Subject: Changes in AEO requirements referencing in TS 10503: 2013 AEO Guide to Engineering Competence Management version 1.0

This technical note has been issued by the Asset Standards Authority (ASA) to align the requirements of T MU MD 00009 ST AEO Authorisation Requirements version 3 with TS 10503: 2013 AEO Guide to Engineering Competence Management version 1.0.

When TS 10503: 2013 was published, AEO requirements were not numbered in the document but shown as indented italicised text.

The engineering management requirements included in TS 10503: 2013 have been replaced with requirements in various sections of T MU MD 00009 ST as shown in Table 1.

<table>
<thead>
<tr>
<th>TS 10503: 2013 section</th>
<th>T MU MD 00009 ST section and requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>5, 6, 6.1, 6.2, 12.4.2</td>
<td>7.6 requirement CPM1</td>
</tr>
<tr>
<td>6.7</td>
<td>7.6 requirement CPM2</td>
</tr>
<tr>
<td>7.2</td>
<td>7.6 requirement CPM1</td>
</tr>
<tr>
<td>7.6, 10.2</td>
<td>7.6 requirement CPM3</td>
</tr>
<tr>
<td>6.9, 12.5 (first quote)</td>
<td>7.6 requirement CPM4</td>
</tr>
<tr>
<td>11.1, 12, 12.5 (second quote)</td>
<td>7.6 requirement CPM5</td>
</tr>
<tr>
<td>12.4</td>
<td>7.6 requirement CPM6</td>
</tr>
<tr>
<td>8, 8.1, 8.2, 10.1</td>
<td>7.6 requirement CPM7</td>
</tr>
<tr>
<td>7.3</td>
<td>7.4.2 requirement ENM15</td>
</tr>
</tbody>
</table>
Authorisation:

<table>
<thead>
<tr>
<th>Technical content prepared by</th>
<th>Checked and approved by</th>
<th>Interdisciplinary coordination checked by</th>
<th>Authorised for release</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Oleg Bondarenko</td>
<td>Luke Homann</td>
<td>Jagath Peiris</td>
</tr>
<tr>
<td>Position</td>
<td>Manager Authorisation</td>
<td>Principal Manager, Authorisation and Audit</td>
<td>A/Director Network Standards and Services</td>
</tr>
</tbody>
</table>
Management standard

AEO Guide to Engineering Competence Management

Version 1.0
Issued Date: 06 June 2013
Effective Date: 07 June 2013

Important Warning

This document is one of a set of standards developed solely and specifically for use on the rail network owned or managed by the NSW Government and its agencies. It is not suitable for any other purpose. You must not use or adapt it or rely upon it in any way unless you are authorised in writing to do so by a relevant NSW Government agency.

If this document forms part of a contract with, or is a condition of approval by, a NSW Government agency, use of the document is subject to the terms of the contract or approval.

This document may not be current. Current standards are available for download from the Asset Standards Authority website at www.asa.transport.nsw.gov.au.
Standard Approval
Owner: Principal Manager (Systems Engineering)
Authorised by: Establishment Project Committee
Approved by: Jim Modrouvanos A/Director Asset Standards Authority

Document Control
Version 1.0

Summary of Change
First issue

For queries regarding this standard

standards@asa.transport.nsw.gov.au
www.asa.transport.nsw.gov.au
Preface

A principle function of the Asset Standards Authority is to set, maintain and administer the framework for assessment, authorisation, surveillance, review and audit of organisations that provide engineering services in relation to the asset life cycle of NSW rail assets.

This AEO Guide to Engineering Competence Management has been developed by the Asset Standards Authority to provide supplier organisations with guidance on establishing and maintaining engineering competence management arrangements to support them gaining and maintaining authorisation to provide engineering services across NSW rail assets.

This AEO Guide to Engineering Competence Management forms part of a suite of documents that describe the Transport for New South Wales management of engineering authority and assurance for rail assets. The authorisation framework is described in AEO Authorisation Governance Framework and the requirements for Authorised Engineering Organisations are defined in AEO Authorisation Requirements.

Notwithstanding the guidance provided in this document, the AEO is required to consider its engineering competence management within the scope and context of the specific TfNSW rail environment. The AEO will need to demonstrate that the competence of its engineering staff includes the specific requirements of carrying out their services within this context.
Table of contents

