

Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network

Engineering
Standard

ENG-ENS-NIL-0023



Document Control

Table 1: Torrens Connect Document Control

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Definitions

Table 2: Definitions

Term	Definition
ADR	Australian Design Rules
ATN	Adelaide Tram Network
DC	Direct Current
DIT	Department for Infrastructure and Transport
EMC	Electromagnetic Compatibility
MGTP	Modified Glenelg Tramline Profile
NDT	Non-destructive Testing
OHW	Overhead Wiring
PM	Project Manager
PRES	Person Responsible for Electrical Safety
PRW	Person Responsible for the Works
RISSB	Railway Industry Safety and Standards Board
SWMS	Safe Work Method Statement
TC	Torrens Connect
Gross Mass	Total mass of road-rail vehicle including tare mass, maximum load, maximum service capacity of crew and passengers.
Infrastructure Maintenance Rolling Stock ¹	Track machines and road-rail vehicles. Also known as on 'track vehicles'.
Rolling Stock [1]	Any vehicle that operates on, or intends to operate on, or uses a railway track, including any loading on such a vehicle, but excluding a vehicle designed for both on- and off-track use when not operating on the track. Rolling stock is a collective



Term	Definition
	term for a large range of rail vehicles of various types, including locomotives, freight wagons, passenger cars, track machines and road-rail vehicles.
Tare Mass ¹	The mass of road-rail vehicle in the lightest condition under which it will be operated. This includes provisioning with sand and water but fuelled to no more than one-third of capacity.
Tram	The standard gauge tracks on the ATN.
Travel Mode	Where the road-rail vehicle is travelling to and from the worksite
Work Mode	Where the road-rail vehicle is performing its work function within the worksite and under an authorised work possession/authority.

[1] RISSB National Guideline Glossary of Railway Terminology



1 Introduction

Torrens Connect (TC) operates and maintains the Adelaide Tram Network (ATN) on behalf of The Department for Infrastructure and Transport (DIT) under its Rail Accreditation. This standard is intended to ensure that the introduction of road-rail vehicles onto the ATN does not create any risks not deemed to meet the So Far As Is Reasonably Practicable (SFAIRP) principles under Rail Safety National Law (RSNL).

The requirements are applicable to TC owned and Contractor supplied road-rail vehicles accessing and operating on the ATN under TC Rail Accreditation. Where an Access Agreement is in place, enabling a third party to undertake work on the ATN under their own rail accreditation, the third party is fully responsible for ensuring that any road-rail vehicles used for the work comply with all applicable legislative requirements, TC Rail Access Procedures, and all relevant standards.

A “road-rail vehicle” is a road vehicle fitted with retractable rail wheels that enable it to be driven along the track. It can be moved on or off the track at level crossings or other suitable places and can also operate as a road vehicle.

This standard provides the minimum requirements for road-rail vehicles to access and operate on the ATN. It does not obviate the need for a site-specific Safety Management Plan or Work Instruction to ensure that the road-rail vehicle can undertake its work tasks safely at the worksite.

Road-rail vehicles that do not meet the minimum requirements in this standard are not permitted to access and operate on the ATN. Approval may be granted by TC, under specified conditions, for a road-rail vehicle to access the ATN for the purpose of vehicle examination and testing.

Note: the terms ‘hi-rail vehicle’, ‘hy-rail vehicle’, ‘road/rail vehicle’ and ‘road-rail vehicle’ have all been used to describe this type of vehicle. In this standard the term ‘road-rail vehicle’ is used exclusively.

2 Purpose

The purpose of this standard is to specify the minimum certification requirements for road-rail vehicles to access and operate on the ATN. The standard *AS 7502 Road Rail Vehicles* shall be used for the safe design, construction, testing, maintenance, decommissioning, and modifications of road-rail vehicles.

3 Scope

This standard applies to all road-rail vehicles, including TC and DIT owned vehicles, accessing and operating on the ATN standard gauge (1435mm) Tram, mainlines, depots, sidings and worksites.

Refer to *ENG-ENS-NIL-0047 Requirements for Rail Trolleys and Trailers Accessing and Operating on the Adelaide Tram Network* for certification of rail trolleys and trailers on the ATN.

Refer to *ENG-ENS-NIL-0041 Requirements for Track Machines Accessing and Operating on the Adelaide Tram Network* for the track machines certification process.

4 Associated Documents

Table 3: Associated Documents

Document ID	Title
ENG-FRM-RSG-0005	Road-Rail Vehicle and Rail Trolley & Trailer Certification Application Form
ENG-FRM-RSG-0001	Infrastructure Maintenance Rolling Stock Certificate Template
ENG-FRM-RSG-0006	Road-Rail Vehicle Document Review Checklist
ENG-FRM-RSG-0011	Road-Rail Vehicle General Condition Examination
ENG-FRM-RSG-0003	Assessment for on Track Plant in 600V OHW Areas
ENG-REG-NIL-0002	Infrastructure Maintenance Rolling Stock Register
	Rolling Stock Examiners Register (Internal Use Only)
	Approving Engineers Register (Internal Use Only)
ENG-FRM-RSG-0002	Infrastructure Maintenance Rolling Stock Annual Confirmation

5 Roles and Responsibilities

5.1 General

There are generally two ways in which a road-rail vehicle can be introduced onto the ATN:

- Through planned construction or maintenance works where an external contractor, who owns or hires a road-rail vehicle, is engaged by TC or DIT for the works.
- Purchasing and maintaining of a new or modified road-rail vehicle for use by TC.

For construction and maintenance works it is the responsibility of the TC Project Manager (PM) or Person Responsible for the Work (PRW) to ensure that all road-rail vehicles to be used for their works are certified before accessing and operating on the ATN.

It is not intended that external contractors apply directly to TC to have their road-rail vehicles certified in anticipation of work on the ATN.

For TC owned vehicles the TC Maintenance Operations Manager is responsible for ensuring that all road-rail vehicles are certified before accessing and operating on the ATN.

