and operational control standards and procedures to ensure compliance with legislation and site-specific requirements.

(d) Managing occupational health, safety and environmentally related hazards and associated risks.

(e) Performing tests throughout the life-cycle stages and mineral excavation processes to determine the degree of control over variables identified during the strategic and tactical mine design and planning processes.

(f) Developing appropriate site-specific risk management policies, procedures and standards.

(g) Preparing concept engineering and order of magnitude estimates, pre-feasibility studies with preliminary estimates, feasibility studies with control estimates, life-

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of-mine exploitation strategies and plans, business plans and bankable documents based on site-specific assumptions, premises, constraints and best practice standards, appropriate available benchmarking converting mineral resources into mineable reserves.

(h) Performing mineral asset valuations.
(i) Managing mineral assets.
(j) Education and training of Candidate Mining Engineering Practitioners.
(k) Geotechnical Engineering.
(l) Tailings and waste management.
(m) Rehabilitation and mine closure.
(n) Infrastructure design.
(o) Project and construction management.
(p) Financial valuation.
(q) Occupational health and ventilation.
(r) Mine economics and planning.
(s) Mine planning and production.

16. IDENTIFIED ENGINEERING WORK FOR PROFESSIONAL CERTIFICATED ENGINEERS

1. For the purposes of section 26(3)(a) of the Engineering Profession Act, work identified for persons registered in terms of section 18(1)(a)(iii) of the Engineering Profession Act includes the core services for the practice areas referred to in sub-section (4), provided that the person so registered holds a statutory certificate of competency issued in terms of the Mine Health and Safety Act 1996, the Occupational Health and Safety Act, 993, or the Merchant Shipping Act,1951 (Act No 57 of 1951.

2. The list of activities is outlined in document **R-02-STA-PCE**.

3. Engineering work performed by a Professional Certificated Engineer includes:

(a) the application of current engineering technology
(b) the management and operation of technology-based engineering solutions and processes

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(c) the introduction of known engineering services and management methods

(d) the management of the implementation of broadly defined engineering projects and the routine maintenance of engineering infrastructure

(e) the management of moderate to high level of risks associated with engineering processes, systems, equipment and infrastructure; and the specific operational and safety requirements to ensure inherently safe working conditions within the specific context relating to persons working in factories, mines and on ships as certificated persons appointed in terms of the Occupational Health and Safety Act, 1993, the Mine Health and Safety Act, 1996, and the Merchant Shipping Act, 19517.

4. A person may perform work identified in this section if he or she is in possession of any one or more of the following government certificates of competency:

(a) Electrical Engineer's Certificate of Competency issued in terms of the Mine Health and Safety Act, 1996

(b) Mechanical Engineer's Certificate of Competency issued in terms of the Mine Health and Safety Act, 1996

(c) Electrical Engineer's Certificate of Competency issued in terms of the Occupational Health and Safety Act, 85 of 1993

(d) Mechanical Engineer's Certificate of Competency issued in terms of the Occupational Health and Safety Act, 85 of 1993

(e) Manager's Certificate of Competency (Metalliferous) issued in terms of the Mine Health and Safety Act, 29 of 1996

(f) Manager's Certificate of Competency (Coal) issued in terms of Mine Health and Safety Act, 29 of 1996

(g) Chief Engineer Officer – Foreign Going Certificate of Competency issued in terms of the Merchant Shipping Act, 57 of 1951.

17. SCOPE OF SERVICES FOR ALL CATEGORIES

1. The standard services performed by a person registered in any category referred to in section 18(1)(a) of the Engineering Profession Act, 2000 (Act No.46 of 2000, who performs Identified Engineering Work in the applicable stages of an engineering project or construction works project are given in **Table A1** in **ANNEXURE A**.

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2. A person who is registered as a Professional Certificated Engineer is deemed to be registered as a Professional Engineering Technologist or Professional Engineering Technician and may perform the Identified Engineering Work that a Professional Engineering Technologist or Professional Engineering Technician may perform as indicated in sections **5** to **16** in the relevant engineering discipline provided that he or she is competent in terms of education, training and experience to perform that work.

18. WORK BY PERSON WHO IS RESPONSIBLE FOR THE PLANNING, DESIGN AND DELIVERY OF EDUCATION AND TRAINING PROGRAMMES

1. Any person responsible for the planning, design, delivery, assessment and moderation of modules at the exit level of engineering programmes, at a higher education institution – whether established, deemed to be established or declared as a public or private higher education institution under the Higher Education Act, 1997 (Act No. 101 of 1997, or at a public college as defined in the Continuing Education and Training Act, 2006 (Act No. 16 of 2006, is deemed to be performing identified work as contemplated in section **1** of this Notice.

