22616VIC

Diploma of Railway Signalling Systems

Version 1.1 - September 2023

This course has been accredited under Part 4.4 of the *Education and Training Reform Act 2006.*

Accredited for the period: 1 July 2023 to 30 June 2028

VICTORIA State Government | Jobs, Skills, Industry and Regions

Version History:		Date
Version 1.1	Department of Education and Training (DET) details and contact information updated with Department of Jobs, Skills Industries and Regions (DJSIR) details in Section A	September 2023

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Section A – Copyright and course classification information

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2. Address	Deputy CEO Victorian Skills Authority Department of Jobs, Skills, Industries and Regions (DJSIR) GPO Box 4509 MELBOURNE VIC 3001 **Organisational contact** Manager, Training and Learning Products Unit Engagement Branch Victorian Skills Authority Department of Jobs, Skills, Industries and Regions (DJSIR) Email: course.enquiry@djsir.vic.gov.au **Day-to-day contact:** Curriculum Maintenance Manager (CMM) Engineering Industries Box Hill Institute Private Bag 2014, Box Hill, Victoria 3128 Email*:* cmmei@boxhill.edu.au
3. Type of submission	This submission is for re-accreditation of: 22458VIC - Diploma of Railway signalling Systems

4. Copyright acknowledgement	The following units of competency: BSBCMM511 – Communicate with influence BSBTWK502 - Manage team effectiveness BSBWRT411 – Write complex documents have been imported from the **BSB – Business Services Training Package** administered by the Commonwealth of Australia. © Commonwealth of Australia The following unit of competency: MSS408007 - Develop problem solving capability of an organisation has been imported from the **MSS - Sustainability Training Package** administered by the Commonwealth of Australia. © Commonwealth of Australia The following unit of competency: TLIE4032 – Use internal communication systems for rail industry regulatory compliance has been imported from the **TLI – Transport and Logistics Training Package** administered by the Commonwealth of Australia. © Commonwealth of Australia The following unit of competency: VU23217 - Recognise the need for cyber security in an organisation has been imported from **22603VIC - Certificate IV in Cyber Security** Copyright of this material is reserved to the Crown in the right of the State of Victoria. © State of Victoria (Department of Jobs, Skills, Industry and Regions) 2023 This work is licensed under a Creative Commons Attribution-No Derivatives 4.0 International licence (see *Creative Commons* for more information).
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	Department of Jobs, Skills, Industries and Regions (DJSIR) Email: course.enquiry@djsir.vic.gov.au Copies of this publication can be downloaded free of charge from the Victorian government website.
6. Course accrediting body	Victorian Registration and Qualifications Authority
7. AVETMISS information	**ANZSCO code** *Australian and New Zealand Standard Classification of Occupations* 233311 Railway Signalling Engineer **ASCED Code** *Field of Education* 0399 Other Engineering and Related Technologies **National course code** 22616VIC
8. Period of accreditation	1 July 2023 to 30 June 2028

Section B – Course information

1. Nomenclature	Standard 4.1 and 5.8 AQTF 2021 Standards for Accredited Courses
1.1 Name of the qualification	Diploma of Railway Signalling Systems
1.2 Nominal duration of the course	540 – 600 hours
2. Vocational or educational outcomes	**Standard 5.1 AQTF 2021 Standards for Accredited Courses**
2.1 Outcome(s) of the course	The vocational outcomes of the course are technical knowledge and skills in the areas of: • Signalling systems/network infrastructure – current and future • Infrastructure and equipment components of a signalling network • Railway signalling systems rules and operating procedures including codes of practice and legislative environment • Roles and responsibility of the various disciplines in railway signalling operations and their interface • Railway safety - Office of the National Rail Safety Regulator Guidelines/Transport Safety Victoria • Signalling systems maintenance - planning and implementing a technical maintenance program • Testing, assessing and commissioning of signalling equipment/systems • Investigating as part of team rail signaling incidents.
2.2 Course description	The Diploma of Railway Signalling Systems provides a pathway for railway signalling technicians to upgrade to railway signalling technical officers, signalling managers and signalling supervisors. Course participants will gain the skills and knowledge to enable them as part of a team, to plan and implement railway signalling systems, coordinate fault diagnosis and rectification of systems, manage the implementation of maintenance plans and contribute to signalling incident investigations.
3. Development of the course	**Standards 4.1, 5.1, 5.2, 5.3 and 5.4 AQTF 2021 Standards for Accredited Courses**
3.1 Industry, education, legislative, enterprise or community needs	The Victorian government has undertake a comprehensive rail industry skills program to train Victorians to deliver an unprecedented amount of work on the metropolitan and regional rail networks over the past four years and into the future. This includes the removal of 50 level

crossings across Melbourne, extending the metropolitan and rural rail networks and the Melbourne Metro Tunnel Project.

This course responds to a Victorian Government priority in building the competencies of the railway industry by enhancing the employability of participants through the provision of a career pathway

The Executive Officer of the Curriculum Maintenance Manager for Engineering Industries has received letters of support from the Level Crossing Removal Project (LXRP) and the two rail network operators' Metro Trains Melbourne (MTM) and V/Line confirmed there is an ongoing need for the course. The Diploma of Railway Signalling Systems provides a pathway for railway signalling technician into various management roles such as testers in charge, maintenance managers, in the signalling systems sector of the industry.

The Department of Education and Training (DET) supports the ongoing available of the Diploma of Railway Signalling Systems and has provided funding for the course review for reaccreditation.

Currently, there is no AQF Level 5 training package qualification or other accredited course which focuses specifically on railway signalling systems and networks.

V/Line Corporation training academy is the only registered provider of the course and although no enrolments appear on either the DET or NCVER data bases, V/Line has advised there are currently 16 V/Line staff enrolled. It is expected the first group of 8 will complete their training by December 2022 and the second group by the end of June 2023. LXRP has confirmed there are two new student intakes planned for February and June 2023 consisting of both V/Line and MTM staff.

The review of 22458VIC - Diploma of Railway Signalling Systems has been overseen by a Course Steering Committee (CSC) made up of the following personnel:

Name:	**Organisation:**
Mark McKay Chairperson Industry representative	Competency Specialist – Signals and Communications, V/Line
Paul Thorman Industry representative	Training Manager, Signals Maintenance, Metro Trains
Scott Gould Industry representative	Signals Maintenance Manager South/East, Metro Trains
Angela Brown Industry representative	Manager, Industry Capability and Development, Level Crossing Removal Project (LXRP)

Nate James Industry representative	Quality Assurance Specialist, V/Line
John Islip Union representative	Organiser – Electrical Trades Union (ETU)

In Attendance:

Steve Bryant Project manager	Supervising Executive Officer, CMM - Engineering Industries
Trevor Lange Curriculum writer	Senior Project Officer, CMM - Engineering Industries
Eva Tsurlis Meeting minutes	Industry Capability Officer, Level Crossing Removal Project (LXRP)

This course:

- does not duplicate, by title or coverage, the outcomes of an endorsed training package qualification
- is not a subset of a single training package qualification that could be recognised through one or more statements of attainment or a skill set
- does not include units of competency additional to those in a training package qualification that could be recognised through statements of attainment in addition to the qualification
- does not comprise units that duplicate units of competency of a training package qualification.

3.2 Review for re-accreditation

Each enterprise (VU) unit has been reviewed by subject matter experts (SMEs) on the Course Steering Committee to ensure their currency. To address the introduction of computer based train control (CBTC) into the Victorian rail system, it was agreed an overview of this high capacity signalling system be added into unit VU23409 - *Evaluate signalling equipment and integrated systems*.

Elective MEM units (MEM16010A and MEM16011A) have been replaced with BSB units with similar vocational outcomes. The current version of the two MEM units now have pre-requisite units which are not required to meet the vocational outcomes of this course. Unit VU21990 has been replaced with the current version (VU23217) with the same title and content. The remaining two imported units (TLIE4032 and MSS408007) are current at the time of the review.

The course structure was examined by the steering committee with the view of increasing flexibility in unit choice. However, it was confirmed all current core units are consider essential and selection of one elective

unit continues to meet the required skills and knowledge outcomes of the course.

The course entry requirements have been amended by removing the course code for the Certificate IV in Electrical – Rail Signalling and replacing it with “current or superseded version” and “with relevant work experience” has been added.

The course 22616VIC Diploma of Railway Signalling Systems supersedes and is deemed equivalent to 22458VIC Diploma of railway Signalling Systems.