5.2 TC Project Manager/Person Responsible for the Works (PM/PRW)

It is the responsibility of the TC PM/PRW to obtain all of the documentation and information required for certification from the Applicant/Owner, follow the process described in Appendix 8 and:

- Ensure that completed *ENG-FRM-RSG-0005 Road-Rail Vehicle and Rail Trolley & Trailer Certification Application Form* (Appendix 1) is obtained and forwarded to the Rolling Stock Engineer;
- Ensure all required supporting documentation as required in accordance with *ENG-FRM-RSG-0006 Road-Rail Vehicle Document Review Checklist* (Appendix 2) is obtained and forwarded to the Approving Engineer for review;
- Ensure that completed *ENG-FRM-RSG-0006 Road-Rail Vehicle Document Review Checklist* (Appendix 2) and all supporting documentation are obtained and forwarded to the Rolling Stock Engineer;
- Ensure that completed *ENG-FRM-RSG-0003 Assessment for on Track Plant in 600V OHW Areas* (Appendix 5) is obtained and forwarded to the Infrastructure Engineer for review;
- Ensure that the road-rail vehicle to undergo the general condition examination by an approved Rolling Stock Examiner and ensure *ENG-FRM-RSG-0011 Road-Rail Vehicle General Condition Examination* (Appendix 3) is completed and forwarded to the Rolling Stock Engineer;
- Ensure that completed *ENG-FRM-RSG-0002 Infrastructure Maintenance Rolling Stock Annual Confirmation* (Appendix 7) is obtained and forwarded to the Rolling Stock Engineer;
- Ensure that any issues arising from the document review and general condition examination are addressed.

5.3 Applicant/Owner

For planned construction and maintenance works the application form *ENG-FRM-RSG-0005 Road-Rail Vehicle and Rail Trolley & Trailer Certification Application Form* (Appendix 1) and *ENG-FRM-RSG-0002 Infrastructure Maintenance Rolling Stock Annual Confirmation* (Appendix 7) is to be completed by the external contractor engaged for the works and forwarded to the PM/PRW. The form has provision for supply of the road-rail vehicle owner details where the contractor is hiring the vehicle.

For DIT owned road-rail vehicles both the application form and annual confirmation are to be completed by the TC Maintenance Operations Manager.

5.4 TC Maintenance Operations Manager

It is the responsibility of the TC Maintenance Operations Manager to obtain all of the documentation and information required for certification and:

- Ensure that *ENG-FRM-RSG-0005 Road-Rail Vehicle and Rail Trolley & Trailer Certification Application Form* (Appendix 1) is completed and forwarded to the Rolling Stock Engineer;
- Ensure all required supporting documentation in accordance with *ENG-FRM-RSG-0006 Road-Rail Vehicle Document Review Checklist* (Appendix 2) is obtained and forwarded to the Approving Engineer for review;
- Ensure that completed *ENG-FRM-RSG-0006 Road-Rail Vehicle Document Review Checklist* (Appendix 2) and all supporting documentation are obtained and forwarded to the Rolling Stock Engineer for review;

- Ensure that completed *ENG-FRM-RSG-0003 Assessment for on Track Plant in 600V OHW Areas* (Appendix 5) is obtained and forwarded to the Infrastructure Engineer for review;
- Ensure that the road-rail vehicle to undergo the general condition examination by an Approved Rolling Stock Examiner and ensure *ENG-FRM-RSG-0011 Road-Rail Vehicle General Condition Examination* (Appendix 3) to be completed and forwarded to the Rolling Stock Engineer;
- Ensure that *ENG-FRM-RSG-0002 Infrastructure Maintenance Rolling Stock Annual Confirmation* (Appendix 7) is to be completed and forwarded to the Rolling Stock Engineer; and
- Ensure that any issues arising from the document review and general condition examination are addressed.

5.5 Approving Engineer

A New Approving Engineer shall be appointed jointly by the Rolling Stock Engineer and Infrastructure Engineer. The Approving Engineer is responsible for carrying out the assessment in accordance with *ENG-FRM-RSG-0006 Road-Rail Vehicle Document Review Checklist* (Appendix 2). The Approving Engineer shall have:

- Experience in assessing rolling stock against standards;
- Demonstrated knowledge and experience of the RISSB rolling stock and road-rail vehicles standards;
- Demonstrated knowledge and experience of the Rail Safety National Law (SA) Act 2012;
- No undeclared conflicts of interest;
- Knowledge of risk management;

It is the responsibility of the Approving Engineer to review the documentation provided by the PM/PRW or TC Maintenance Operations Manager against the requirements of this standard and complete *ENG-FRM-RSG-0006 Road-Rail Vehicle Document Review Checklist* (Appendix 2). For documentation relating to track engineering the Approving Engineer shall consult with the Infrastructure Engineer.

If the Approving Engineer determines that the documentation provided is not satisfactory the PM/PRW or TC Maintenance Operations Manager is to be advised and requested to update and resubmit. If the documentation is satisfactory the completed checklist is to be forwarded to the PM/PRW. The Approving Engineer shall provide recommendations on restrictions or limitations for the operation of road-rail vehicles on the ATN.

5.6 Rolling Stock Engineer and Infrastructure Engineer

It is the responsibility of the Rolling Stock Engineer and Infrastructure Engineer to:

- Jointly ensure all applications for certification of road-rail vehicles are assessed in accordance with this standard;
- Jointly appoint a new approving engineer;
- Jointly sign all approval certificates with any restrictions or limitations;

The Rolling Stock Engineer or delegate shall:

- Receive the application pack for the certification or re-certification of the road-rail vehicles via rolling stock engineering mail box: RS_Eng@torrensconnect.com.au

- Approve the appointment of the Rolling Stock Examiners undertaking the general condition examinations;
- Select an Approving Engineer from the Register;
- Determine the expiry date and inserting expiry date on the certificate;
- Ensure that the certificate is prepared and arrangements made for the certificate and labels to be displayed on the road-rail vehicle. A copy of certificate is to be forwarded to the PM/PRW or TC Maintenance Operations Manager
- Maintain a register of all Infrastructure Maintenance Rolling Stock, this register shall contain details of road-rail vehicle type, owner, certification/recertification dates;
- Ensure that the Infrastructure Maintenance Rolling Stock Register is updated at every new certification or re-certification; and
- Maintain a register of all Rolling Stock Examiners and Approving Engineers.

5.7 Infrastructure Engineer

It is the responsibility of the Infrastructure Engineer to:

- Ensure that all applications for certification of road-rail vehicles are assessed for operation under live 600V electrified tram lines in accordance with Section 17 of this standard;
- Review and sign the assessment form *ENG-FRM-RSG-0003 Assessment for on Track Plant in 600V OHW Areas* (Appendix 5) and provide the conditions under which the road-rail vehicle may access and operate under live 600V electrified tram lines;
- Ensure that the signed form is forwarded to the Rolling Stock Engineer for preparation and issuing of the certificate
- Arrange for issuing and displaying, in prominent positions on the road-rail vehicle, of the appropriate labels that detail the conditions for operating on 600V electrified tram lines.

5.8 Head of HSQE

The Head of HSQE shall:

- Maintain this standard and all associated forms and checklists;
- Update this standard or associated form or checklist when required;
- Ensure that the current standard and all associated forms and checklists are available via intranet/internet to internal staff and external contractors; and
- Advise to internal staff and external contractors on interpretation of the standard and requirements for road-rail vehicles to access and operate on the ATN under this standard.