2. For the purpose of this section, “exit level” refers to the “exit level” as defined in the Regulations issued under the National Qualifications Framework Act, 2008 (Act No. 67 of 2008.

19. EMPLOYEE OF ORGAN OF STATE IDENTIFIED WORK

Any person who is employed by an organ of state and whose conditions of service require of that person to manage the delivery and maintenance of engineering work is deemed to be a person who performs identified work contemplated in section **1** of this Notice.

20. PERFORMANCE OF IDENTIFIED WORK BY PERSON REGISTERED IN DIFFERENT CATEGORY

1. For the purposes of section 18(2) of the Engineering Profession Act, 2000 (Act No. 46 of 2000, a person who is registered as a Professional Engineer is deemed to be registered as a Professional Engineering Technologist or Professional Engineering Technician and may perform the identified engineering work that a Professional Engineering Technologist

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or Professional Engineering Technician may perform as indicated in in the relevant engineering discipline provided that he or she is competent in terms of his or her education, training and experience to perform that work.

2. A person who is registered as a Professional Engineering Technologist is deemed to be registered as a Professional Engineering Technician and may perform any of the identified engineering work that a Professional Engineering Technician may perform as indicated in sections **5** to **16** in the relevant engineering discipline provided that he or she is competent in terms of his or her education, training and experience and authorisation to perform that work.

3. A person registered in a particular category referred to in section 18(1)(i), (ii) and (iv) of the Engineering Profession Act, 2000 (Act No.46 of 2000, may, notwithstanding the provisions of clauses 5 to 16, perform any work identified in sections **5** to **16** for a different category of the registered person, if ECSA grants such registered person a transitional authorisation, special consent or category adjustment, as the case may be.

4. A person who is registered as a Professional Certificated Engineer may perform engineering work identified at the broadly defined level in the disciplines referred to in items 5, 7, 10, 12, 14 and 15 commensurate with the qualification or combination of qualifications that led to the issuing of his or her certificate of competency referred to in section **16** as updated.

5. Notwithstanding the provisions of this section, a person who is registered as a candidate referred to in section 18(1)(b) of the Engineering Profession Act, 46 of 2000, may not apply for special consent and may only perform Identified Engineering Work under the direction, control and direct supervision of a person registered in the appropriate category in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000,) if the professional or person concerned is authorised under clauses 5 to 16 in the relevant engineering discipline to perform such Identified Engineering Work.

21. TRANSITIONAL AUTHORISATION

1. A person who is registered in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000, and who, after commencement of that Act but before commencement of this

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notice, performed Identified Engineering Work referred to in sections **5** to **16** clauses 5 to 16 for a person registered in a category of registration in which he or she is not registered may apply to ECSA for a transitional authorisation.

2. An application for a transitional authorisation must be in writing, submitted to ECSA in the form determined by ECSA within 6 months of the date of commencement of this notice and be accompanied by –

   (a) proof of practice during the period contemplated in subclause (1) within the category that he or she is not registered for
   (b) all available documents pertaining to that practice
   (c) the name and contact details of at least two registered persons who are in a position to serve as personal referees
   (d) the fee determined by ECSA in accordance with clause 12 of the Engineering Profession Act
   (e) any other information required by ECSA.

3. When considering an application for a transitional authorisation, ECSA must take into account the education, training and experience of the applicant requesting such transitional authorisation to undertake the applicable Identified Engineering Work commensurate with the competency requirements contemplated in section **3**.

4. ECSA may, after evaluation of the application for transitional authorisation, refuse or approve the transitional authorisation and if it approves the transitional authorisation, it may subject the approval to any condition it considers appropriate.

5. If ECSA refuses to grant a transitional authorisation, it must, in writing, provide the applicant with the reasons for its decision.

6. If ECSA approves the transitional authorisation, it must issue a transitional authorisation certificate in the manner determined by it and the certificate must contain the conditions of issue, if any.

7. A transitional authorisation certificate authorises the holder thereof to perform the work identified in terms of this Notice for another category of registered person for a period

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determined on the certificate provided that the holder remains a registered person, complies with the CPD requirements and the conditions of approval, if any.

22. SPECIAL CONSENT

1. An ECSA professionally registered person who, after commencement of this notice, intends to perform work for a specific project, commission or appointment or a particular scope of work for which specific competencies are required and which is identified in this Notice for a person registered in a category of registration and linked to a particular discipline in which he or she is not registered, may apply to ECSA for special consent.