Transition Table:

22616VIC Diploma of Railway Signalling Systems	**22458VIC Diploma of Railway Signalling Systems**	**Relationship**
VU23402 Contribute to the safe operations of railway signalling systems and network	VU22293 Contribute to the safe operations of railway signalling systems and network	Equivalent
VU23403 Apply communication network concepts and practices to railway signalling systems	VU22294 Apply communication network concepts and practices to railway signalling systems	Equivalent
VU23404 Carry out testing and commissioning of signalling equipment and integrated systems	VU22295 Test and commission signalling equipment and integrated systems	Equivalent
VU23405 Participate in the investigation of a railway signalling incident	VU22296 Participate in the investigation of a railway signalling incident	Equivalent
VU23408 Manage the implementation of a railway signalling systems technical maintenance program	VU22297 Develop and implement a railway signalling systems technical maintenance program	Equivalent
VU23406 Coordinate fault diagnosis and rectification in integrated signalling systems	VU22298 Coordinate fault diagnosis and rectification in integrated signalling systems	Equivalent
VU23407 Undertake a railway signalling systems project	VU22299 Undertake a railway signalling systems project	Equivalent
VU23409 Evaluate signalling equipment and integrated systems	VU22300 Evaluate signalling equipment and integrated systems	Not equivalent

		(Additional element added)
VU23217 Recognise the need for cyber security in an organisation	VU21990 Recognise the need for cyber security in an organisation	Equivalent
TLIE4032 Use internal communication systems for rail industry regulatory compliance	TLIE4032 Use internal communication systems for rail industry regulatory compliance	No change
MSS408007 Develop problem solving capability of an organisation	MSS408007 Develop problem solving capability of an organisation	No change
	MEM16011A Communicate with individuals and small groups	Deleted
BSBCMM511 Communicate with influence		Newly imported unit
BSBTWK502 Manage team effective	BSBWOR502 Lead and manage team effective	Equivalent
	MEM16010A Write reports	Deleted
BSBWRT411 Write complex documents		Newly imported unit

4. Course outcomes	Standards 5.5, 5.6 and 5.7 AQTF 2021 Standards for Accredited Courses
4.1 Qualification level	The course outcomes of the Diploma of Railway Signalling Systems are consistent with the characteristics and outcomes of the Australian Qualifications Framework Level 5 (Diploma) qualification. It is expected that graduates at this level will have: **Knowledge:** • technical and theoretical knowledge and concepts, with depth in key areas of railway signalling technology **Skills:** • Cognitive and communication skills to identify, analyse, synthesise and act on information from a range of sources • Cognitive, technical and communication skills to analyse, plan, implement and evaluate approaches to unpredictable problems

	in the field of railway signalling system and network technologies • Specialist technical and creative skills to express ideas and perspectives on railway signalling systems issues • Communication skills to transfer knowledge and specialist skills to others and demonstrate understanding of railway signalling technology **Application of knowledge and skills:** The ability to apply knowledge and skills in rail signaling technology: • with depth in some areas of railway signalling equipment and related technologies, in known and changing contexts • to transfer and apply theoretical concepts and/or technical and/or creative skills in a range of situations such the integration of network equipment and other related technologies • with personal responsibility and autonomy in performing complex railway signaling systems technical operations with responsibility for own outputs • with initiative and judgment to organise the work of self and others when preparing for and managing a railway signaling system maintenance program The Volume of Learning for the Diploma of Railway Signalling Systems is consistent with the Australian Qualifications Framework Level 5 which is typically 1 - 2 years. This includes structured training delivery and assessment and non-structured learning activities undertaken by the learner. Non-structured learning activities may include independent study, research and work experience.
4.2 Foundation skills	Foundation Skills summary applicable to the outcomes of the course are located in Appendix 1. Foundation skills relevant to the units are identified in each unit.
4.3 Recognition given to the course (if applicable)	Not applicable
4.4 Licensing/regulatory requirements (if applicable)	Not applicable

5. Course rules	Standards 5.8 and 5.9 AQTF 2021 Standards for Accredited Courses
5.1 Course structure	To achieve the qualification *22616VIC Diploma of Railway Signalling Systems* the learner must successfully complete a total of 8 units comprising: • 7 core units • 1 elective units from the list below Where the full qualification is not completed, a VET Statement of Attainment will be issued for each unit successfully completed.

Unit of competency code	Unit of competency title	Field of Education code (six-digit)	Pre-requisite	Nominal hours
Core units:				
VU23402	Contribute to the safe operations of railway signalling systems and network	039907	None	60
VU23403	Apply communication network concepts and practices to railway signalling systems	039907	VU23402	60
VU23404	Carry out testing and commissioning of signalling equipment and integrated systems	039907	VU23402	80
VU23405	Participate in the investigation of a railway signalling incident	039907	VU23402	80
VU23406	Coordinate fault diagnosis and rectification in integrated signalling systems	039907	VU23402	80
VU23407	Undertake a railway signalling systems project	039907	VU23402 VU23403	80
VU23408	Manage the implementation of a railway signalling systems technical maintenance program	039907	VU23402	80
			Total nominal hours for core units =	**520**
Elective units:				
VU23409	Evaluate signalling equipment and integrated systems	039907	VU23402	60
TLIE4032	Use internal communication systems for rail industry regulatory compliance	031309	None	20
VU23217	Recognise the need for cyber security in an organization	029901	None	60

BSBWRT411	Write complex documents	080901	None	50
BSBTWK502	Manage team effectiveness	080303	None	60
MSS408007	Develop problem solving capability of an organisation	080307	None	80
BSBCMM511	Communicate with influence	100707	None	60
			Total nominal hours for elective units	**20 - 80**
			Total nominal hours for core and elective units	**540 - 600**

	Standard 5.11 AQTF 2021 Standards for Accredited Courses
5.2 Entry requirements	Due to the highly technical nature of current and future railway signalling systems and safety considerations, it is deemed essential all 22616VIC Diploma of Railway Signalling Systems applicants must have completed UEE41220 Certificate IV in Electrical - Rail Signalling or equivalent competencies and have rail signalling systems work experience at a technician level. In addition applicants are best equipped to successfully undertake the qualification if they have as a minimum language, literacy and numeracy skills that align to Level 3 of the Australian Core Skills Framework (ACSF), details of which can be accessed from: *Australian Core Skills Framework* Applicants with language, literacy and numeracy skills at lower levels may require additional support to complete the course.
6. Assessment	**Standard 5.12 and 5.14 AQTF 2021 Standards for Accredited Courses**
6.1 Assessment strategy	All assessment, including Recognition of Prior Learning (RPL), must be compliant with the requirements of: • Standard 1 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 4.1 and 4.2 of the VRQA Guidelines for VET Providers, or • the Standards for Registered Training Organisations 2015 (SRTOs), or • the relevant standards and Guidelines for RTOs at the time of assessment. Assessment strategies must therefore ensure that: • all assessments are valid, reliable, flexible and fair • learners are informed of the context and purpose of the assessment and the assessment process

	• feedback is provided to learners about the outcomes of the assessment process and guidance given for future options • time allowance to complete a task is reasonable and specified to reflect the industry context in which the task takes place. Assessment strategies should be designed to: • cover a range of skills and knowledge required to demonstrate achievement of the course aim • collect evidence on a number of occasions to suit a variety of contexts and situations • be appropriate to the knowledge, skills, methods of delivery and needs and characteristics of learners • assist assessors to interpret evidence consistently • recognise prior learning • be equitable to all groups of learners. Assessment methods may include: • oral and/or written questioning • inspection of final process outcomes • portfolio of documentary on-site work evidence • practical demonstration of required physical tasks • investigative research and case study analysis. Questioning techniques should not require language, literacy and numeracy skills beyond the level advised for course entry. A holistic approach to assessment is encouraged. This may be achieved by combining the assessment of more than one unit where it better replicates working practice. Assessment of imported units must reflect the assessment requirements for the relevant training package or accredited course.
6.2 Assessor competencies	Assessment must be undertaken by a person or persons in accordance with: • Standard 1.4 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 3 of the VRQA Guidelines for VET Providers, or • the Standards for Registered Training Organisations 2015 (SRTOs), or • the relevant standards and Guidelines for RTOs at the time of assessment. Units of competence imported from training packages or accredited courses must reflect the requirements for assessors specified in that Training Package or accredited course.