5.9 Rolling Stock Examiner

The Rolling Stock Examiner is responsible for carrying out the general condition examination in accordance with *ENG-FRM-RSG-0011 Road-Rail Vehicle General Condition Examination* (Appendix 3) and assessment in accordance with *ENG-FRM-RSG-0003 Assessment for on Track Plant in 600V OHW Areas*.

Only Rolling Stock Examiners approved by TC are permitted to undertake the general condition examination.

The roles of Rolling Stock Examiner and the Approving Engineer cannot be performed by the same person.

6 General

The Railway Industry Safety Standards Board (RISSB) has developed and issued *AS7502 Road-Rail Vehicles* for the design, construction, testing, maintenance, decommissioning and modification of road-rail vehicles.

TC adopts all mandatory requirements as specified in *AS7502 Road-Rail Vehicles* unless modified as shown in the following sections.

TC adopts all recommended requirements as specified in *AS7502 Road-Rail Vehicles* as mandatory unless modified as shown in the following sections. If the applicable clause contains the word 'should', it is to be read as the word 'shall'. This is to eliminate any doubt as to the requirements of the clause.

The certification process for road-rail vehicles shall be in accordance with Section 28 of this standard.

7 Road-Rail Vehicle Classification

AS7502 Road-Rail Vehicles provides the method for classification of road-rail vehicles.

Type 2 – friction drive road-rail vehicles are not preferred for operation on the ATN however they may be permitted under special conditions.

7.1 Road-rail Guidance System Identification

All new road rail guidance systems, both front and rear, shall be identified with a unique identification number and shall be fitted with identification plate displaying the information in accordance with *AS 7502 Road Rail Vehicles*.

8 Maintenance Schedule and Service History

Each road-rail vehicle shall be maintained in accordance with the manufacturer's requirements or as per *AS 7502 Road-rail vehicles*.

A maintenance schedule and service history of a road-rail vehicle shall be provided for any certification or re-certification application for access and operation on the ATN.

9 Crack Testing - Rail Guidance Equipment

For road-rail vehicles that have been in service for more than 10 years, a visual examination of the axles, rail wheels and structural elements of the rail guidance equipment, including the mounting on the vehicle chassis, shall be conducted in accordance with the requirements of *AS 3978 Non-destructive Testing – Visual Inspection of Metal Products and Components* by an inspector certified to *ISO 9712 Non-destructive Testing – Qualification and Certification of NDT Personnel* Level 3 or equivalent. The Level 3 inspector shall then prepare a procedure for NDT of all welds and critical members of the rail

guidance system. This NDT procedure shall be implemented by an inspector certified to *ISO 9712* level 1 or higher for the applicable method(s). The crack testing shall be carried out at certification and every two years thereafter. Evidence of the crack testing in the form of a certificate along with relevant photographs and the procedure used shall be provided.

Notwithstanding the above, the stub axles on all road-rail vehicles accessing and operating on the ATN shall be inspected using the magnetic particle method in accordance with the requirements of *AS 1171 Non-destructive Testing – Magnetic Particle Testing of Ferromagnetic Products, Components and Structures* at certification and annually thereafter. Evidence in the form of a testing certificate along with relevant photographs shall be provided.

10 Vertical Load

Road-rail vehicles have three (3) possible loading configurations:

- Complete vehicle loading is carried on the rail wheels.
- Complete vehicle loading is shared between the front rail wheels and the rear road wheels with the rear rail wheels providing guidance only.
- Complete vehicle loading is carried on the road wheels and the rail wheels providing guidance only.

Details of the manner in which the loading is configured shall be provided. The vertical load on any fully load supporting rail wheel will be based on the maximum permitted road loading as shown in following tables¹.

Table 4: Road Vehicle Mass Limits Per Axle

AXLE/TYRE CONFIGURATION AND ROAD VEHICLE MASS LIMITS PER AXLE			
Single axle or single axle group fitted with single tyres with a section width of:	Road vehicle mass limits for single axles and axle groups in tonnes	Tandem axle group fitted with single tyres with section width of	Road vehicle mass limits for single axles and axle groups in tonnes
1. Less than 375 mm	6.0	1. less than 375 mm	11
2. 375 mm or more but less than 450 mm	6.7	2. 375 mm or more but less than 450 mm	13.3
3. 450 mm or more	7.0	3. 450 mm or more	14
Single axle fitted with dual tyres	9.0		

¹ DPTI Mass and Dimension Limits for General Access Heavy Vehicles Operating in South Australia

Table 5: Road Vehicle Mass Limits Per Axle

AXLE/TYRE CONFIGURATION AND PERMITTED VERTICAL LOAD PER RAIL WHEEL			
Single axle or single axle group fitted with single tyres with a section width of:	Permitted vertical load per rail wheel in tonnes	Tandem axle group fitted with single tyres with section width of	Road vehicle mass limits for single axles and axle groups in tonnes
1. less than 375 mm	3.0	1. less than 375 mm	5.5
2. 375 mm or more but less than 450 mm	3.35	2. 375 mm or more but less than 450 mm	6.65
3. 450 mm or more	3.5	3. 450 mm or more	7
Single axle fitted with dual tyres	4.5		

10.1 Safe Working Loads for Road-Rail Cranes and Excavators / Backhoes / Front end loaders

Details of the safe working loads for cranes and excavators / backhoes / front end loaders on road-rail vehicles shall be provided and a sign or placard displayed on the vehicle in such a way that it is visible to operators.

11 Travel & Work Modes

Road-rail vehicles have two modes of operation:

- Travel mode – where the vehicle is travelling to and from the worksite with all componentry fully retracted and secured.
- Work mode – where the vehicle is performing its work function within the worksite under an authorised work possession/authority.

12 Road-Rail Vehicle Outline

The static profile of the road-rail vehicle shall not exceed the limits shown in the following diagrams under any condition of loading or wear:

- A TC Tram Rolling Stock Outline drawing is still to be developed for the tram system (the Flexity vehicle outline shall be used in the interim).

The above profiles do not take account of the dynamic and kinematic effects associated with the movement of the road-rail vehicle and reference should be made to *CP-TS-975 Structural Clearances for Tram*. The kinematic envelope of the road-rail vehicle can be determined using one of the following methods:

- Full application of the above standards.

- A combination of the application of the above standards and, where available, actual performance and measurements of the dynamic behaviour of the road-rail vehicle.

Details of the road-rail vehicle kinematic envelope shall be provided.

The road-rail vehicle componentry, when in work mode within a controlled worksite, may exceed the permissible outline, but must be retracted and securely locked within the maximum rolling stock outline when in travel mode. A diagram or illustration shall be supplied clearly defining the retracted positions of the components in travel mode.