2. A person who is professionally registered in any of the Built Environment Councils, after commencement of this notice, and intends to perform work for a specific project, commission or appointment or a particular scope of work for which specific competencies are required and which is identified in this Notice for a person registered in a category of registration and linked to a particular discipline in which he or she is not registered, may apply to ECSA for special consent.

3. An application for special consent must be in writing submitted to ECSA in the form determined by ECSA and be accompanied by –

   (a) a brief motivation for the application
   (b) if applicable, an affidavit from the prospective client of the applicant, other consultants on the proposed team and the proposed contractor
   (c) if applicable, an affidavit from the employer of the applicant who is entitled to perform the identified work by reason of the employer's registration in the applicable category
   (d) all available documents pertaining to the proposed project
   (e) the name and contact details of at least two persons who are in a position to serve as personal referees
   (f) the fee determined by ECSA in accordance with clause 12 of the Engineering Profession Act
   (g) any other information required by ECSA.

4. When considering a request for special consent, ECSA must take into account the education, training and experience of the applicant requesting such special consent to

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undertake the applicable identified engineering work at the level of complexity of a project contemplated in clause 2 commensurate with the competency requirements contemplated in clause **3**.

5. ECSA may, after evaluating the application for special consent referred to in this clause, refuse or approve the special consent, and if it approves the special consent, it may condition the approval to any condition it considers appropriate.

6. If ECSA refuses to grant a special consent, it must, in writing, provide the applicant with the reasons for its decision within 7 days of that decision.

7. If ECSA grants the special consent:

   (a) for a specific project, commission or appointment, it must issue a special consent certificate for that specific project, commission or appointment; or
   (b) for a particular scope of work which requires specific competencies, it must issue a special consent certificate for that particular scope of work, in the manner determined by it and the certificate must contain the conditions of issue, if any.

8. A special consent certificate granted for –

   (a) a specific project, commission or appointment, authorises the holder thereof to perform the relevant work for the period stated on the certificate; or
   (b) a particular scope of work which requires specific competencies, authorises the holder thereof to perform the particular scope of work for a period determined on the certificate, provided that the person remains a registered person, complies with CPD requirements and the conditions of approval, if any

23. CATEGORY ADJUSTMENT

1. A registered person who, after commencement of this notice, generally wants to perform work identified in clause sections **3** and **4** read with clause **5** to **16** , for a person registered in a category of registration in which he or she is not registered, may apply to ECSA for a category adjustment.

2. An application for a category adjustment must comply with the rules of ECSA pertaining to registration.

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24. CROSS-DISCIPLINARY PRACTICE

A person who is registered as a professional and who performs Identified Engineering Work in a particular discipline identified in clause **5** to **16** for which he or she has the competence, education, training and experience, may perform Identified Engineering Work in a different discipline if he or she has the competence, education, training and experience to perform such work in that different discipline.

25. DUAL REGISTRATION

1. A person who is registered as a professional under the Professions' Acts, other than the Engineering Profession Act, may apply for registration with ECSA provided that such person can show proficiency to perform the Identified Engineering Work applicable to the respective category of registration.

2. The work must include aspects that are common to more than one Council where recognised requisite skills and competence permit the professional within one Council to undertake work identified within the scope of works of another Council.

26. APPEAL

Any person who feels aggrieved by an action of ECSA as a result of the work identified in this Notice or due to the refusal by ECSA to grant a transitional authorisation, special consent or category adjustment contemplated in clause **20, 21** and **22** may lodge an appeal against such an action with ECSA and section 35 of the Engineering Profession Act applies with the necessary changes.

27. IMPROPER CONDUCT

Any registered person who is not permitted to undertake work identified in clause 5 to 16 or who has not obtained a transitional authorisation, special consent or category adjustment to do so in terms of clause **18**, **19** or **20**, is in breach of the ECSA code of conduct and the provisions of the Engineering Profession Act relating to improper conduct apply.

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28. TRANSITIONAL PROVISIONS

1. Any person who is not registered in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000) and who is required to be registered as a professional or in a specified category in terms of this Notice must, within 36 months of the date on which this Notice comes into operation, apply for registration according to the programme contemplated in sub-clause in the appropriate category referred to in section 18(1)(a) or (c) of the Engineering Profession Act, 2000 (Act No. 46 of 2000).

2. Any person whose registration in a category referred to in section 18(1)(a) or was cancelled in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000), within one year prior to the date on which this Notice commences must be reinstated as prescribed in the Rules on Cancellation of Registration and Renewal.