7. Delivery	Standards 5.12, 5.13 and 5.14 AQTF 2021 Standards for Accredited Courses
7.1 Delivery modes	There are no restrictions on the delivery for the Diploma of Rail Signalling Systems. The qualification may be delivered in a variety of modes including: • classroom based • workplace or simulated environment • blended or flexible delivery To maximise opportunities for course participants to have learning experiences which are as close as possible to a real workplace environment, it's recommended workplace projects be used where practical to support delivery. Delivery strategies should actively involve the participants and learning where possible is experiential, relevant and age appropriate. A holistic approach to delivery is encouraged. This may be achieved by combining the delivery of more than one unit where it better replicates working practice. There is no restriction on offering this course on either a full- time or part-time basis. Trainers should contextualise delivery of the course in response to learner needs, while still meeting the requirements of the units of competency.
7.2 Resources	General facilities, equipment and other resources required to deliver this course includes: • general training facilities and class room equipment • access to computers and internet • communication technologies

	• general workplace documentation, forms and resources • access to the current version of: Book of Rules and Operating Procedures • relevant organisational policies and procedures • codes of practice, texts and references • appropriate environmental safeguards and occupational health and safety equipment; • a rail signalling workplace or simulated workplace environment. Trainers/assessors should refer to the individual units of competency for specific resource requirements. Training must be undertaken by a person or persons in accordance with: Standard 1.4 of the AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guideline 3 of the VRQA Guidelines for VET Providers, OR the Standards for Registered Training Organisations 2015 (SRTOs), OR the relevant standards and Guidelines for RTOs at the time of assessment. Units of competency imported from training packages or accredited courses must reflect the requirements for resources/trainers specified in that training package or accredited course.
8. Pathways and articulation	**Standard 5.10 AQTF 2021 Standards for Accredited Courses**
	Successfully completion of the Diploma of Railway Signalling Systems provides a pathway into the 22596VIC - Graduate Certificate in Railway Signalling Systems or 22593VIC - Graduate Diploma of Railway Signalling Systems. Graduates of the course who have successfully completed an imported unit will gain a credit for any qualifications they undertake in the future that includes that unit. Likewise, participants who have already completed an imported unit from another qualification will be granted credit for the unit. There are no formal arrangements for articulation with qualifications offered in the higher education (university) sector. When RTOs are arranging articulation they should refer to the: *AQF Second Edition 2013 Pathways Policy*.
9. Ongoing monitoring and evaluation	**Standard 5.15 AQTF 2021 Standards for Accredited Courses**

	The Curriculum Maintenance Manager - Engineering Industries (CMM-EI) is responsible for the ongoing monitoring and maintenance of this course during the accreditation period. The CMM-EI will undertake a review of the course midway through the accreditation period. The review will involve consultation with: • course participants and graduates • railway signalling systems industry representatives • teaching/assessing staff Any significant changes to the course resulting from the ongoing monitoring and review process will be reported to the Victorian Registrations and Quality Authority through the formal amendment process.

Appendix 1

Summary of Foundation Skills for the Diploma of Railway Signalling Systems

Skills	Description
Reading skills to:	analyse complex technical information regarding developments in signalling systems and associated equipment
Writing skills to:	complete procedural documentation and reports using correct signalling terminology
Oral communication skills to:	provide instructions and clarify receipt of instructions
Numeracy skills to:	calculate signalling equipment/system capability and/or performance for a given situation Interpret technical data from drawings and charts
Learning skills to:	maintain knowledge of relevant rules and operational procedures, legislative requirements, codes and standards relevant to railway signalling systems and networks identify and consult appropriate personnel and technical experts or other reference sources to obtain and verify information.
Problem-solving skills to	analyse and evaluate information, ideas and concepts as well as test results, trends and graphical data implement problem solving and decision making tools, including root cause analysis and solution evaluation techniques
Initiative and enterprise skills to:	make modifications to work plans and schedules to overcome unforeseen difficulties or developments initiate recommendations for modifications to signalling systems and network equipment that lead to desired changes in performance
Teamwork skills to:	work with a range of rail personnel from different disciplines to achieve a completed task or outcome provide clear and precise information to other team members delegate and supervise work where required
Planning and organising skills to:	select and use techniques and tools to plan, sequence and prioritise work operations organise resource requirements for a particular operation/project maintain records of operations or projects for accountability against project objectives, schedule and budget

Self-management skills to:	accept full responsibility and accountability for personal outputs establish personal responsibilities for significant operations or projects establish and pursue personal professional development opportunity
Technology skills to:	apply a range of specialised, technical or conceptual skills in a highly specialised and varied context assess and select suitable signaling equipment to use in a given situation/environment
Digital literacy skills to:	use software for modelling, human machine interfaces, graphical user interfaces, and networks for data handling and control

Section C – Units of competency

Enterprise units:

VU23402	Contribute to the safe operations of railway signalling systems and network
VU23403	Apply communication network concepts and practices to railway signalling systems
VU23404	Carry out testing and commissioning of signalling equipment and integrated systems
VU23405	Participate in the investigation of a railway signalling incident
VU23408	Manage the implementation of a railway signalling systems technical maintenance program
VU23406	Coordinate fault diagnosis and rectification in integrated signalling systems
VU23407	Undertake a railway signalling systems project
VU23409	Evaluate signalling equipment and integrated systems

Endorsed training package units:

These unit can be download from the National Register of VET *http://training .gov.au*

BSBCMM511	Communicate with influence
BSBTWK502	Manage team effectiveness
BSBWRT411	Write complex documents
MSS408007	Develop problem solving capability of an organisation
TLIE4032	Use internal communication systems for rail industry regulatory compliance

The following unit of competency imported from the Victorian Crown Copyright Accredited Course **22603VIC - Certificate IV in Cyber Security** can be accessed from the Victorian Department of Education and Training website (here): A copy of the unit has been included at the end of this document for convenience.

VU23217	Recognise the need for cyber security in an organization

Unit code	**VU23402**
Unit title	**Contribute to the safe operations of railway signalling systems and network**
Application	This unit describes the performance outcomes, skills and knowledge required to contribute to the safe, reliable and efficient operations of railway signalling systems and network. It requires the ability to apply a thorough knowledge of railway signalling equipment, subsystems, operating principles, rules, regulations and work practices that contribute to the operation of a safe railway system. This unit applies to railway signalling technical officers working as part of a team responsible for overseeing safe railway signalling systems and network operations. No licensing or certification requirements apply to this unit at the time of accreditation.
Pre-requisite Unit	N/A
Unit Sector	Railway signalling

Element		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Determine the objectives and priorities of a railway signalling systems	1.1	Objectives of railway signalling systems are identified
		1.2	Railway industry priorities are identified and defined
2	Plan to participate in railway signalling operations	2.1	Operating principles of different signalling systems in current use are identified
		2.2	Role and operation of key components and equipment in a modern railway signalling system are described
		2.3	Railway signalling systems rules and operating procedures, codes of practices, standards and legislative environment are interpreted and followed
		2.4	Appropriate signalling terminology and relevant graphics are identified and applied
		2.5	Developments in railway signalling technology are investigated and compared

3	Model a railway signalling system	3.1	Topographical and functional analyses are conducted to determine the appropriate railway signalling system for a specific situation or environment
		3.2	Operational factors are considered in creating the signalling system layout
		3.3	Relevant equipment and subsystems are evaluated and selected
		3.4	Automatic warning systems are evaluated and selected for the system
		3.5	Control tables are developed and incorporated into the signalling design
		3.6	Typical application data and circuits are developed for the control tables
		3.7	Signalling power systems including smooth (low voltage) power supplies are determined and documented
		3.8	Equipment requirements for the train control centre are determined, in accordance with railway rules and operating procedures
		3.9	Signalling system is evaluated for safety and cost effectiveness over the system life cycle
4	Assess the risks, safety and reliability requirements of the signalling system	4.1	Factors affecting the safety, reliability and maintainability of signalling equipment and systems are identified
		4.2	Measures to guard against human failure are determined
		4.3	Rules and procedures for conducting a risk assessment of a signalling system are identified and applied
		4.4	Risks, safety and reliability considerations of the system are collated, evaluated and documented
5	Work effectively with others to provide safe signalling operation	5.1	Roles and responsibilities of all personnel involved in railway signalling operations are identified and clarified
		5.2	Own role, responsibilities and relationship to other signalling functions and personnel are identified and established
		5.3	Rules and procedures for effective communication with the various roles and personnel are clarified and applied
		5.4	Own contribution to the work team is evaluated and any unresolved issues or concerns are addressed

Range of Conditions

N/A

Foundation Skills

Foundation Skills describe the language, literacy, numeracy and employability skills that are essential to performance and not explicit in the performance criteria.