13 Speed and Ride Performance

The maximum speed for road-rail vehicles on the ATN is 40 km/hr or reduced speed under special conditions. This speed shall be clearly displayed in the cab and be visible to the operator.

- At level crossings, facing switches, V and K crossings the speed shall be reduced to 10 km/hr.
- The maximum reversing speed is 20 km/hr.

Notwithstanding the above all posted track speeds shall be strictly observed.

14 Wheels

The following rail wheel profile is used on the ATN:

- Tram – Modified Glenelg Tramline Profile (MGTP – Flexity/Citadis)

The use of wheel profiles other than the above may be permitted under special conditions. Details of the alternative profile shall be provided.

The back-to-back measurement for each wheel set shall be measured at three different locations around the wheel (120 degrees apart). For standard gauge the back-to-back measurement shall be within the range of 1387 -1389 mm.

The wheel alignment “toe in” shall be measured for the front and back wheel set and shall not exceed 3mm.

The rail wheels on the road-rail vehicle shall comply with all the requirements of *ENG-ENS-NIL-0026 Tram wheel inspection and defects standard*.

A twist test shall be carried out in accordance with *Engineering Instruction ENG-PRO-NIL-0002 Static Twist Test for Rolling Stock*.

The maximum wheel unloading permitted is 60%. A value for wheel unloading exceeding 60% will mean the road-rail vehicle has failed the twist test and is not permitted to access or operate on the ATN.

15 Traction Drive

The road-rail vehicle traction system shall be independently capable of moving the road-rail vehicle in both tare and gross laden conditions in a smooth manner without wheel spin on dry level track.

Details of the traction system shall be provided.

Traction systems using a friction drum roller or friction drive applied directly to the rail wheels may be permitted on the ATN under special conditions. A braking system independent of the friction drive and applied to the rail wheels shall be fitted.

16 Signal Detection Interface

Road-rail vehicles have much lower wheel loads than conventional rolling stock which makes their ability to 'short circuit' or 'shunt' track circuits unreliable and introduces the risk that they will not consistently activate signals or level crossings or show up on the network control system.

Accordingly, it is preferred for non-electrified lines that road-rail vehicles have electrical isolation between the wheels on adjacent rails to ensure that they cannot activate track circuits and associated signals. Evidence shall be provided that the isolation will be effective and that the direct current (DC) electrical resistance between the rail contact surfaces of wheels on the same axle is greater than 20,000 ohms in accordance with *AS7505 Signalling Detection Interface*.

For non-insulated road-rail vehicles evidence shall be provided that resistance between the wheels on the same axle is less than 1 milliohm (0.001 ohm) at 1 volt in accordance with *AS7505 Signalling Detection Interface*.

Both insulated and non-insulated road-rail vehicles are only allowed to operate under appropriate track possession authorities and are not permitted to run as a 'train' operating under signal indication.

17 Operation on Electrified Lines

17.1 Operation on 600V Electrified Tram Lines

Road-Rail vehicles are only permitted to access and operate on 600V electrified tramlines if:

The 600V electrified tram lines are isolated and earthed for the area in which the road-rail vehicle is travelling or working and is accompanied by a PRES who holds a Certificate of Isolation for the OHW.

OR

A vehicle specific Safe Work Method Statement (SWMS) is available that details how that vehicle will safely travel and work under live 600V OHW equipment.

18 Lighting

The lighting on road-rail vehicles shall fully comply with ADR regulations.

Where a road-rail is required to reverse any greater than 500 metres it shall be fitted with headlights, stop lights, tail lights and marker lights at both ends. Under these circumstances the headlights, stop lights, tail lights and marker lights shall be suitably interlocked to provide clarity of direction of travel and avoid contravention of the ADR regulations while on road.

The road-rail lighting shall comply with all of the requirements relevant to road-rail vehicles in *AS7531 Rolling stock – Lighting & Visibility – Part 4 – Infrastructure Maintenance Rolling Stock*.

19 Vigilance System

A vigilance system shall be installed on the road-rail vehicle.

The vigilance system shall periodically alert the driver with a flashing light and auditory alarm which requires acknowledgement to prevent an emergency brake application and loss of traction power/engine cut-out.

The time from reset to the first vigilance system alarm shall not be less than 25 seconds nor more than 90 seconds. The time from reset to the emergency brakes application shall not be less than 30 seconds nor more than 110 seconds. The total time from reset to the emergency brakes application, including the first vigilance system alarm, shall not be more than 110 seconds.

The over speed function shall prevent the road-rail vehicle from over speeding by applying the emergency brakes. The maximum allowable speed on the ATN shall be in accordance with Section 13. The threshold speed limits at which the emergency brakes apply shall be no greater than 5km/hr above the maximum allowable speed for both the forward and reverse directions.

The road-rail vehicle shall have provision for isolation of the vigilance system should the vigilance unit become inoperable due to a malfunction. The isolation switch/mechanism shall have a permanent seal that is required to be broken to affect the isolation. The vigilance isolation shall only be used to enable travel of the road-rail vehicle to an on-off tracking point for removal to depot for repair of the vigilance malfunction. Under these circumstances driver only operation is not permitted – a second person must be present on the road-rail vehicle as it travels to the on-off tracking point. Where the vigilance system is isolated a visual indication shall be provided to the driver. Road-rail vehicles with a broken vigilance seal are not permitted to access or operate on the ATN.

The road-rail vehicle shall be configured to ensure that the vigilance system can automatically distinguish between travel and work modes. When in travel mode the vigilance system shall be fully operational. When in work mode the road-rail vehicle shall be configured to enable the vigilance system to be suppressed – the sealed isolation switch is not permitted to be used for this purpose. Suppression of the vigilance system is required to enable the road-rail vehicle driver to concentrate on work activities. The configuration shall ensure that the suppression of the vigilance is automatically cancelled when work mode is terminated. Where the vigilance system is suppressed a visual indication shall be provided to the driver.

Details of the type, operation and configuration of the vigilance system shall be provided.

20 Event Recorders

An event recorder shall be fitted to all road rail vehicles.

An event recorder shall be able to record the data in accordance with *AS 7502 Road Rail Vehicles*.

21 Communications

The road-rail vehicle shall have a communication system that is compatible with the ATN communication system.

22 Safety and Emergency Equipment

The road-rail vehicle shall be fitted with the following safety and emergency equipment:

- First aid kit
- Fire extinguisher compliant with *AS1841 Portable Fire Extinguishers*
- Torch
- At least two (2) red and one (1) white signalling flags
- Jack

23 Emergency Stop²

If the road-rail vehicle is designed to be operated or attended by more than one (1) person and more than one (1) emergency stop control is fitted, it must ensure that the multiple emergency stop controls are of the "stop and lock-off" type so that the road-rail vehicle cannot be restarted after an emergency stop control has been used unless that emergency stop control is reset.