1. Introduction ...........................................................................................................................................6
2. Purpose ....................................................................................................................................................6
2.1 Scope ..................................................................................................................................................6
2.2 Application ..........................................................................................................................................7
3. Reference documents ...............................................................................................................................7
3.1 International standards ..........................................................................................................................7
3.2 Australian standards, acts, and regulations .........................................................................................7
3.3 TNSW and ASA standards ..................................................................................................................7
3.4 Other references ..................................................................................................................................7
4. Terms and definitions ..............................................................................................................................8
5. Purpose of competence management .....................................................................................................9
6. Competence management principles .....................................................................................................9
6.1 Competence management system .......................................................................................................10
6.2 Defined skill types ...............................................................................................................................11
6.3 Proficiency levels ................................................................................................................................12
6.4 Safety culture ......................................................................................................................................13
6.5 Business strategy ...............................................................................................................................13
6.6 Performance .......................................................................................................................................13
6.7 Recognition of prior learning .............................................................................................................13
6.8 Risk-based training needs analysis .....................................................................................................13
6.9 Continuing professional development ..............................................................................................13
7. Competence management system .......................................................................................................14
7.1 Establishing a competence management process .............................................................................14
7.2 Defining competence requirements ...................................................................................................15
7.3 Identifying activities and assessing risks ..........................................................................................15
7.4 Selecting competence standards .........................................................................................................16
7.5 Developing competence statements .................................................................................................16
7.6 Establishing learning and development ............................................................................................17
7.7 Assigning competence assessors .......................................................................................................17
7.8 Competence requirements for candidates ..........................................................................................18
8. Roles and responsibilities ......................................................................................................................18
8.1 Competence manager ..........................................................................................................................18
8.2 Competence assessor ..........................................................................................................................19
8.3 Candidate under assessment ..............................................................................................................20
8.4 Subcontractor under assessment ........................................................................................................20
8.5 Line managers and human resources .................................................................................................20
9. Resource planning and management ....................................................................................................20
9.1 Assigning a competence manager ......................................................................................................20
9.2 Assigning assessors ............................................................................................................................20
9.3 Selecting and recruiting staff .............................................................................................................21
10. Learning and development ................................................................................................................21
10.1 Maintaining manager competencies ...............................................................................................21
10.2 Training, developing, and assessing staff .........................................................................................22
10.3 Controlling learning and development activities ..............................................................................22
10.4 Training process ................................................................................................................................22
11. Competence assessment ......................................................................................................................23

© State of NSW through Transport for NSW
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1</td>
<td>Reviewing competence records</td>
<td>23</td>
</tr>
<tr>
<td>11.2</td>
<td>Recommending assessment</td>
<td>24</td>
</tr>
<tr>
<td>11.3</td>
<td>Agreeing an assessment date</td>
<td>24</td>
</tr>
<tr>
<td>11.4</td>
<td>Carrying out the assessment</td>
<td>24</td>
</tr>
<tr>
<td>11.5</td>
<td>Reviewing assessment results</td>
<td>25</td>
</tr>
<tr>
<td>11.6</td>
<td>Developing plans for filling gaps</td>
<td>26</td>
</tr>
<tr>
<td>12.0</td>
<td>Competence records</td>
<td>26</td>
</tr>
<tr>
<td>12.1</td>
<td>Competence assessment form</td>
<td>26</td>
</tr>
<tr>
<td>12.2</td>
<td>Competence management schedule</td>
<td>26</td>
</tr>
<tr>
<td>12.3</td>
<td>Engineering CPD records</td>
<td>27</td>
</tr>
<tr>
<td>12.4</td>
<td>Competence register and skills matrix</td>
<td>27</td>
</tr>
<tr>
<td>12.5</td>
<td>Validity period of competence records</td>
<td>29</td>
</tr>
<tr>
<td>Appendix A</td>
<td>Competence assessment form (example)</td>
<td>30</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Engineering frameworks and agencies</td>
<td>31</td>
</tr>
</tbody>
</table>
1. Introduction

Transport for New South Wales (TfNSW) is collaborating with industry to improve the engineering governance of rail projects and to utilise the skilled resources of both government and industry organisations to greatest effect. One of the key initiatives is the process for enabling Authorised Engineering Organisations (AEOs) to manage the competence of their engineering staff (including supporting safety and human factors), and to manage the assurance of their engineering services, on behalf of TfNSW.

2. Purpose

The purpose of this AEO Guide to Engineering Competence Management is to provide guidance to engineering organisations to meet the competence management requirements in AEO Authorisation Requirements, and 'to expand on these by providing guidance on how an AEO may demonstrate that the risks (including safety) associated with the competence of their staff are under sufficient management control. Competence management is of particular relevance to suppliers who provide safety-critical engineering services to TfNSW.

It also describes aspects of engineering competency which ASA aims to foster within industry.

2.1 Scope

This standard provides guidance to Authorised Engineering Organisations (AEO) as well as engineering organisations planning to establish competence management systems and plans to support their becoming AEOs.

This guide is tailored to address most competence management requirements. The minimum mandatory AEO requirements are defined in AEO Authorisation Requirements.

The AEO should consider engineering competence management within the TfNSW rail safety context. It is not sufficient to just demonstrate competence in an engineering service within a discipline (for example, signal designer, overhead wiring installer or traction substation tester). It will be necessary to demonstrate other competencies required to meet TfNSW obligations under the regulatory environment and national rail safety law (for example, Rail Industry Worker requirements, as referenced at http://railindustryworker.com.au ).

An AEO may need to undergo training with, and obtain qualifications from, TfNSW Learning & Development for certain competencies in order to meet TfNSW and national rail competency standards. The AEO may also need to consider engineering competency requirements of other rail bodies such as ARTC, in particular where TfNSW and ARTC have assets that are co-located or shared at system boundaries (for example, signalling).
2.2 Application

This standard is intended to be used as guidance by existing AEOs or by suppliers planning to become AEOs. It applies to the management of the competence of engineering staff whose activities may affect the level of safety risk exposure to staff working on the railway, to passengers, and to members of the general public.

This standard applies across all stages of the asset lifecycle.

3. Reference documents

References in the text are made to the latest editions of documents unless specific editions are cited.