Skill	Description
Reading skills to:	research railway signalling equipment, operations and development
Writing skills to:	prepare technical documentation and reports relating to railway signalling systems and networks using appropriate terminology
Oral communication skills to:	liaise with work team members and articulate relevant issues encountered in railway work environments
Numeracy skills to:	calculate operating costs and dwell times at platforms
Problem-solving skills to:	identify and establish railway signalling systems risk assessment

Unit Mapping Information

Code and Title Current Version	Code and Title Previous Version	Comments
VU23402 Contribute to the safe operations of railway signalling systems and network	VU22293 Contribute to the safe operations of railway signalling systems and network	Equivalent

Assessment Requirements Template	
Title	Assessment Requirements for **VU23402 Contribute to the safe operations of railway signalling systems and network**
Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to: • contribute as a member of a small team to model at least one (1) a railway signalling system to suit a specific situation or environment. • apply procedures to assess the risks and safety requirements for safe signalling operation of the model system
Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of: • background of the national railway systems and how signalling evolved • railway signalling systems rules, operating procedures, codes of practices, standards and legislative environment • objectives of signalling systems – safe traffic management • signalling principles: safe separation of trains, proving and holding the route, clearance points, roll out protection, failsafe design • signals, train detection, points, control panels, level crossing protection and interlocking principles and requirements • signalling terminology and graphics symbols • range of roles and responsibilities of workers in railway and signalling operations and their interface requirements. • principles for working effectively with others to provide safe signalling operation
Assessment Conditions	Assessment must be conducted in a railway signalling workplace or simulated environment that replicates workplace conditions. **Resources:** • computer equipment • railway rules, regulations, and codes of practice relevant to railway signalling systems and networks • workplace documentation, equipment manuals and specifications • resources to mock-up a model railway signalling system. **Assessor requirements:** Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

OFFICIAL

Unit Code		**VU23403**	
Unit Title		**Apply communication network concepts and practices to railway signalling systems**	
Application		This unit describes the performance, outcomes, skills and knowledge required to apply communication network concepts and practices to railway signalling systems. It requires the ability to examine and explain how data traverses in railway signalling networks, protocols required, networking and communication devices, IP addressing, routing protocols, Virtual Local Area Networks (VLANs), troubleshooting logs and networking monitoring tools. The unit includes building a small network facilitating interlocking and associated equipment to practice troubleshooting capability. This unit applies to railway signalling technical officers working as part of a team responsible for maintaining, monitoring and upgrading railway signalling systems and networks. No licensing or certification requirements apply to this unit at the time of accreditation.	
Pre-requisite Unit		VU23402 – Contribute to the safe operations of railway signalling systems and network	
Unit Sector		Railway signalling	
Elements		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Establish key communication network concepts	1.1	Types of communication networks are defined
		1.2	Data transmission in a communication network is explained
		1.3	Physical communication network equipment and cables are identified
		1.4	Methods, tools and infrastructure used to connect to the internet from a workstation are identified
2		2.1	Physical and logical network representations of a local area network are established

	Apply key elements to communication networking devices	2.2	Function and operation of network switches, VLANs and network routers are explained
		2.3	Function and operation of a computer based interlocking device is described
		2.4	Function and operation of a wireless access point (WAP) is described
		2.5	Appropriate firewalls and network monitoring tools are recognised and applied
		2.6	Log files used for troubleshooting are identified and applied
3	Construct, configure and commission a basic network	3.1	Key features and structure of an internetworking operating system (IOS) to prepare a communication network device for operation are defined
		3.2	Communication network is cabled according to a provided network diagram
		3.3	Configuring communication network addresses for a workstation is performed
		3.4	Communication network is constructed, configured, tested and commissioned
4	Apply the key features of the protocols and models used for OSI and TCP/IP	4.1	Function and basic operation of key protocols in the Open Systems Interconnect (OSI) and Transmission Control Protocol/Internet Protocol (TCP/IP) communication models are established
		4.2	Differences and commonalities between the OSI and TCP/IP models for a communication network are identified
		4.3	OSI Layer 1 standards and types of communication channels are identified
		4.4	OSI Layer 2 Protocols, standards and addressing (MAC addresses) for both local area networks (LANs) and wide area networks (WANs) are identified and applied
		4.5	Binary number system and hexadecimal number systems are defined and applied
		4.6	IPv4 and IPv6 addressing schemes are defined
		4.7	Function and operation of OSI Layer 3 Routed and Routing addressing protocols are identified and applied
		4.8	Packet encapsulation and decapsulation concepts are defined and established
		4.9	Function and operation of OSI Layer 4 Protocols are defined and applied

		4.10	Function and operation of OSI Layer 5 to 7 protocols and networking applications are defined and applied
5	Establish IP addressing schemes	5.1	Sub-netting an IPv4 communication network is established and applied
		5.2	Configuring IPv4 and IPv6 communication network addresses for a workstation is performed
6	Implement a small routed communication network	6.1	Appropriate media, cables, switches and routers are selected
		6.2	Communication network topology is cabled
		6.3	Basic switch and router configuration for the network topology is performed
		6.4	End to end connectivity for a communication network topology utilising troubleshooting methodologies tools and commands is demonstrated

Range of Conditions

N/A

Foundation Skills

This section describes language, literacy, numeracy and employment skills that are essential to performance and not explicit in the performance criteria.

Skill	Description
Reading skills to:	research types of communication networks for railway signalling systems and outline the function and operation of key network concepts
Writing skills to:	prepare technical documentation relating to railway signalling systems communication network concepts and practices using appropriate terminology
Numeracy skills to:	Interpret binary and hexadecimal number systems
Problem solving skills to:	configure end to end railway signalling system connectivity

Unit Mapping Information

Code and Title Current Version	Code and Title Previous Version	Comments
VU23403 Apply communication network concepts and practices to railway signalling systems	VU22294 Apply communication network concepts and practices to railway signalling systems	Equivalent

Assessment Requirements

Title	Assessment Requirements for **VU23403** - **Apply communication network concepts and practices to railway signalling systems**
Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to: • construct and configure at least one (1) small basic rail signalling network facilitating interlocking and associated equipment and demonstrate troubleshooting capability.
Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of: • concepts and functions of communication networks relevant to rail signalling systems including but not limited to: ○ Open Systems Interconnect (OSI) layered communication model ○ switch and router ISO commands ○ Transmission Control Protocol/Internet Protocol (TCP/IP) layered communication model ○ Media Access Layer (MAC) addresses ○ packet encapsulation and decapsulation concepts and operation ○ binary number system ○ hexadecimal number system ○ Transmission Control Protocol (TCP) protocol ○ User Datagram Protocol (UDP) ○ function and operation of application layer protocols ○ Virtual Local Area Networks (VLANs) ○ network monitoring tools ○ log files generated from networking devices ○ Internet protocol (IP)V4 and IPV6 addressing and subnetting ○ network cabling ○ network devices ○ routers, switches, firewall fundamentals & wireless access points ○ end to end test commands
Assessment Conditions	Assessment must be conducted in a railway signalling workplace or simulated environment that replicates workplace conditions. **Resources:** • computer equipment • railway rules, regulations, and codes of practice relevant to

	railway signalling systems and networks • workplace documentation, equipment manuals and specifications • relevant resources to build and troubleshoot a small network facilitating interlocking capability. **Assessor requirements:** Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Unit Code		**VU23404**	
Unit Title		**Carry out testing and commissioning of signalling equipment and integrated systems**	
Application		This unit describes the performance, outcomes, skills and knowledge required to carry out testing and commissioning of integrated railway signalling systems and associated equipment. It requires the ability to verify interfacing functions, perform installations, testing and commissioning, as well as verifying system design integrity. It also includes safe working practices and compliance with established procedures. This unit applies to a railway signalling technical officer working as part of a team. The team is responsible for one or more railway signalling systems and associated infrastructure integrated with a control centre to form a complete railway signalling system. No licensing or certification requirements apply to this unit at the time of accreditation.	
Pre-requisite Unit		VU23402 – Contribute to the safe operations of railway signalling systems and network	
Unit Sector		Railway signalling	
Element		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Plan and prepare to carry out testing and commissioning procedures	1.1	Testing and commissioning procedures are planned and prepared to ensure the work is sequenced and scheduled in an orderly manner
		1.2	Work health and safety and occupational health and safety (WHS & OHS) requirements including risk control measures are identified and applied
		1.3	Appropriate personnel are consulted to ensure the work is coordinated effectively and roles and responsibilities are clarified
		1.4	Equipment, resources, and testing devices to carry out the testing tasks are obtained and checked for correct operation and safety in accordance with established procedures