24 Elevated Work Platforms (EWPs)

All elevated work platforms shall comply with:

- AS2550 Cranes, hoists and winches - Safe use – Mobile elevating work platforms
- Work Safe SA document Safeguard CS6 'Elevating Work Platforms'
- AS1418.10 – Cranes, hoists and winches - Mobile elevating work platforms

In travel mode all EWP componentry shall be fully retracted and secured. It is acknowledged, however, that where an EWP is working on successive overhead wiring electrification poles (nominally 60 metres apart) or progressively inspecting overhead wires that it is impractical to retract the platform to move the EWP from pole to pole or work point to work point. In addition, it may also be necessary for the platform to move while outside of the minimum structure clearance. Moving the EWP under these circumstances carries the risk of the platform striking structures in the corridor.

To manage this risk the PM/PRW shall ensure:

- that a Safety Management Plan or Safe Work Method Statement is developed that demonstrates that all risks have been identified and control measures put in place so far as is reasonably practicable.
- that the speed of the EWP does not exceed 6 km/hr or that specified by the EWP manufacturer if this is less;
- that the EWP is of a Type 3 design as defined in *AS1418.10* i.e. the control of the movement of the EWP is from the platform only for the duration of the work

² Work Health and Safety Regulations 2012 (South Australia)

The EWP shall be fitted with track clearers at the leading and trailing ends to remove any obstacles on the track that may cause a derailment.

Workers are not permitted to occupy the work platform during travel mode.

25 Height, Slew and Reach Restrictors

Road-rail excavators, elevated work platforms (EWP's), backhoes, front end loaders and cranes shall have all lifting equipment capable of elevating above the vehicle or slewing fitted with restrictors to automatically prevent over travel and ensure stability.

Where the vehicle is operating on electrified lines it shall be fitted with height restrictors.

26 Towing

Where a road-rail vehicle is used to tow a trailer, the arrangement shall comply with engineering standard *ENG-ENS-NIL-0023 Requirements for Certification of Rail Trolleys and Trailers* for the certification of rail trolleys and rail trailers.

27 Derailment Catch System

A derailment catch system shall be installed on the road-rail vehicle in accordance with *AS7502*. The distance from the engagement surface of the catch system to the back of the nearest wheel shall be no greater than 270mm to ensure the derailed wheel does not travel beyond the sleeper end.

28 Certification and Recertification

28.1 Certification

In order to be certified all road-rail vehicles shall comply with all of the requirements of this standard. The Road-rail Vehicle Certification Application Form, *ENG-FRM-RSG-0005 Road-Rail Vehicle and Rail Trolley & Trailer Certification Application Form* (See Appendix 1), must be completed by the applicant/owner to enable the vehicle to be assessed.

The process to be followed for certification of road-rail vehicles is shown in the flow chart in Appendix 8. This flow chart is intended to specify the action to be taken by the person responsible at each stage of the process towards certification.

The Application Form (See *Appendix 1*), *Document Review Checklist* (See *Appendix 2*), *General Condition Examination* (See *Appendix 3*), *600V Assessment* (See *Appendix 5*) and all associated test documentations shall be provided by the PM/PRW or TC Maintenance Operations Manager. For identification purposes photographs of the front, back and sides of the road-rail vehicle shall be provided. If elements of the required evidence are missing the PM/PRW or TC Maintenance Operations Manager will be requested to supply the missing information for further review.

Once certified the road-rail vehicle shall be issued with a certificate, *ENG-FRM-RSG-0001 Infrastructure Maintenance Rolling Stock Certificate Template* (See Appendix 4), and a certification label as shown in Appendix 6. The expiry date on a certificate shall be inserted by the Rolling Stock

Engineer. Any restrictions or limitation on the certificate are applied by Rolling Stock Engineer and/or Infrastructure Engineer following the recommendations provided by an Approving Engineer.

TC Infrastructure Maintenance Rolling Stock Register shall be updated at every new certification or re-certification.

Road-rail vehicles may be certified for a maximum 1 year period or period determined by Rolling Stock Engineer. Following the first year of certification an annual automatic renewal for a maximum of 2 further years (i.e. total 3 years including first certification year) may be granted in accordance with the Section 28.3.

Both the certificate and the label must be retained on the vehicle at all times when accessing and operating on the ATN. The road-rail vehicle driver must follow all restrictions or conditions as shown on the certificate and/or label. TC reserves the right to request the certificate for audit purposes at any time. The label must be attached to the vehicle in a prominent position.

28.1.1 Certification of Gauge Convertible Road-Rail Vehicles

The general condition examination in accordance with *ENG-FRM-RSG-0011 Road-Rail General Condition Examination Checklist* (See Appendix 3) shall be required for both standard gauge and broad gauge configurations for the application of a gauge convertible road-rail vehicle to access and operate on the ATN.

For any subsequent gauge conversion on the ATN during the certificate validity period, a detailed inspection by an approved Rolling Stock Examiner is required to ensure that the gauge conversion has been carried out correctly. A record of this inspection may be requested by TC at any stage during the operation on the ATN for auditing purposes.

28.2 General Condition Examination

The general condition examination, *ENG_FRM-RSG-0011 Road-Rail General Condition Examination Checklist* (See Appendix 3), is not intended to be an exhaustive assessment of all of the operating systems, components and sub-components of the road-rail vehicle. The examination enables TC to assess the road-rail vehicle to determine if its general condition is consistent with the level of compliance attributed by the PM/PRW or TC Maintenance Operations Manager in the document review. The examination is primarily visual in nature, with some checking, measuring, and testing of critical functions and structural elements.

28.2.1 External Contractor Supplied Road-Rail Vehicles

All External Contractor supplied road-rail vehicles are required to undergo the general condition examination. Any issues arising from the examination will need to be corrected before the road-rail vehicle can be certified.

28.2.2 TC Owned Road-Rail Vehicles

TC has contracted out the maintenance of its road-rail vehicles and it is an expectation that the contractual arrangement will include a maintenance regime that ensures that the requirement for a general condition assessment is satisfied by regular assessments and examinations. The Rolling Stock Engineer and the Infrastructure Engineer shall determine the requirement for a general condition assessment.