3.1 International standards

ISO 9001:2008 Quality Management System

3.2 Australian standards, acts, and regulations

Rail Safety National Law (NSW) pursuant to the Rail Safety (Adoption of National Law) Act 2012 (NSW)

Work Health and Safety Act 2011 (NSW)

Work Health and Safety Regulation 2011 (NSW)

3.3 TfNSW and ASA standards

AEO Authorisation Governance Framework

AEO Guide to Authorisation

AEO Authorisation Requirements

AEO Guide to Engineering Management

EPA 240 FM01 Engineering Design Career Log Book (RailCorp template as a suitable example to use)

60-SD-064/2.0 Competence and Competence Management (Rail Safety)

3.4 Other references

Developing and Maintaining Staff Competence – Railway Safety Publication 1; ORR (UK)


4. Terms and definitions

The following terms and definitions are used in this document:

accountable the obligation of an individual or organization to account for its activities, accept responsibility for them, and to disclose the results in a transparent manner. The job role that is ultimately responsible for the engineering service. Accountability cannot be delegated.

AEO Authorised Engineering Organisation

AQF Australian Qualifications Framework

ASA Asset Standards Authority

assessor a person deemed competent and approved to undertake competence assessments of engineering staff against requirements set out in specific competence standards

assessment the gathering and judging of evidence to determine a person's competence as required by a competence standard

assurance a positive declaration intended to give confidence

authorisation the conferring of authority, by means of an official instruction and supported by assessment and audit

authorised engineering organisation a supplier of a defined engineering service or product that has been assessed and granted AEO status by TfNSW

CPD continuous professional development

compliance the state or fact of according with, or meeting, rules or standards

competencies the skills (technical and non-technical) and underpinning knowledge that enable someone to demonstrate a certain level of competence

framework a basic structure underlying a system, concept, or text

governance the rules, processes, or laws by which the authorisation framework is operated, regulated, and controlled. The exercise of authority and control between the accountable and responsible entities within TfNSW and the AEOs such that planned outcomes are achieved.

KPI key performance indicator

responsible a duty or obligation to satisfactorily perform or complete a task (assigned by someone, or created by one's own promise or circumstances) that one must fulfil, and which has a consequent penalty for failure. Responsibility can be delegated.

review a method to provide assurance by a competent person that an engineering output complies with relevant standards and specific requirements, is safe and is fit for purpose

SME subject matter expert

SQE safety, quality and environment
subject matter expert a person assessed or recognised as having the highest level of competence (including knowledge, skills and practical experience) in a particular field or discipline.

supplier a supplier of services or products. A supplier is defined as an 'applicant' until it has been granted AEO status, after which it is referred to as an AEO.

TfNSW Transport for New South Wales

TNA training needs analysis

5. Purpose of competence management

The purpose of engineering competence management is to ensure that only engineering staff with the appropriate knowledge, skills and behaviours are engaged to perform activities defined for a specific job role or function, within a specific engineering service area or discipline.

This contributes to the overall assurance of engineering services or products of the supplier organisation, and reduction or elimination of associated risk (including safety risk).

The mandatory requirement for a competent engineering organisation is:

"An Authorised Engineering Organisation shall demonstrate that it employs people who have the necessary knowledge, skills and experience to competently and safely discharge their duties in providing engineering services"

6. Competence management principles

The following principles support competence management in the AEO environment. The ASA will look for demonstration of these in its assessment of prospective AEOs.

- managing staff competence through a competence management system
- identifying and recognising appropriate skills and proficiency
- embedding an organisational safety culture
- integrating competence management with business goals and performance analysis
- recognising prior learning and external qualifications
- undertaking risk based training needs analyses
- demonstrating continuing professional development (CPD)

The mandatory requirement for competence management arrangements is:

"An Authorised Engineering Organisation shall have systematic and comprehensive arrangements for managing the competence of its engineering staff relevant to the engineering services provided"
An Authorised Engineering Organisation’s competence management arrangements should typically address the following elements:

- job types, roles and skill types
- range of competencies
- mapping of skills and competency to job types and roles
- mapping people to appropriate tasks
- competency development plans of the organisation and staff
- planning, development and execution of appropriate training and development programs
- how the AEO will utilise the skills and competencies to meet its objectives
- development of suitable succession plans
- planning for future changes to the organisation or environment

6.1 Competence management system

The mandatory requirements for a competence management system are:

"Authorised Engineering Organisations shall implement a system for managing engineering staff competence that comprises a coherent arrangement of organisation roles, plans, processes, tools, and records, and that manages relative levels of skills, experience, and behaviours"

An AEO’s approach to managing staff competence should include a system that encompasses all of these functions and provides sufficient assessment of a variety of skill types, rather than focusing on practical and technical skills alone, commensurate with the size and complexity of the engineering organisation.

A competence management system typically includes:

- identifying tasks where competent execution of the task is required to manage safety effectively
- identifying and documenting competence requirements for the tasks to be carried out, considering health, safety and environmental awareness
- recruiting employees, including assessing candidates’ qualifications, experience and skills
- training employees including:
  - establishing training and development requirements
  - selecting training providers
  - providing initial and ongoing training and mentoring
• assessing and developing competences, including:
  • ongoing coaching and appraisals, both safety critical appraisals and non safety critical performance assessments
  • verifying the competences of those carrying out competence assessments
  • checking the necessary competences are obtained before tasks are undertaken, including checking the competence of their suppliers’ employees
  • maintaining training and competence records

The rationale for any changes to an AEO's competence management system should be recorded in the competence management system records.