		1.5	Integrated system requirements for signalling systems are analysed from documentation, specifications, manufacturers' manuals, PLC logic assembly printouts and drawings, and/or discussions with appropriate personnel
2	Undertake testing and commissioning procedures	2.1	WHS & OHS requirements for carrying out the testing and commissioning procedures are followed
		2.2	Signalling systems and circuits are checked as being isolated where necessary using specified testing procedures
		2.3	Testing and commissioning procedures are performed in collaboration with team members and without damage to the surrounding environment or services
		2.4	Technical requirements are communicated to appropriate personnel
		2.5	Contingency measures are implemented in accordance with established procedures to ensure that commissioning is completed
		2.6	Unplanned events or conditions are responded to in accordance with established procedures
		2.7	On-going checks of the quality of the work are undertaken in accordance with established procedures
3	Inspect and document testing and commissioning work and notify completion	3.1	Final inspections and performance checks are undertaken to ensure the integrated signalling system, associated equipment and circuits meet intended criteria
		3.2	Records and documentation are completed in accordance with workplace requirements
		3.3	Appropriate personnel are notified of work completion in accordance with established procedures

Range of Conditions

N/A

Foundation Skills

This section describes language, literacy, numeracy and employment skills that are essential to performance and not explicit in the performance criteria.

Skill	Description
Reading skills to:	interpret and evaluate documentation, specifications, manufacturer manuals, computer based interlocking assembly drawings with respect to signalling equipment and associated infrastructure

Writing skills to:	prepare reports relating to signalling equipment and associated infrastructure using correct terminology
Oral communication skills to:	relate effectively to relevant personnel using the correct rail signalling related terminology
Teamwork skills to:	work with team members in a cooperative and collaborative manner
Planning and organising skills to:	schedule and coordinate testing and commissioning of integrated signalling equipment and associated infrastructure
Technology skills to:	determine procedures to integrate signalling systems and associated equipment, and circuits

Unit Mapping Information

Code and Title Current Version	Code and Title Previous Version	Comments
VU23404 Carry out testing and commissioning of signalling equipment and integrated systems	VU22295 Test and commission signalling equipment and integrated systems	Equivalent

Assessment Requirements

Title	Assessment Requirements for **VU23404 – Carry out testing and commissioning of signalling equipment and integrated systems**
Performance Evidence	The learner must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to: • test, assess and commission integrated signaling systems and associated infrastructure for at least two (2) types of interlocking systems in accordance with sequencing schedule, operational procedures and safe work practices.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:
	• railway signalling systems, infrastructure and worksite protection
	• safe work practices in a signalling system environment
	• principles and components of data communications
	• sources of integrated signalling system information
	• testing and commissioning procedures for integrated railway signalling systems and associated equipment including:
	  ○ integrated signalling systems which include subsystem software, firmware equipment and circuits
	  ○ failure analysis of train protection points, train detection telemetry, interlocking and control and indication
	• equipment and resources required to undertake testing and commissioning procedures
	• typical work allocation for testing and commissioning procedures
	• document formats and version control relevant to reporting and documenting testing and commissioning activities.

Assessment Evidence	Assessment must be conducted in a railway signalling workplace or simulated environment that replicates workplace conditions. **Resources:** • computer equipment • railway rules, regulations, and codes of practice relevant to railway signalling systems and networks • workplace documentation, equipment manuals and specifications • relevant resources to build and troubleshoot a small network. **Assessor requirements:** Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

OFFICIAL

Unit Code		**VU23405**	
Unit Title		**Participate in the investigation of a railway signalling incident**	
Application		This unit describes the performance outcomes, knowledge and skills required to participate in the planning, conducting and reporting of an investigation of a railway signalling incident which has resulted in, or has the potential to result in injury or damage. The situation may range from relatively minor through to major incident. It requires the ability to undertaking an initial assessment of the situation, establishing the scope and legal parameters of the investigation, conducting a systematic analysis to identify underlying cause/s and actions for prevention and reporting on the outcomes of the investigation. The incident investigation report maybe required as evidence in a court of law and subject to cross examination. This unit applies to railway signalling technical officers working as part of a team responsible for investigating a signalling incident. No licensing or certification requirements apply to this unit at the time of accreditation.	
Pre-requisite Unit		VU23402 – Contribute to the safe operations of railway signalling systems and network	
Unit Sector		Railway signalling	
Elements		**Performance**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Participate in the establishment of an investigation process	1.1	Investigation team is convened appropriate to the level of the investigation
		1.2	Organisational policies and procedures for incident investigation are accessed and applied
		1.3	Scope of the investigation is defined taking account of legislative requirements and workplace procedures
		1.4	Own responsibilities and tasks within the investigation team are identified and confirmed
		1.5	Involvement of interested parties is facilitated in accordance with regulations and workplace procedures
		1.6	Resources required to conduct the investigation, including the need for expert advice are identified and sourced as required

		1.7	Barriers to investigation are identified and addressed
		1.8	Action plans and timelines are developed by the investigation team in line with legislation and workplace procedures
2	Collect information and data for analysis	2.1	Sources of information and data are identified and accessed
		2.2	Incident site/s, equipment and other evidence involved is inspected
		2.3	Information and data are gathered on the inspection
		2.4	Statements, photographs, measurements and documentary evidence are taken and recorded, taking account of objectivity, confidentiality and legal implications
		2.5	Site evidence and all necessary documentation is appropriately secured
3	Establish causes and prevention measures	3.1	Information and data gathered is analysed to identify immediate and underlying causes and practical prevention measures
		3.2	Conceptual basis for the analysis was discussed and supported by all members of the investigation team
		3.3	Timeline of events leading up to incident is constructed
		3.4	Key event/s that resulted in the outcome/s of injury or damage is identified
		3.5	Conditions and circumstances that contributed to the causative event are identified
		3.6	Intervention points on the timeline for prevention are identified
		3.7	Strategies to prevent the re-occurrence of the incident are identified
4	Compile and disseminate investigation report	4.1	Results of analysis are documented in a format to suit the required target audiences and legal requirements
		4.2	Report is phrased in objective terms and cites evidence, reasons for conclusions and recommendations for prevention
		4.3	Relevant information and data is disseminated to key personnel, stakeholders and external agencies as appropriate
		4.4	Findings from the report are used to develop further prevention strategies
		4.5	Own role and contribution to the investigation team is self-assessed and strengths and weaknesses are identified

Range of Conditions

N/A

Foundation Skills

This section describes language, literacy, numeracy and employment skills that are essential to performance and not explicit in the performance criteria.

Skill	Description
Reading skills to:	interpret railway industry standards, rules, codes of practice, and guidelines for investigating railway signalling incidents
Writing skills to:	prepare technical documentation relating to railway signalling incident investigation using appropriate terminology
Oral communication skills to:	interview relevant stakeholders, taking statements to investigate railway signalling incidents
Problem solving skills to:	apply investigative principles to ascertain incident issues and make recommendations
Teamwork skills to:	communicate and work cooperatively and collaboratively with an investigation team
Planning and organising skills to:	work systematically with required attention to detail to gather and analyse evidence within set timelines

Unit Mapping Information	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23405 Participate in the investigation of a railway signalling incident	VU22296 Participate in the investigation of a railway signalling incident	Equivalent

Assessment Requirements

Title	Assessment Requirements for **VU23405 Participate in the investigation of a railway signalling incident**
Performance Evidence	The learner must be able to demonstrate competency in all of the elements and performance criteria in this unit. In doing so the learner must as part of a team: • contribute effectively to the planning, conducting and reporting of an investigation into at least two (2) railway signalling incidents each in a different context.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:
	• railway signalling regulations rules and codes of practice
	• role and responsibilities of an incident investigation team
	• railway signalling safety management systems
	• incident investigation methods, processes and reporting requirement for the investigation of railway signalling incidents
	• interviewing techniques used to investigate railway signalling incidents
	• concept and process for establishing timelines of events that extend back in time as far as required and not just focus on immediate events
	• concept and process for establishing causative events that resulted in the outcome/s of injury or damage
	• concept of common law and duty of care and its relevance to railway signalling incidents
	• court of law procedures, appearances and the process of cross examination
	• signalling incident types include but not limited to:
	  ○ level crossing accidents
	  ○ derailments
	  ○ mechanical/electrical failures
	  ○ accidents that result from human error.