28.2.3 Rolling Stock Examiner

Only companies approved by TC are permitted to carry out the general condition examination. The companies must demonstrate the following competencies:

- Qualified in a relevant trade with knowledge of the purpose and safety requirements applicable to rail equipment fitted to road-rail vehicles.
- Complete understanding of the construction, functionality, maintenance and inspection requirements of rail guidance, traction and braking equipment fitted to road-rail vehicles.
- Competent in assessing and identifying rail wheel damage and profile condition.
- Familiarity with all operating controls and safety functions installed on road-rail vehicles.
- Familiarity with all interface requirements related to TC's overhead wiring system.
- Familiarity with RISSB AS 7502 Road Rail Vehicles.
- Capable of competently checking the operation of the rail guidance equipment.
- Competent in carrying out the testing requirements necessary to establish compliance with the specified acceptance criteria.

28.3 Recertification and Decertification

Where the certification is required to be extended past the initial 1 year period the Applicant / Owner, may use the form, *ENG-FRM-RSG-0002 Infrastructure Maintenance Rolling Stock Annual Confirmation* (See Appendix 7), to confirm annually (on the initial certification anniversary) the following:

1. That regular servicing has been carried out and includes all of the check items detailed in the General Condition Examination form used at the initial certification.
2. No modifications have been undertaken to the vehicle since the initial certification.
3. The vehicle has not been involved in any accidents or incidents since the initial certification.
4. A twist test has been carried out annually since the initial certification.
5. Crack testing of the stub axle has been carried out annually since the initial certification.
6. Equipotential bonding testing has been carried out annually since the initial certification.
7. All records are available for audit.
8. The vehicle is fit for purpose.

On receipt of the completed form the certification of the road-rail vehicle will be carried over for a further 1 year or period determined by the Rolling Stock Engineer and the vehicle owner advised accordingly. A 4 weeks grace period may be granted for the submission of the annual confirmation following the initial expiry date. During this period the road-rail vehicle shall not be allowed to access and operate on the ATN. Unless directed otherwise by the Rolling Stock Engineer there is no requirement for a new Application Form, Documents Review Checklist or General Condition Examination Checklist to be submitted with the Annual Confirmation Form.

A full recertification will be required at the end of the 2 automatic renewals period. Full recertification will require submission of a new Application Form, Documents Review Checklist and General Condition Examination Checklist in accordance with Section 28.1.

The road-rail vehicle may be decertified at any time at the discretion of TC. Typical circumstances where this may occur include, but are not limited to:

- Failure to provide the annual confirmation at the end of full certification period.
- A safety incident e.g. runaway, collision etc.
- Evidence of lack of maintenance.
- Substantial modification without notification to TC.

In the event of decertification the certificate and certification label will be removed from the road-rail vehicle and it shall not be permitted to access or operate on the ATN.

Following a safety incident (e.g. runaway, collision, derailment) the road-rail vehicle shall be removed from the ATN until an inspection has been carried out. Any identified issues shall be addressed before the road-rail vehicle is allowed to resume access and operation on the ATN.

28.4 Pre-work Inspection

Evidence must be provided that there is a pre-work start checklist for the vehicle. It is a requirement that the pre-work inspection be carried out daily or before the vehicle commences any operation on the ATN. All defects noted during the inspection must be recorded, reported and rectified before work commences.

TC reserves the right to audit the pre-work inspection records and log books at any time the road-rail vehicle is operating on the ATN.

28.5 Modifications

Where substantial modifications are made to a road-rail vehicle it will require recertification. A modification is considered substantial if it impacts in any way on the ability of the road-rail vehicle to operate safely on the ATN. Where there is doubt as to whether the modifications are substantial clarification shall be sought from the Rolling Stock Engineer.

All modifications made to the road-rail vehicle that have the potential to affect its ability to be fit for purpose shall be notified to TC for assessment.

28.6 Submission Time Frame

All submissions related to certification or recertification of road-rail vehicles are to be emailed to the following email address:

RS_Eng@torrensconnect.com.au

Submission of all documentation in a single emailed pack at least 10 working days prior to any planned work on the ATN is essential for an efficient and smooth certification process.

I. Appendix 1

Road-Rail Vehicle Certification Application Form



Road-Rail Vehicle and Rail Trolley & Trailer Certification Application Form

Applicant Name			
Applicant Contact Details			
Vehicle Name and Type			
Vehicle Registration Number		Vehicle Serial Number:	
Vehicle Details	Make: _____ Year: _____ <input type="checkbox"/> Crane <input type="checkbox"/> EWP <input type="checkbox"/> Excavator <input type="checkbox"/> Backhoe <input type="checkbox"/> Front End Loader Number of Axles: _____ Axle Spacing (mm): _____ <input type="checkbox"/> Insulated <input type="checkbox"/> Non-Insulated <input type="checkbox"/> Both (Adjustable) Road-Rail Manufacturer: _____ Road-Rail Serial Number: (E)____ (R)____		
Vehicle Dimensions (mm)	Height: _____	Width: _____	Length: _____
Vehicle Maximum Speed (km/hr)		Vehicle Mass (tonnes)	Tare: _____
Vehicle Owner (If different to Applicant)			
Vehicle Owner Contact Details			
Reason for Accessing AMPRN	<input type="checkbox"/> Electrified Network <input type="checkbox"/> Non-Electrified Network <input type="checkbox"/> Both		
Vehicle Gauge	<input type="checkbox"/> Standard (1035 mm) <input type="checkbox"/> Gauge Convertible		
Certification Type	<input type="checkbox"/> New Certification <input type="checkbox"/> Recertification		
Vehicle Type	<input type="checkbox"/> 1 Self-Powered Traction and braking directly on rail wheels	<input type="checkbox"/> 2 High Ride Traction and braking on road wheels, in contact with rail wheels. Use of Friction drums or roller (Not Preferred)	<input type="checkbox"/> 3 Low Ride Traction and braking on road wheels; rail wheels are for guidance only
Declaration I declare that the information submitted is correct to the best of my knowledge and complies with TC document <i>ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network</i> , or document <i>ENG-ENS-NIL-0047 Requirements for Rail Trolleys and Trailers Accessing and Operating on the Adelaide Tram Network</i> .			
Name			
Signature		Date	
Contact Details			
Acknowledged by TC Project Manager / Person Responsible for the Works	Name:	Title:	
	Signature:	Date:	