Related topics: Section 7 Competence management system

### 6.2 Defined skill types

The mandatory requirements for defining skill types and proficiency levels are:

"An Authorised Engineering Organisation shall define the skills and proficiency levels that are relevant to the tasks and activities employed in the provision of engineering services to TfNSW"

These skills are not limited to technical skills and can include soft skills. The proficiency of AEO staff needs to be managed to ensure the appropriate level of proficiency in a skill is matched to the activity and associated responsibility level.

Competence generally consists of three elements or skill types:

- technical skills
- non-technical skills
- functional skills

Technical skills include workplace-specific practical skills (for example, track design), supported by the relevant knowledge associated with the skills, and governed by established industry standards and work procedures.

Non-technical skills are less prescriptive and more subjective skills that support the application of core technical skills in carrying out work-specific activities under a range of situations from planned to unplanned (novel). Examples of non-technical skills include presentation, problem-solving, communication and negotiation, and facilitation skills.

Functional skills include literacy, numeracy, and information and communications technology.

Related topic: Section 6.3 Proficiency levels
6.3 Proficiency levels

Proficiency relates the level of knowledge, skill and behaviours associated with a particular task or activity, to the level of responsibility and accountability (supervised, practitioner or expert) associated with the position or role performed.

Different professionals will have different proficiency levels in a job function. Some organisations may define many proficiency levels. Three levels of proficiency are suggested:

- supervised practitioner
- practitioner
- expert

6.3.1 Supervised practitioner

A supervised practitioner has sufficient knowledge and basic understanding of best practice, within the organisation or within the relevant industry, to be able to work on the tasks associated with the overall function without placing an excessive burden on the practitioner or expert that may compromise safety. A practitioner or expert checks a supervised practitioner’s work.

Supervised practitioners may not have previous experience of working on a complex project. Their competencies may have been developed through targeted training and work on non-related projects. An assessor may need to extrapolate from evidence of technical skills derived from another project environment to determine competence and the level of supervision.

6.3.2 Practitioner

A practitioner has sufficient knowledge and detailed understanding of best practice, and sufficient demonstrated experience, to be able to work on the tasks associated with the overall function with little or no supervision. A practitioner will maintain their knowledge and be aware of all current developments in their field of work. The practitioner may be required to perform detailed checks on the work carried out by a supervised practitioner.

6.3.3 Expert

An expert will have an authoritative understanding of why things are done in certain ways, and sufficient demonstrated managerial skills, to be able to undertake overall responsibility for the performance of a function. An expert will be familiar with the ways in which systems, and previous systems or projects, have failed in the past.

An expert will keep abreast of technologies, architectures, application solutions, standards, and regulatory requirements, particularly in evolving fields. An expert will have sufficient breadth of experience, knowledge and deep understanding to be able to work in novel complex situations.

An expert is able to deal with multiple problems under pressure without compromising safety.
6.4 Safety culture

Competence management with effective communication provides a means to embed individual and group values, behaviours, knowledge and skills in the safety culture of the AEO.

6.5 Business strategy

Competence management should align with the AEOs current and future goals and strategy, to ensure that engineering staff have the appropriate competencies to support this strategy while ensuring that associated risk (including safety) is controlled.

6.6 Performance

Competence management should align with planning, evaluating and allocating engineering staff to tasks at the appropriate level of proficiency, to ensure that they remain challenged while maintaining the associated risk within acceptable levels.

6.7 Recognition of prior learning

The mandatory requirements for recognising external qualifications are:

"An Authorised Engineering Organisation shall consider relevant external qualification standards to benchmark the skills to be assessed"

The Australian Qualifications Framework (AQF) or Engineers Australia competence criteria are acceptable benchmarking standards for recognising engineering qualifications.

A list of potential frameworks or agencies is provided in Appendix B. Any organisations not identified on this list are not precluded, but an AEO should indicate why they are relevant.

The AEO may recognise prior engineering learning and experience as a basis for competence development and assessment, leading to an authority to perform an engineering service.

6.8 Risk-based training needs analysis

AEOs should apply risk-based training needs analysis to support initial and ongoing competence development and assessment decisions.

6.9 Continuing professional development

The mandatory requirements for continuing professional development (CPD) are:

"An Authorised Engineering Organisation shall provide for the planning, implementation, recording, assessment and recognition of relevant continuing professional development activities to enhance the knowledge and skills of staff and the organisation as a whole"

The generally accepted understanding of CPD is the "70/20/10 model". This is a learning and development model developed by Lombardo and Eichinger for the Centre for Creative Leadership that requires the following blend of different learning and development approaches:
• about 70% from on-the-job experiences, tasks, and problem solving
• about 20% from feedback and from working around good or bad examples of the need
• about 10% from courses and reading (that is, ‘formal’ classroom training)

7. **Competence management system**

The AEO may choose to establish and maintain a competence management system as the basis for the competence management arrangements.

A competence management system typically consists of the following elements:

• establishing a competence management process
• defining competence requirements
• identifying activities and assessing risks associated with roles
• selecting applicable standards
• developing competence statements
• establishing learning and development
• establishing an assessor organisation
• establishing competence requirements for candidates

7.1 **Establishing a competence management process**

The AEO should establish and operate an engineering competence management process that supports the competence management system and achievement of key performance indicators (KPIs).