Assessment Conditions	Assessment must be conducted in a railway signalling workplace or simulated environment that replicates workplace conditions. **Resources:** • computer equipment

	• railway rules, regulations, and codes of practice relevant to railway signalling systems and networks • workplace documentation, equipment manuals and specifications • access to simulated or real incident sites • access to an incident investigation team real and/or simulated **Assessor requirements:** Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Unit Code		**VU23408**	
Unit Title		**Manage the implementation of a railway signalling systems technical maintenance program**	
Application		This unit describes the performance outcomes, knowledge and skills required to manage the implementation of a railway signalling systems technical maintenance program in accordance with workplace procedures and regulatory requirements. It requires the ability to assess the maintenance requirements, identify potential risks and hazards, determine the required resources, estimate cost, schedule the maintenance activities, oversee the implementation of the program, document the maintenance work and assess the performance of the team. This unit applies to a railway signalling systems technical officer responsible for implementing maintenance programs under the direction of the maintenance manager. No licensing or certification requirements apply to this unit at the time of accreditation.	
Pre-requisite Unit		VU23402 – Contribute to the safe operations of railway signalling systems and network	
Unit Sector		Railway signalling	
Elements		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Plan to implement a technical maintenance program	1.1	Technical maintenance program documentation is accessed and clarified to ensure the planned works are compliant with workplace procedures
		1.2	Previous maintenance documentation is reviewed and current condition of the assets scheduled for maintenance is confirmed
		1.3	Members of the maintenance team are confirmed and individual roles are clarified
		1.4	Hazards, environmental issues and risks associated with the planned technical maintenance work are identified and evaluated.
		1.5	Resources required to implement technical maintenance program are identified

2	Prepare the detail of the technical maintenance program	2.1	Viable options for the implementation of the specific maintenance tasks are identified
		2.2	Preferred option is selected and the implementation program is drafted in consultation with relevant team members to ensure best use of available resources
		2.3	Contingency requirements allowed for in the implementation of the program are identified
		2.4	Resources required are identified for the execution of the maintenance program
		2.5	Maintenance work milestones are identified and clarified
		2.6	Estimate of the cost of implementing the maintenance program is prepared in consultation with relevant team members
		2.7	Implementation of the technical maintenance program is documented and approved by maintenance manager
3	Implement the technical maintenance program	3.1	Resources are acquired and made available to team members
		3.2	Work schedules are confirmed and issued to team members
		3.3	Clear and timely instructions are provided to team members and others involved
		3.4	Maintenance work is carried out in accordance to approved schedule and time allowance
		3.5	Any contingencies that arise are addressed in accordance with the requirement of the maintenance program and workplace procedures
4	Review performance and prepare a report on outcomes	4.1	Completed work is checked against maintenance schedule and work program
		4.2	Feedback from team members is sought and recorded for future maintenance planning
		4.3	Any additional maintenance issues noted by team members are recorded in accordance with workplace procedures
		4.4	Completed maintenance work is recorded in accordance with workplace procedures
		4.5	Technical maintenance report is completed and distributed to relevant person/s
Range of Conditions			

Technical maintenance program can be implemented in an urban rail signalling environment and/or a rural rail signalling environment

Foundation Skills

This section describes language, literacy, numeracy and employment skills that are essential to performance and not explicit in the performance criteria.

Skill	Description
Reading skills to:	interpret technical maintenance program documentation
Writing skills to:	prepare technical documentation relating to railway signalling systems maintenance issues using appropriate terminology
Oral communication skills to:	relay information and elicit feedback from team members using appropriate language for the audience
Numeracy skills to:	prepare cost estimates for rail signalling maintenance work
Problem solving skills to:	address technical maintenance contingencies, hazards, environmental issues and risks
Teamwork skills to:	communicate and work cooperatively and collaboratively with team members
Planning and organising skills to:	work systematically with required attention to detail to implement each stage of the technical maintenance program

Unit Mapping Information	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23408 Manage the implementation of a railway signalling systems technical maintenance program	VU22297 - Develop and implement a railway signalling systems technical maintenance program	Equivalent

Assessment Requirements

Title	Assessment Requirements for **VU23408 - Manage the implementation of a railway signalling systems technical maintenance program**
Performance Evidence	The learner must be able to demonstrate competency in all of the elements and performance criteria in this unit. In doing so the learner must: • demonstrate the ability to plan and implement at least one (1) technical maintenance program for an urban or rural signalling environment • review and report on the planning process and team performance in carry out the maintenance program.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:
	• maintenance requirements of railway signalling systems and equipment that includes testing devices
	• function and components of the railway signalling technical maintenance program documentation including:
	  ○ planning and scheduling requirements
	  ○ maintenance reporting requirements
	  ○ resources requirements
	  ○ costing estimates
	• teamwork principles and techniques relevant to developing, monitoring and reporting on a railway signalling technical maintenance program.

Assessment Conditions	Assessment must be conducted in a railway signalling workplace or simulated environment that replicates workplace conditions. **Resources:** • computer equipment • railway rules, regulations, and codes of practice relevant to railway signalling systems and networks • workplace documentation, equipment manuals and specifications • access to rail signalling system to carry out maintenance **Assessor requirements:** Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Unit Code		**VU23406**	
Unit Title		**Coordinate fault diagnosis and rectification in integrated signalling systems**	
Application		This unit describes the performance outcomes, knowledge and skills required to coordinate the maintenance and repair of integrated railway signalling systems and associated infrastructure, and to provide technical guidance and support to maintenance personnel. It requires the ability to coordinate fault diagnosis and repair procedures and to work safely and complying with regulatory requirements. The unit applies to a railway signalling systems technical officer responsible for coordinating fault diagnosis and rectification of integrated signalling systems. No licensing or certification requirements apply to this unit at the time of accreditation.	
Pre-requisite Unit		VU23402 – Contribute to the safe operations of railway signalling systems and network	
Unit Sector		Railway signalling	
Elements		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Plan and prepare coordination of fault diagnosis and procedures	1.1	Diagnosis of integrated signal system faults is planned to ensure the work is sequenced and scheduled in an orderly manner
		1.2	Work health and safety and occupational health and safety (WHS & OHS) requirements including risk control measures are identified and followed
		1.3	Appropriate personnel are consulted to ensure the work of others is coordinated effectively on the work site
		1.4	Integrated signal systems and equipment fault diagnosis is scheduled according to rail operator's requirements
		1.5	Required materials to complete the work are organised to be available in accordance with established procedures and checked against job requirements
		1.6	Tools, equipment and testing devices to carry out the work are organised to be available and checked for correct

			operation and safety compliance in accordance with established procedures
		1.7	Preparatory work is checked to ensure no unnecessary damage has occurred and that it complies with requirements
2	Coordinate fault diagnosis procedures	2.1	Reported faults are confirmed and normal function of integrated systems and equipment are ascertained in accordance with requirements
		2.2	Integrated systems and circuits are checked as being isolated where necessary using specified testing procedures
		2.3	Fault diagnosis procedures are coordinated in accordance with work requirements
		2.4	Contingency measures are implemented in accordance with established procedures to ensure that the integrated system operates as intended/designed
		2.5	Unplanned events or conditions are responded to in accordance with established procedures
		2.6	On-going checks of quality of the work are undertaken in accordance with established procedures
3	Coordinate rectification procedures	3.1	Work health and safety and occupational health and safety requirements (WHS & OHS) for carrying out the work are followed
		3.2	Supporting company documentation is confirmed and issued to team members
		3.3	Integrated systems and equipment are isolated in accordance with established procedures as required
		3.4	Repair or replacement of faulty components is coordinated in accordance with established procedures
		3.5	Unplanned events of conditions are responded to in accordance with established procedures
		3.6	Appropriate personnel are consulted before any contingencies are implemented
		3.7	On-going checks of the quality of work are monitored in accordance with established procedures
		3.8	Integrated systems and associated circuit testing are coordinated to ensure safety of the installation
		3.9	Integrated systems and associated circuits are returned to service in accordance with established procedures
4	Provide status report	4.1	Arrangements are made for maintenance and any repair as required, with relevant authorised personnel in accordance with requirements

		4.2	Status report is completed and checked for accuracy
		4.3	Status report is distributed in accordance with established procedures

Range of Conditions

N/A

Foundation Skills

This section describes language, literacy, numeracy and employment skills that are essential to performance and not explicit in the performance criteria.