II. Appendix 2

Road-Rail Vehicle Document Review Checklist



Road Rail Vehicle Documents Review Checklist

ROAD RAIL VEHICLE DETAILS						
Review Time		Road Vehicle Registration No.				
Vehicle Make		Vehicle Year				
Vehicle Description	<input type="checkbox"/> Crane <input type="checkbox"/> EWP <input type="checkbox"/> Excavator <input type="checkbox"/> Backhoe <input type="checkbox"/> Front End Loader					
	Other:		Date Road-Rail Guidance System Fitted			
Serial Number				Odometer / Hour Reading		
Applicant / Owner						
Reviewed By	Name:				Title:	
Company Details						
Item No.	Description	Compliant			Details of Supporting Evidence	Non-Compliance Details and Control
		Yes	No	N/A		
Approvals and Engineering Reports						
1	Does the vehicle have a current engineering report demonstrating structural integrity of the road-rail System?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2	Is there evidence that issues that resulted in the failure of a previous application for certification have been addressed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3	Is there evidence provided that the vehicle has been approved for use in other railway networks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4	Has the vehicle been subject to substantial modification from the original design since last certified on the Adelaide Tram Network?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5	Is there evidence provided that the modification has been the subject of an engineering report?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
6	Does the modification comply with AS 7502 Road-rail vehicles and relevant TC standards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Maintenance Records						
7	Is there evidence provided of a valid maintenance regime for the vehicle?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8	Is there evidence provided that the vehicle is being maintained to that regime?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9	Are the maintenance records up to date?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10	Is there any deferred work that may affect the operation of the vehicle on the Adelaide Tram Network?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11	Is there evidence of a pre-work inspection regime?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Road Registration and Compliance of Road-Rail Vehicles						
12	Is there evidence that the vehicle is registered in accordance with AS7502 Road-Rail Vehicles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Emergency Off-Tracking System						
13	Is there evidence that the vehicle has an emergency off-tracking system in accordance with AS7502 Road-Rail Vehicles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Transferring To and From Rail Operation						
14	Is there evidence that the method of transfer for road to rail mode or rail to road mode complies with AS7502 Road-Rail Vehicles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Vehicle Chassis and Rail Guidance Equipment						
15	Is there evidence that the rail guidance equipment is fitted with compliance plates in accordance with AS7502 Road-Rail Vehicles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
16	Is there evidence of stub axle crack testing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
17	Is there evidence of rail axle crack testing? (At 10 years and every 2 years thereafter)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
18	Is there evidence of rail wheel crack testing? (At 10 years and every 2 years thereafter)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
19	Is there evidence of rail guidance structural elements crack testing? (At 10 years and every 2 years thereafter)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Vertical and Safe Working Load						
20	Is there evidence that the vertical load configuration complies with AS7502 Road-Rail Vehicles and Section 10 of ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
21	Is there evidence that the safe working loads (SWLs) for cranes, excavators, backhoes and front-end loaders have been determined and comply with all the necessary legislation and standards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
22	Is there evidence that the safe working load for cranes, excavators, backhoes and front-end loaders is displayed in such a way that it is visible to operators?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Vehicle Outline						
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

23	Is there evidence provided that the vehicle's static outline complies with Section 12 of <i>ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
24	Is there evidence provided that the kinematic vehicle outline complies with Section 12 of <i>ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
25	Is there evidence that the locking system for retractable components will ensure that vehicle does not infringe TC's Rolling Stock Outline or Structural Clearance Standards in travel mode?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Track Forces and Stresses		✓	x	✓		
26	Is there evidence that the vehicle complies with AS7502 <i>Road-Rail Vehicles</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Dynamic Behaviour and Speed & Ride Performance		✓	x	✓		
27	Is there evidence that the vehicle complies with AS7502 <i>Road-Rail Vehicles</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
28	Is there evidence that the vehicle complies with Section 13 of <i>ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Suspension, Axles and Axle Bearings		✓	x	✓		
29	Is there evidence that the suspension complies with AS7502 <i>Road-Rail Vehicles</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
30	Is there evidence that the axles comply with AS 7502 <i>Road-Rail Vehicles</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
31	Is there evidence that the axle bearings in accordance with AS 7502 <i>Road-Rail Vehicles</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Brakes		✓	x	✓		
32	Is there evidence that the service brakes comply with AS 7502 <i>Road-Rail Vehicles</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
33	Is there evidence that the parking brake complies with AS 7502 <i>Road-Rail Vehicles</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Wheels and Traction Drive		✓	x	✓		
34	Is there evidence that the wheels of the road-rail vehicle comply with Section 17 of <i>ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

35	Is there evidence that the wheel profile is compatible with the Adelaide Tram Network's infrastructure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
36	Is there evidence that the wheel diameter complies with TC's Rolling Stock Standard: <i>ENG-ENS-NIL-0026 Tram wheel inspection and defects standard</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
37	Is there evidence that the vehicle is fitted with effective traction control to prevent wheel spin?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Insulation		✓	x	✓		
38	For insulated vehicles is <u>there</u> evidence that the vehicle has effective electrical isolation in accordance with Section 16 of <i>ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
39	For non-insulated vehicles, is there evidence that the vehicle meets the resistance requirements in accordance with Section 18 of <i>ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Operation on Live Electrified Lines		✓	x	✓		
40	Is there evidence the road-rail vehicle has been equipotentially bonded and tested in accordance with Section 20 of <i>ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
41	Has the road-rail vehicle been assessed to ensure it is not affected by electromagnetic interference and does not generate electromagnetic interference that could affect railway signalling and communication equipment in accordance with Section 20 of <i>ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
42	Have the component and sub-component parts of the road-rail vehicle been assessed for susceptibility and immunity to electromagnetic induced current in accordance with Section 20 of <i>ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Rail Guidance Equipment Status Indications		✓	x	✓		
43	Is there evidence that the vehicle is fitted with Rail Guidance Equipment Status indicators in accordance with AS7502 <i>Road-Rail Vehicles</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Audible Warning Device		✓	x	✓		
44	Is there evidence that the vehicle is fitted with an Audible Warning Device in accordance with AS 7502 <i>Road-Rail Vehicles</i> ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Lighting and Visibility		✓	x	✓		
45	Is there evidence that the road-rail vehicle lighting and visibility complies with AS7502 Road-Rail Vehicles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Driving Cabs		✓	x	✓		
46	Is there evidence that the road-rail vehicle driving cab complies with AS7502 Road-Rail Vehicles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Vigilance System		✓	x	✓		
47	Is there evidence that the road-rail vehicle vigilance system complies with Section 19 of ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Event Recorder		✓	x	✓		
48	Is there evidence that the road-rail vehicle is fitted with an event recorder in accordance with Section 20 of ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Communication system		✓	x	✓		
49	Is there evidence that the road-rail vehicle has a communication system compatible with the Adelaide Tram Network's communication system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Safety and Emergency Equipment		✓	x	✓		
50	Is there evidence that the road-rail vehicle is fitted with safety & emergency equipment in accordance with Section 22 of ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Derailment Catch System		✓	x	✓		
51	Is there evidence that the road-rail vehicle is fitted with a derailment catch system in accordance with AS7502 Road-Rail Vehicles?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Height, Slew and Reach Restrictors		✓	x	✓		
52	Is there evidence that the road-rail vehicle is fitted with height, slew and reach indicators in accordance with Section 25 of ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Elevated Work Platforms (EWPs)		✓				
53	Is there evidence that the EWP complies with the AS1418.10 Crane, hoists, and winches – Mobile Elevating Work Platforms?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