Competence management can be represented typically as a cyclical process in Figure 1.
The AEO may choose to define a different competence management process that achieves similar outcomes to the guidance presented in this document.

7.2 Defining competence requirements

The mandatory requirement for defining competence requirements is:

"An Authorised Engineering Organisation shall maintain evidence that relevant industry competence requirements have been analysed and interpreted for the appropriate engineering services offered"

The level and depth of the requirements may depend on industry requirements or those required by standards.

An AEO’s competence management processes must, as a minimum, satisfy quality and safety requirements.

The mandatory requirement for setting competence requirements for posts with 'key roles' is:

"An Authorised Engineering Organisation shall set minimum acceptable competence requirements for posts carrying out 'key roles' identified in the organisation"

The AEO competence manager may tailor the requirements to meet project or industry needs in consultation with relevant stakeholders, including aligning to activities on particular projects.

7.3 Identifying activities and assessing risks

The mandatory requirement for identifying engineering activities and associated risks is:
"An Authorised Engineering Organisation shall identify and assess its engineering work activities and associated risks to determine those that have the potential to affect safe railway operations, or that may affect occupational health and safety of staff, passengers or the general public."

These are the activities where the competence of people to control the risks is essential.

### 7.4 Selecting competence standards

The AEO should select relevant competence standards to ensure that risks associated with the provision of the engineering service are controlled.

### 7.5 Developing competence statements

The AEO should establish and maintain competence statements for the job functions related to engineering services offered.

A role description can be broken down into functions that a person must carry out. Each function will require that the person have some ability or skill to carry out the function. These abilities form the basis of a competence statement, as illustrated in Figure 2.

![Figure 2 Development of competence statements](image)

Competence statements should be written in a form of objective criteria that can be fulfilled with objective evidence. The inherent ability of the candidate to directly map the required ability to the assigned role in an objective manner is difficult.

For a technical skill such as welding or cable jointing, this should be simpler to determine than for an ability to understand complex concepts. A safety assurance example is described below:

- Role description: Safety assurance
- Job function: hazard management
- Required ability: perform hazard analysis
- Competence statement (fault tree analysis)
  - technical derivation of fault trees
  - understand the reason and outcome for fault tree analysis
  - understand the context of fault tree analysis within the wider safety program

- Objective evidence
  - completing a course in fault tree analysis
  - successful issue of previous analyses in related areas

In stating whether a candidate meets the competence requirements for the assigned role, the assessor (see section 8.2) relies on a well-written job or role description, the functions of the role and the abilities required for each function.

The functions should state whether a candidate must complete the hazard analysis supervised or unsupervised. A practitioner could fulfil both the supervised and unsupervised function, but supervised practitioners would only fulfil a supervised function. The assessor may seek clarification regarding the true meaning or requirements for the role, function or ability.

Generation of competence statements depends on well-written role descriptions, job functions and abilities to fulfill that function. Competence statements should be written as objective criteria. The assessor should seek additional clarification or set training requirements for the candidate.

The inability of the candidate to meet the proficiency level may not mean the candidate cannot accept the role assigned, just that additional supervision may be required.

### 7.6 Establishing learning and development

The mandatory requirement for establishing training, development and assessment is:

> "An Authorised Engineering Organisation shall establish training and development needs and competence assessment requirements for staff that will deliver the engineering services"

AEOs may choose to merge specific engineering learning and development requirements into an existing general learning and development system, or to manage it separately.

Related topic: Section 11 Competence assessment

### 7.7 Assigning competence assessors

Once the role descriptions and associated competence statements have been defined, the AEO should determine requirements for competence assessors. Each role or function to be assessed should be assigned an assessor who is competent to perform the assessment.

For example, an assessment of a signalling design engineer requires the competence assessor to demonstrate sufficient knowledge and experience in signalling to perform a valid assessment.
7.8 **Competence requirements for candidates**

From the role or function description the assessor will produce competence statements that a successful candidate must possess to perform the assigned role or function. These should be recorded on a competence assessment form or equivalent record (see Appendix A).

**Related topics:**
Appendix A
Section 7.5 Developing competence statements

8. **Roles and responsibilities**

The mandatory requirement for establishing training, development and assessment is:

> "An Authorised Engineering Organisation shall define engineering competence management roles and responsibilities"

The main roles involved in competence management include the following:

- manager of the competence management system
- competence assessor
- candidate under assessment
- subcontractor under assessment (where applicable)
- line managers and human resources
- mentors and coaches

8.1 **Competence manager**

The mandatory requirement for assigning a competence manager is:

> "An Authorised Engineering Organisation shall assign ownership and responsibility of engineering competence management to a suitably experienced individual"

A 'competence manager' is not a defined post or role description, and may be a job function that can be assigned to a person fulfilling another job or role description. It could be one of multiple job functions performed by a suitable person within the organisation. In this guide the 'competence manager' is defined as the person assigned the function of managing engineering competence.