Skill	Description
Reading skills to:	interpret integrated signalling system technical documentation
Writing skills to:	prepare technical documentation relating to fault diagnosis status reports using appropriate terminology
Oral communication skills to:	relay information to team members using appropriate language for the audience
Problem solving skills to:	address technical contingencies and risks
Teamwork skills to:	communicate and work cooperatively and collaboratively with team members
Planning and organising skills to:	implement WHS and OHS procedures and practices including the use of risk control measures work systematically with required attention to initiate and coordinate fault diagnosis and maintenance of integrated signalling systems

Unit Mapping Information	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23406 Coordinate fault diagnosis and rectification in integrated signalling systems	VU22298 - Coordinate fault diagnosis and rectification in integrated signalling systems	Equivalent

Assessment Requirements

Title	Assessment Requirements for **VU23406 - Coordinate fault diagnosis and rectification in integrated signalling systems**
Performance Evidence	The learner must be able to demonstrate competency in all of the elements and performance criteria in this unit. In doing so the learner must: • coordinate the diagnosis and rectification of faults in an integrated railway signalling system and associated infrastructure on at least two (2) occasions each in a different context • prepare a fault rectification report for each occasion in accordance with appropriate regulations and procedure.
Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of: • railway integrated signalling systems, infrastructure and protection • industrial computers and logic controllers and configuration • principles and components of data communication • purpose and function of the maintenance and repair of integrated railway signalling systems • Integrated system and equipment techniques and practices relevant to the maintenance and repair of integrated railway signalling systems may include but are not limited to: o redundancy techniques o fault diagnosis techniques o test equipment practices o control/electrical calculations • writing techniques, formats and version control relevant to reporting on testing and produce technical documentation • WHS & OHS requirements including risk control measures and workplace procedures • tools, equipment and testing devices.
Assessment Conditions	Assessment must be conducted in a railway signalling workplace or simulated environment that replicates workplace conditions. **Resources:** • computer equipment • railway rules, regulations, and codes of practice relevant to railway signalling systems and networks • workplace documentation, equipment manuals and specifications • access to an integrated railway signalling systems and associated infrastructure **Assessor requirements:**

	Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Unit Code		**VU23407**	
Unit Title		**Undertake a railway signalling systems project**	
Application		This unit describes the performance outcomes, skills and knowledge to plan, administer, finalise a railway signalling systems project. It requires the ability to define the project, develop the project plan, administer and monitor the project within project timelines, quality standards and budget control and reviewing the project processes and outcomes. This unit applies to railway signalling technical officer working alone or as a member of a project team. No licensing or certification requirements apply to this unit at the time of accreditation.	
Pre-requisite Units		VU23402 – Contribute to the safe operations of railway signalling systems and networks VU23403 – Apply communication network concepts and practices to railway signalling systems	
Unit Sector		Railway signalling	
Elements		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Define the project	1.1	Project team members are identified and confirmed
		1.2	Project scope and other relevant details are identified
		1.3	Project key stakeholders are identified
		1.4	Responsibilities of each team member and reporting requirements are established
		1.5	Relationships of the project to other projects and to the organisation's objectives are clarified
		1.6	Resources required to undertake the project are determined
2	Develop project plan	2.1	Project plan is developed in line with the project parameters
		2.2	All team members are consulted and their views are considered in the planning of the project

		2.3	Appropriate project management tools are identified and accessed
		2.4	Risk management plan for the project, including work health and safety and occupational health and safety (WHS & OHS) requirements is developed
		2.5	Project budget is prepared and documented for approval
		2.6	Project plan and cost are finalised and the approval is gained to commence the project
3	Administer and monitor project	3.1	Project requirements and project team members' responsibilities are clarified and confirmed
		3.2	Support for project team members with specific needs or tasks are provided to ensure the quality of the expected outcomes and timelines are met
		3.3	Record keeping system is established and maintained throughout the project
		3.4	Processes for managing project finances, resources and quality are implemented and monitored
		3.5	Project reports are prepared as required and forwarded to stakeholders
		3.6	Risk management plan is implemented as required to ensure project outcomes are met
		3.7	Project deliverables are achieved in-line with plan and time frame
4	Provide status report	4.1	Record keeping associated with the project is completed in accordance with required procedures and checked for accuracy
		4.2	Project documentation is completed and the necessary sign-offs are obtained
5	Review project	5.1	Project outcomes and processes are reviewed against the project scope and plan
		5.2	Team members input is sought as part of the project review
		5.3	Lessons learned from the project are documented and shared with key stakeholders

Range of Conditions

Project examples could be:

- new installations
- upgrading of assets
- replacement of life expired assets

Installation sites can be existing (brown field) or new (green field).

Foundation Skills

This section describes language, literacy, numeracy and employment skills that are essential to performance and not explicit in the performance criteria.

Skill	Description
Reading skills to:	interpret railway signalling system project plan requirements
Writing skills to:	prepare project plans relating to railway signalling systems using appropriate terminology
Oral communication skills to:	define the project with relevant stakeholders based on establishing the project scope and other requirements
Numeracy skills to:	calculate and manage project costs
Problem solving skills to:	address project planning contingencies
Teamwork skills to:	communicate and work cooperatively and collaboratively with team members
Planning and organising skills to:	work systematically with required attention to detail to undertake each stage of railway signalling project

Unit Mapping Information	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23407 Undertake a railway signalling systems project	VU22299 - Undertake a railway signalling systems project	Equivalent

Assessment Requirements

Title	Assessment Requirements for **VU23407 Undertake a railway signalling systems project**
Performance Evidence	The learner must be able to demonstrate competency in all of the elements, performance criteria and foundation skills in this unit. In doing so, the learner as member of a team, must demonstrate a contribution to the each stage of at least one (1) rail signalling project which includes: • planning, administering and finalising a project in line with agreed deliverables/outcomes, timeline and allocated budget *and* • review the project processes and outcomes including feedback from team members.

Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:
	• railway signalling regulations rules and codes of practice
	• railway signalling safety management systems
	• principles and practices of project management, including:
	  ○ defining project objectives in line with organisational vision and plans
	  ○ setting measurable targets and deliverables within budgetary constraints and realistic timelines
	  ○ implementing a risk management plan
	  ○ setting clear team roles and responsibilities
	  ○ preparing strategies for implementation
	  ○ identifying priorities and milestones
	  ○ establishing review processes, means of accountability and responsibility
	  ○ establishing a communication plan, incorporating transparency and team feedback
	  ○ conducting risk assessments, incorporating contingency planning and re-planning when objectives change
	  ○ monitoring and reviewing processes at designated periods to assess and measure progress
	• project management tools, including software for project planning and budgeting.

Assessment Conditions	Assessment must be conducted in a railway signalling workplace or simulated environment that replicates workplace conditions. **Resources:** • computer equipment • railway rules, regulations, and codes of practice relevant to railway signalling systems and networks • workplace documentation, equipment manuals and specifications • access to relevant resources and equipment for the project

	Assessor requirements: Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Unit Code		**VU23409**	
Unit Title		**Evaluate signalling equipment and integrated systems**	
Application		This unit describes the performance outcomes, knowledge and skills required to evaluate railway signalling equipment and circuits to ensure the integrated signalling system equipment and infrastructure are functioning to specification. It requires the ability to apply safe work practices and work in accordance with the Authorised Rail Operator (ARO) rules, regulations and reporting requirements. The unit also provides an introduction to computer based train control (CBTC) system, architecture and functionality. This unit applies to railway signalling technical officers working as part of a team that is responsible for the maintenance, servicing and repair of railway signalling equipment and associated infrastructure. No licensing or certification requirements apply to this unit at the time of accreditation.	
Pre-requisite Unit		VU23402 – Contribute to the safe operations of railway signalling systems and networks	
Unit Sector		Railway signalling	
Elements		**Performance Criteria**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Plan and prepare for the evaluation	1.1	Evaluation and testing are planned in accordance with the relevant Authorised Rail Operator (ARO) rules and regulations
		1.2	Work health and safety and occupational health and safety (WHS & OHS) requirements and safe work practices are identified and applied
		1.3	Tools, equipment and testing devices to carry out the work are obtained and checked for correct operation and safety in accordance with established procedures
2		2.1	Circuits are checked as being isolated where necessary using specified testing procedures