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ANNEXURE A

Work identified by the Council for the Built Environment in the context of an engineering project including the scope of services in the following stages

1. The engineering work performed by a person registered in terms of section 18(1)(a) of the Engineering Profession Act, 2000 (Act No. 46 of 2000). in the context of an engineering project or a construction works project, includes the standard services set out in **Table A1** to the extent that the registered person's education, training, experience and contextual knowledge render him or her competent to perform.

2. A person registered in terms of section 18(1)(a) of the Engineering Profession Act, 2000 (Act No. 46 of 2000). may, in the performance of engineering work in the context of an engineering project or the Mechanical and Electrical Engineering work components of a construction works project, perform the work of a principal consultant or principal agent, if appointed as such by the client or employer, to the extent that the registered person's education, training, experience and contextual knowledge render him or her competent to perform.

3. Stages 7, 8 and 9 in **Table A1** are only applicable to engineering projects.

Table A1: Scope of services for a person registered in terms of section 18(1)(a) of the Engineering Profession Act in the context of an engineering project or a construction works project

STAGE 1 – PROJECT INITIATION AND BRIEFING	
Standard Services	
1.1	Assist the client to procure the necessary and appropriate consultants, including the clear definition of their roles, responsibilities and liabilities.
1.2.	Establish in conjunction with the client, consultants and all relevant authorities the site characteristics necessary for the proper design and approval of the intended project.
1.3.	Manage the integration of the preliminary design to form the basis for the initial viability assessment of the project.
STAGE 2 – CONCEPT AND FEASIBILITY	
Standard Services	
2.1	Assist the client to procure the necessary and appropriate consultants including the clear definition of their roles, responsibilities and liabilities.

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2.2	Advise the client on the requirement to appoint a Health and Safety Consultant.
	a) Manage and integrate the concept documentation for presentation to the client for approval.
STAGE 3 – DESIGN DEVELOPMENT	
Standard Services	
3.1	Assist the client to procure the balance of the consultants, including the clear definition of their roles, responsibilities and liabilities.
3.2	Manage, co-ordinate and integrate the design by the consultants.
3.3	Conduct and record the co-ordination meetings.
3.4	Manage and monitor the timeous submission by the design team of all plans and documentation to obtain the necessary statutory approvals.
3.5	Establish responsibilities and monitor the information flow among the design team.
3.6	Facilitate and monitor the timeous technical co-ordination of the design by the design team.
STAGE 4 – TENDER DOCUMENTATION AND PROCUREMENT	
Standard Services	
4.1	Manage the tender process in accordance with agreed procedures.
STAGE 5 – CONSTRUCTION DOCUMENTATION AND MANAGEMENT	
Standard Services	
5.1	Appoint contractors on behalf of the client, including the finalisation of all agreements.
5.2	Instruct the contractor on behalf of the client to appoint subcontractors.
5.3	Receive, co-ordinate, review and obtain approval of all contract documentation provided by the contractor, subcontractors and suppliers for compliance with all the contract requirements.
5.4	Facilitate the handover of the site to the contractor.
5.5	Regularly conduct and record the necessary site meetings.
5.6	Monitor the compliance by the contractors of the requirements of the Health and Safety Consultant.
5.7	Monitor the preparation by the Environmental Consultants of the Environmental Management Plan.
5.8	Establish the construction information distribution procedures.
5.9	Agree and monitor the Construction Documentation Schedule for timeous delivery of required information to the contractors.
5.10	Manage the review and approval of all necessary shop details and product propriety information.

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5.11	Agree to the quality assurance procedures and monitor the implementation thereof by the consultants and contractors.
5.12	Monitor, review, approve and certify monthly progress payments.
5.13	Receive, review and adjudicate any contractual claims.
5.14	Issue the Practical Completion Lists and the Certificate of Practical Completion.
5.15	Issue of the Works Completion List by the consultants to the contractors.
5.16	Check the defects items to achieve Works Completion.
STAGE 6 – PROJECT CLOSE OUT	
Standard Services	
6.1	Issue the Works Completion Certificate.
6.2	Preparation of all as-built drawings and design documentation.
6.3	The procurement of all statutory compliance certificates and documentation.
6.4	Issue the Final Completion Defects list and Certificate of Final Completion.
STAGE 7 – OPERATE IN ACCORDANCE WITH PURPOSE STATEMENT FOR LIFE OF PROJECT	
STAGE 8 – MAINTAIN THE AS-BUILT-STATE FOR LIFE OF PROJECT	
STAGE 9 – SHUTDOWN PERMANENTLY, DECOMMISSION, DEMOLISH AND RE-INSTATE	

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