For authorisation purposes, the ASA does not need to assess the person to whom this role has been assigned; just that a system is in place to assign the role, and that it has been done.
The competence manager should typically be responsible for the following activities:

- advise on a breakdown of the organisation into individual roles, functions and abilities
- maintain the competence management system, its associated records and any changes to competence management processes
- manage and record deviations from the competence management process
- set guidelines and requirements for assessment of the assessor and the candidate
- appoint assessors that have been assessed as competent (internal or external)
- authorise the results of the assessment of a candidate

Related topics:

Section 9.1 Assigning a competence manager

8.2 Competence assessor

The competence assessor (referred to in this guide as the “assessor”) should be nominated by the competence manager to carry out competence assessments. In smaller organisations the competence manager and assessor roles may be performed by the same person.

The mandatory requirement for the competence assessor responsibilities is:

"Assessors shall have relevant engineering subject matter expertise, qualifications and assessment experience in the area being assessed"

The assessor may be an internal staff member, or appointed from an external organisation that specialises in providing competence assessment services.

The competence assessor should be responsible for the following:

- assess engineering staff against defined competencies
- follow assessment guidelines and requirements
- record details of all assessments they conduct
- advise on training requirements for a candidate being assessed

An assessor should be able to inform the competence manager or human resources of training or development requirements placed on a candidate.

Related topics:

Section 9.2 Assigning assessors

Section 11 Competence assessment
8.3 Candidate under assessment

The candidate under assessment is the engineering staff member (including those responsible for system safety), who is being assessed for competence in a defined job role or function.

Individual candidates are responsible for ensuring that their personal competence records, including CPD records such as career log books and certificates, are up to date.

8.4 Subcontractor under assessment

Subcontractors (including sub-consultants) should typically be responsible for the following:

- fulfil a defined engineering role or function for an AEO performing work for TfNSW
- have competence assessment arrangements for safety related rail engineering services
- operate under the AEO competence management system if not an AEO themselves

The AEO and subcontractor may agree to expand competence to cover all aspects of their work. In such cases the contract may be formulated to require that the subcontractor operates under the AEO’s competence management system.

The AEO may need to take responsibility for competence of certain sub-contractors who are not AEOs. This would be a contractual requirement with TfNSW to manage the supply chain.

8.5 Line managers and human resources

Line managers and human resources should typically be responsible for the following activities:

- agree on role and function descriptions
- consult with the competence manager when preparing role or job descriptions
- inform the competence manager of any changes in staff or role or job descriptions

9. Resource planning and management

9.1 Assigning a competence manager

The AEO functional manager is the person identified and assigned responsibility as the AEO single point of contact with the ASA for the purpose of authorisation. This manager should ensure that the AEO competence management framework is owned, resourced and maintained.

The person assigned should understand the engineering functional requirements of the organisation, and may hold the learning and development role within human resources.

9.2 Assigning assessors

Once the requirements for the assessors have been defined, the competence manager may assign an assessor, who should meet these requirements to be able to assess competencies.
For engineers, an assessor should have a degree recognised under the Washington Accord and have (eligibility for) Chartered Engineer status with the Institution of Engineers Australia or an equivalent internationally recognised professional body. For technicians this would be at least the same level qualification or skill set and appropriate trainer and assessor qualification level recognised by the Australian Qualifications Framework (AQF).

The assessor of a team should not be the team leader of that team. It could be the line manager of the team leader, or an independent assessor. Under normal circumstances the team leader would act as the proxy for the team during the assessment.

For the assessment of a team candidate, it is possible that a single assessor may not hold the relevant skills or knowledge to assess the team as a whole; it may be necessary to assign several assessors with a lead assessor.

The competence manager should ensure that the assessor understands the job description and the competence placed on that role.

The assignment of the assessors should be recorded in the competence records.

The AEO may elect to outsource assessment and training to specialist external organisations; however their records should still be maintained within the competence management system.

9.3 Selecting and recruiting staff

The recruitment process should be based on roles, functions, and competence areas defined in the competence matrix, when selecting candidates for short listing, interviewing and recruitment.

Staff should be selected and recruited using relevant competence standards.

10. Learning and development

Learning and development is a key element of competence management and responds to the requirements of defined job roles within an organisation, in terms of developing the knowledge and skills of engineering staff to meet these specific job requirements.

An AEO should also ensure that assessors are also subject to learning and development.

Learning and development arrangements should typically include the following:

- maintaining managers and assessor competencies
- training, developing and assessing staff
- controlling learning and development activities
- training procedures

10.1 Maintaining manager competencies

The mandatory requirement for maintaining the competence of managers and assessors is:
"An Authorised Engineering Organisation shall maintain the competence of those managers and assessors operating the competence management system, and ensure that the managers and assessors understand their responsibilities"

This should form part of their continuing professional development, possibly as a dimension of their performance management.

10.2 Training, developing, and assessing staff

The mandatory requirement for training, developing and assessing staff is:

"An Authorised Engineering Organisation shall have arrangements in place to train, develop, and assess the competence of existing staff and new recruits using established methods and competence standards"

Training, development and assessment arrangements could either be managed within the AEO, or could be sub-contracted to an external training and assessment provider.

10.3 Controlling learning and development activities

The AEO should establish control processes to ensure that staff and sub-contractors have been assessed and certified as competent prior to their selection for the undertaking of work.

10.4 Training process

AEOs should carry out the following training activities associated with role requirements, to enable staff to carry out defined roles with required competencies:

- identifying the training required
- agreeing the training requirements
- completion of the training
- updating the competence records

10.4.1 Identifying training required

The assessor should identify the competence requirements for a role, and match and record any training that may be required in order for the candidate to meet these requirements.