	Evaluate equipment and integrated systems	2.2	Testing of signalling equipment, integrated systems and associated infrastructure is undertaken in accordance with workplace procedures
		2.3	Contingency measures are implemented in accordance with established procedures to ensure that the signalling system is performing as intended
		2.4	Unplanned events or conditions are responded to in accordance with established procedures
3	Report on evaluation outcomes	3.1	Final inspections are undertaken to ensure the system tests conform to requirements
		3.2	Evaluation results and recommendations are documented in accordance with established procedures
		3.3	Evaluation report is prepared in accordance with established procedure
4	Investigate the functionality of a CBTC system	4.1	Benefits of CBTC system to the network operator and travelling public compared to conventional signalling systems are identified
		4.2	Rail lines where a CBTC system has been implemented are identified
		4.3	Function of the various on-board (train-borne) CBTC components and the method of communication with wayside equipment and central control are identified and explained
		4.4	Function of the wayside (track side) CBTC components and the method of communication with train-borne equipment and central control are identified and explained
		4.5	Function of the central control and communications equipment for the CBTC system is identified and explained
		4.6	Similarities and differences between the CBTC system and other high capacity train control systems are identified

Range of Conditions

- Evaluation and testing may include but not limited to:
  - signalling systems which include subsystem software, firmware, equipment and circuits
  - failure analysis of train protection, points, track circuits, telemetry, interlocking and control and indication
  - analysis of road and pedestrian protection
  - evaluation of data logger events
  - trend analysis
  - version control procedures (software, firmware, documentation).

- Other high capacity train control systems may include but not limited to:
  - European Train Control System (ETCS) – part of the European Rail Traffic Management System (ERTMS)
  - New Generation Train Control System (NGTCS)

Foundation Skills

This section describes language, literacy, numeracy and employment skills that are essential to performance and not explicit in the performance criteria.

Skill	Description
Reading skills to:	interpret and evaluate documentation, specifications, manufacturers manuals and drawings with respect to signalling equipment and associated infrastructure
Writing skills to:	prepare technical documentation relating to signalling equipment and integrated systems using appropriate terminology
Oral communication skills to:	relay information to team members using appropriate terminology
Teamwork skills to:	communicate and work cooperatively and collaboratively with team members
Planning and organising skills to	conduct timely signalling equipment and integrated systems tests and reports that incorporate recommendations on evaluation results

Unit Mapping Information	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23409 Evaluate signalling equipment and integrated systems	VU22300 - Evaluate signalling equipment and integrated systems	Equivalent

Assessment Requirements

Title	Assessment Requirements for **VU23409 - Evaluate signalling equipment and integrated systems**
Performance Evidence	The learner must be able to demonstrate competency in all of the elements, performance criteria and foundation skills in this unit. In doing so the learner must: • plan, test and evaluate railway signalling equipment and associated infrastructure in accordance with railway signalling evaluation procedures, and regulations on at least two (2) occasions and each in a different context.
Knowledge Evidence	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of: • railway integrated signalling systems, infrastructure and protection • testing equipment used for railway signalling operations • evaluation and testing processes and procedures (refer Range of Conditions) • analysis of test results relevant evaluating railway signalling equipment and circuits • relevant Authorised Rail Operator (ARO) rules and regulations relevant to testing railway signalling equipment • relevant WHS requirements and safe work practices relevant to testing railway signalling equipment • techniques and formats for recording data/event processing and reporting evaluation results of railway signalling equipment testing • benefits, and functionality of a communication based train control (CBTC) system • comparison between CBTC and other high capacity train control systems (refer Range of Conditions).
Assessment Conditions	Assessment must be conducted in a railway signalling workplace or simulated environment that replicates workplace conditions. **Resources:** • railway rules, regulations, and codes of practice relevant to railway signalling systems and networks • workplace documentation, equipment manuals and specifications • access to two different contexts for each railway signalling equipment and integrated systems evaluation • access to testing equipment and related resources **Assessor requirements:**

	Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

UNIT CODE		**VU23217**	
UNIT TITLE		**Recognise the need for cyber security in an organisation**	
APPLICATION		This unit describes the performance outcome, knowledge and skills required to recognise threats, risks and vulnerabilities to cyber security in an organisation. The threats to an organisation include networks, machines, applications, data, users and infrastructure. The unit addresses common cyber security attack mechanisms and an introduction to threat management as well as security issues surrounding Internet of Things (IoT) devices. The unit also includes the implementation of tools and systems an organisation can use for protection against cyber-attacks. This unit applies to individuals working as cyber security technicians either alone or as part of a team. No licensing or certification requirements apply to this unit at the time of accreditation.	
PRE-REQUISITE UNIT(S)		N/A	
ELEMENTS		**PERFORMANCE CRITERIA**	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.	
1	Identify the need for cyber security for an organisation	1.1	Reasons to protect online identity and personal data are clarified
		1.2	Reasons to protect an organisation's data are explained
		1.3	Cyber security awareness practices for an organisation are identified
		1.4	Concept of cyber threat is defined
		1.5	Reasons for the need for cyber security professionals are explained
2	Investigate common and emerging cyber	2.1	Difference between threat actors, threat vectors and threat goals are clarified

	security attacks, and techniques	2.2	Techniques used by attackers to infiltrate a system are described
		2.3	Characteristics and operation of a cyber-attack are explained
		2.4	Trends of cyber threats are examined
		2.5	Cyber attack methods on an organisation infrastructure are identified
		2.7	Examples of IoT devices are provided
		2.8	Security vulnerabilities for IoT devices are explained
3	Investigate methods to protect personal data and privacy	3.1	Techniques to protect personal devices from cyber threats are described and demonstrated
		3.2	User authentication techniques are identified and demonstrated
		3.3	Methods and tools to safeguard personal privacy are identified and demonstrated
4	Examine methods used to protect an organisation's data	4.1	Common infrastructure, equipment, and software used to protect an organisation from cyber security attacks are identified
		4.2	Cyber security terms such as botnets, malware, virus's, worms, Root Kits are clarified
		4.3	Mitigation strategies such as the cyber kill chain process, the MITRE Adversarial Tactics, Techniques and Common Knowledge (ATT&CK) in the context of cyber security protection and mitigation strategies are explained
		4.4	Policies, tools and systems for protecting an organisation from cyber-attacks are investigated
		4.5	Behaviour based approach to cyber security is investigated
		4.6	Incident response policies, processes and systems are reviewed
5	Investigate current Cyber Security Frameworks (CSF)	5.1	Fundamentals of the National Institute of Standards and Technology Cyber Security Framework (NIST CSF) are examined and explained
		5.2	Essential Eight strategies from the Australian Cyber Security Centre (ACSC) to mitigate Cyber Security incidents are identified
		5.3	Centre for Internet Security (CIS) controls identified for organisations to implement for Cyber Security protection are examined
RANGE OF CONDITIONS			

N/A

FOUNDATION SKILLS

This section describes language, literacy, numeracy and employment skills that are essential to performance and are not explicitly expressed in the performance criteria of this unit of competency.

Skill	Description
Reading skills to	interpret and follow documented material and procedures
Technology skills to	use a PC or laptop computer and software tools

UNIT MAPPING INFORMATION	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23217 Recognise the need for cyber security in an organisation	VU21990 Recognise the need for cyber security in an organisation	Equivalent

Assessment Requirements

TITLE	Assessment Requirements for **VU23217 - Recognise the need for cyber security in an organisation**
PERFORMANCE EVIDENCE	The learner must be able to demonstrate competency in all of the elements, performance criteria and foundation skills in this unit and provide evidence of the ability to: • identify threats, risks and vulnerabilities to sensitive organisational data and recommend suitable methodologies to protect the data for two (2) scenarios.
KNOWLEDGE EVIDENCE	The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of: • cyber security awareness work practises • sources of cyber security attacks • types of security vulnerabilities and malware • methods to protect your own data and privacy • methods of cyber security attacks • introduction to cyber security mitigation techniques and resources • methods and tools used to protect an organisation's data • fundamentals of National Institute of Standards and Technology Cyber Security Framework (NIST CSF) • Essential eight strategies from the Australian Cyber Security Centre (ACSC) to mitigate cyber security incidents • Centre for Internet Security (CIS) controls • Internet of Things (IoT) devices and their security vulnerabilities

ASSESSMENT CONDITIONS	This unit can be assessed either in the workplace or in a simulated workplace environment. Where the assessment is conducted in a simulated workplace then the range of conditions must reflect a realistic workplace environment.
	Resources:
	• computer equipment
	• networking equipment
	• computer software
	• relevant documentation including:
	  ○ workplace procedures
	  ○ codes/standards

	○ manuals and reference material **Assessor requirements** Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.