The assessor should enter training requirements into a competence record for the candidate.

If the candidate can accept the role, then the competence record should clearly state the proficiency levels before and after training.

The ASA may provide advice on rail engineering competence requirements, based on issued standards, guidance notes and codes of practice.

In determining the need for training for a role, the assessor should document when the training must be completed, and any temporary measures which may be acceptable to mitigate risks.
10.4.2 **Agreeing training requirements**

The assessor should agree training and mitigating actions with the candidate's line manager.

10.4.3 **Completion of training**

Once training has been completed the competence record for the candidate should be updated. The assessor should decide whether completion of the training requires a reassessment, or if the candidate is deemed competent to carry out the assigned role. The latter case implies that the competence record for the candidate only needs to be updated.

10.4.4 **Updating competence records**

After the assessment review the assessor should update the competence record to recommend any further training, and whether training was completed successfully or not.

The assessor should state whether the candidate should accept, or not accept, the role.

The assessor should recommend a date for the reassessment of the candidate.

The assessor passes this competence record to the competence manager for endorsement.

The assessor should ensure that the candidate and the candidate's line manager sign the competence record to acknowledge that they are aware of the contents.

Related topics:

- Section 11.1 Reviewing competence records
- Section 12 Competence records

11. **Competence assessment**

AEO procedures to measure, record and assess competence should include the following tasks:

- reviewing candidate competence records
- recommending assessment
- agreeing an assessment date
- carrying out the assessment
- reviewing assessment results
- developing a learning and development plan for identified gaps

11.1 **Reviewing competence records**

The assessor should review the competence record of the candidate prior to the assessment.
The mandatory requirement for reviewing competence records is:

"An Authorised Engineering Organisation shall maintain evidence of reviews of engineering staff competence records for audit purposes"

It may be possible to review the evidence available to make a recommendation about the competence of a candidate to fulfil a role without assessment or reassessment. This is possible if the role is minor or has fully objective competence statements.

Related topic:
Section 12 Competence records

11.2 Recommending assessment

When reviewing the candidate’s competence record, the assessor should make a recommendation to the competence manager as to whether an assessment or reassessment is required.

The decision reached should be recorded in the competence record of the candidate.

11.3 Agreeing an assessment date

If an assessment of a candidate is required, the assessor should set a date for the assessment with the agreement of the candidate and the candidate’s line manager.

The assessor should ensure that the competence record is copied to the candidate prior to the agreed assessment date to allow the candidate sufficient time to gather appropriate evidence.

11.4 Carrying out the assessment

This section suggests a possible approach to carrying out a competence assessment, and it is recognised that AEOs may have different approaches depending on the services offered.

At the start of the assessment the assessor informs the candidate of the purpose of the assessment, the general conduct and the possible outputs and actions.

Before evidence is tabled the assessor explains the completed competence record, including the fields within the record relating to the role, the context of the role, and the competence statements and their meaning.

The assessor explains the meaning of ‘competence’ to the candidate and ensures that lack of a competence is seen in context of the job function and not as a personal failure.

The assessor may then discuss each of the competence statements on the form. The candidate will table evidence collected against each statement.

If the assessment is only due to a training requirement completed from a previous assessment, then there is no need for the candidate to re-table all previous evidence. The evidence from the successful completion of training is all that is required.
At this stage the assessor should not assign a proficiency level to each competence statement, as this is best carried out when reviewing results after the assessment has been completed.

11.5 Reviewing assessment results

After the assessment has been completed, the assessor should review the evidence presented. Evidence presented will not always be fully objective and there will be a subjective element in the assessor judgement. Advice should be sought from the competence manager on the applicability of the evidence.

Often, documentary evidence may not be available, and in such cases the assessor may have to use other methods for determining evidence such as:

- observation in the work place
- results of relevant work completed in the past
- testimonials from the candidates line manager

Judgement of whether a candidate is competent to fulfil the role assigned may need considered discussion with the competence manager.

At this stage the assessor assigns a proficiency level to each competence statement. When this has been completed the assessor provides an assessment of the candidate's ability to perform the assigned role.

Related topic:

Appendix A
11.6 Developing plans for filling gaps

Proficiency levels assigned to competence statements define the level of supervision placed on the candidate and the requirements for training, and all should be documented.

12. Competence records

The mandatory requirement for competence records is:

"An Authorised Engineering Organisation shall maintain competence management records that contain appropriate and timely information about all competence aspects of a candidate"

Competence records typically comprise the following:

- competence assessment form
- competence management schedule
- engineering CPD records such as career log book
- competence matrix

12.1 Competence assessment form

A competence assessment form should record the staff member's details, including role title, description, and responsibilities within the organisation, as well as functions and competencies and competence levels. It should record evidence supporting each competence statement, and summarise the assessment outcome, including an action plan and training requirements. It is typically signed off by the candidate, assessor, line manager and competence manager.

Related topics:
Appendix A
Section 7.5 Developing competence statements

12.2 Competence management schedule

The competence management schedule is essentially a calendar of all planned competence assessments and competence development and training activities in a structured manner. This may be a standalone schedule or may be integrated into a broader organisation-wide calendar or schedule that includes audits and reviews of various management systems such as quality, safety, environment, and engineering reviews.
12.3 Engineering CPD records

This career logbook is a recommended means for an individual to maintain a record of all elements of competence and continuing professional development (CPD). An example of a career log book is EPA 240 FM01 Engineering Design Career Log Book, which records the following:

- education development
- employment history
- professional memberships
- licences held
- work experience
- register of supervisors (verifiers of experience)
- professional development plan
- training record
- register of attachments

Individual organisations may have similar means for recording engineering staff career details.

On the job training logbooks can be used for AQF qualifications.

12.4 Competence register and skills matrix

The mandatory requirement for a competence register is:

"An Authorised Engineering Organisation shall establish and maintain a register of all engineering staff and their competences"

Organisations may wish to record summary details of the competencies and competence levels of their engineering staff in a competence (or skills) matrix. This could range from a simple spreadsheet to an online database with links to supporting records and evidence.

12.4.1 Defining roles and responsibilities

Prior to commencing the assessment of candidates, job roles and responsibilities should be defined in the competence matrix.

Each role description should be separated into descriptions of role functions and then the abilities to fulfil each defined function.

The competence manager would provide advice and assistance to a project producing a breakdown of role, function and ability within the job descriptions. This includes identifying skills, knowledge and experience for each role.

Related topics: Section 7.5 Developing competence statements
12.4.2 Assigning roles or functions to candidates

The mandatory requirement for assigning roles or functions is:

"An Authorised Engineering Organisation shall provide a job description containing roles, function, and abilities prior to commencing assessment of a candidate"

Assigning roles or functions to candidates aims to match competent individuals with the relevant project or service. The roles and functions should be agreed with procurement (sub-contractors) and recruitment (own staff) functions.

Table 1 provides an example of a competence matrix for civil engineering; showing competence statements and proficiency levels.

Table 1 - Competence matrix simple example - Civil engineering

<table>
<thead>
<tr>
<th>Code</th>
<th>Element</th>
<th>Competence statement</th>
<th>Staff proficiency level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>RF</td>
</tr>
</tbody>
</table>
| CE0101 | Track system | • rails, joints and welds  
• sleepers  
• rail fastening systems  
• switches and crossings  
• track geometry  
• top ballast  
• gauging and clearances  
• bottom ballast  
• formation and drainage | 2 | 2 | 1 | 1 | 3 |
| CE0102 | Track support structures and earthworks | • embankments  
• metallic under bridges  
• masonry under bridges  
• loadings | 2 | 2 | 2 | 1 | 3 |
| CE0103 | Trackside structures and over bridges | • tunnels  
• retaining walls  
• cuttings  
• foot, road and other over bridges  
• masts and gantries  
• structure gauge and clearances  
• level crossings | 3 | 1 | 3 | 3 | 2 |
| CE0104 | Stations | • structure gauge and clearances  
• platform height and offset  
• platform dimensions  
• DDA/BCA compliance  
• fire safety at underground and major stations | 1 | 3 | 2 | 2 | 2 |
12.5 Validity period of competence records

The mandatory requirement for competence assessment timescales is:

"An Authorised Engineering Organisation shall establish timescales for periodic re-assessment of staff competence"

A competence assessment may have a 'sunset' clause, which will depend on the risk level, type of engineering service, and discipline involved. Where this does not exist, organisations should stipulate their own validity period.

Re-assessment of competence may be scheduled to occur at any time and frequency within the validity period, and may be triggered by:

- Individual staff performance which brings into question their ability to carry out their work
- Attainment of qualifications or expiry of licenses which change the competence levels

The mandatory requirement for maintaining competence assessment records is:

"An Authorised Engineering Organisation shall keep all engineering staff competence records in a secure location for the duration of the validity period"

This may be a dedicated repository, or may be integrated into a human resources database.
Appendix A Competence assessment form (example)

<table>
<thead>
<tr>
<th>Role title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role description and responsibilities</td>
</tr>
<tr>
<td>Context of role within organisation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Competencies required (competence statements)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Competence statement No.</th>
<th>Specific evidence</th>
<th>Proficiency level achieved (delete as appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td>Expert Practitioner Supervised Practitioner</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Expert Practitioner Supervised Practitioner</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>Expert Practitioner Supervised Practitioner</td>
</tr>
</tbody>
</table>

Assessment summary

Action plan and training requirements

Date of next assessment

<table>
<thead>
<tr>
<th>Candidate name</th>
<th>Role title</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Assessor name | Signature | Date |
|---------------|-----------|------|

Line manager name | Signature | Date |
|------------------|-----------|------|

CMS manager name | Signature | Date |
|-----------------|-----------|------|

Figure 3 Example of a competence assessment form
Appendix B Engineering frameworks and agencies

The following is a list of possible engineering frameworks and agencies that form part of recognised external qualifications and certifications:

- Australian Qualifications Framework (AQF)
- Engineers Australia
- Washington Accord (international recognition of engineering degrees)
- International Council on Systems Engineering (INCOSE)
- Systems Engineering Society of Australia (SES)
- Institution of Engineering and Technology (IET) – British based
- Institution of Railway Signal Engineers (IRSE)
- Institution of Civil Engineers (ICE)
- Permanent Way Institution
- Australian Geomechanics Society
- Institution of Surveyors
- Australian Institute of Architects

Agencies, frameworks, organisations and societies not included on this list are not necessarily precluded from consideration, but the AEO should indicate why they are relevant to the nature of engineering services offered.