54	Is there evidence of the EWP inspection by competent person in accordance with the requirements of AS204610 Cranes, hoists, and winches – Safe use – Mobile elevating work platforms?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
General		✓	x	✓		
55	Are vehicle photographs provided in accordance with Section 28 of ENG-ENS-NIL-0023 Requirements for Road-Rail Vehicles Accessing and Operating on the Adelaide Tram Network?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
56	Is there evidence of the risk assessment for external vehicles in normal, degraded and emergency modes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
The documentation supplied by the Applicant has been reviewed against the requirements detailed in the checklist.				<input type="checkbox"/> Satisfactory <input type="checkbox"/> Unsatisfactory		
Approving Engineer <small>(Please list any special operational conditions or restrictions in comment box below)</small>						
Name		Signature			Date	
Contact Details						
Comments	List all special operational conditions or restrictions					

III. Appendix 3

Road-Rail Vehicle General Condition Examination

Road Rail Vehicle General Condition Examination Checklist

Review Date		Road Vehicle Registration Number				
Vehicle Make		Vehicle Year				
Vehicle Description		<input type="checkbox"/> Crane <input type="checkbox"/> EWP <input type="checkbox"/> Excavator <input type="checkbox"/> Backhoe <input type="checkbox"/> Front end loader				
		Other:		Date Road Rail Guidance System Fitted:		
		Road Rail Guidance System Serial Number: (F)		(R)		
Serial No		Odometer/Hour Reading				
Applicant / Owner						
Inspected by		Name:		Title:		
Company Details						
		1st Inspection		2nd Inspection		N/A
		Pass	Fail	Pass	Fail	
Item No.	Record Keeping	✓	✗	✓	✗	✓
1	Check maintenance inspection records for correct reporting of faults.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Check the vehicle is registered with relevant National, State or Territory legislative and regulatory requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Check rail guidance equipment is fitted with compliance plate.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Road Rail Vehicle Classification						
4	Check the classification type of Road rail vehicle.	Type: <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3				
Emergency Off-Tracking System						
5	Check the emergency off-tracking system for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transferring to and from Rail Operation						
6	Is the transfer of the road-rail vehicle to and from rail operation satisfactory?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle Chassis and Rail Guidance Equipment						
7	Check the vehicle chassis and rail guidance equipment for condition, cracks, wear, excessive corrosion, lack of lubrication & damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Check all hydraulic systems and associated equipment for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vertical Load						
9	Is loading configuration satisfactory?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Measure rubber tyre width						
10	Wheel	Measurement/Category				
		Front	Rear			
	Minimum width	mm	mm			
	Maximum width	mm	mm			
Road Rail Vehicle Outline						
11	Check that the overall height and width of the Road-Rail Vehicle does not exceed the limits for the Adelaide Tram Network Rolling Stock static outline.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12	For componentry that exceeds the Adelaide Tram Network Rolling Stock static outline in work mode check the retracting and locking mechanisms in travel mode for correct function/damage.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dynamic Vehicle Behaviour			✓	✗	✓	✗	✓
13	Conduct twist test in accordance with RS4-DOC-001299 Static Twist Test for Rolling Stock to satisfy maximum wheel unloading requirement						
	Vehicle Side	Maximum % wheel unloading					
		Front rail wheel	Rear rail wheel				
	Left			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Rail Wheels, Axles, Wheelsets & Suspension			✓	✗	✓	✗	✓
14	Check rail wheels & wheelsets for condition, cracks, wear, damage & correct/matching dimensions.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Check axles for condition, cracks, wear, and damage.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Check axle bearings for wear and damage.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Check suspension for condition, cracks, wear and damage.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Check back-to-back gauge of front and rear rail wheels. (Back-to-back 1387 – 1389mm for Tram Network).						
	Back-to-back gauge – front	Back-to-back gauge – rear					
		mm	mm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Check the wheel alignment toe-in (3 mm is maximum allowed)						
	Wheel	Left	Right	Difference			
	Front	mm	mm	mm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Rear	mm	mm	mm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brakes			✓	✗	✓	✗	✓
20	Test service and parking brake for correct function in full load condition.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Conduct full emergency application of service brake to satisfy minimum requirement						
	Parameter	Measurements					
	Initial Speed	km/h	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Deceleration	m/s ²	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Stopping Distance	metres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Test parking brake holding ability on 1 in 30 grade track for at least 10 minutes.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Check that provision has been made for the manual release (conscious action by the operator) of the fail-safe parking brake in a recovery situation.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Check the automatic application of the parking brake for correct function/damage. (Loss of brake energy, engine shut down, vigilance time out & operator alighting the vehicle)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Check the visual indication showing the parking brake status for correct function/damage.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Check the emergency stop for correct function/damage. (Road-rail vehicle cannot be restarted after an emergency stop control has been used unless that control is reset)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Signal Detection Interface	✓	✗	✓	✗	✓
27	Where the road-rail vehicle has facility to interchange from insulated to non-insulated check for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Rail Guidance Equipment Status Indication	✓	✗	✓	✗	✓
28	Check rail guidance equipment status indicator for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Audible Warning Devices	✓	✗	✓	✗	✓
29	Check warning horns for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	Check reversing and movement awareness alarms for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Lighting and Visibility	✓	✗	✓	✗	✓
31	Check all lighting for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	Where interlocked - check headlights, stop lights, taillights and marker lights to ensure they are suitably interlocked with the direction of travel.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33	Check flashing beacons for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34	Check reflective delineators are fit for purpose.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Driving Cabs	✓	✗	✓	✗	✓
35	Check driving cab for seating comfort, condition, access, egress, and emergency exit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36	Check that the vehicle is fitted with rear vision devices and that they are functioning correctly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37	Check all controls and actuators for correct marking, illumination, and function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38	Check all interior lighting for correct level and function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39	Check the control which prevents the transition, of both front and rear rail guidance equipment at the same time, from road to rail.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40	Check rail wheel deployment controls to ensure that the vehicle cannot be placed on rail in an unbraked condition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41	Check the speed indicating device for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Vigilance System	✓	✗	✓	✗	✓
42	Check vigilance system for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43	Check isolation seal intact.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44	Check suppression system for correct function / damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45	Check the automatic configuration of vigilance system, which distinguishes between work & travel mode, for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Event Recorder	✓	✗	✓	✗	✓
46	Check event recorder for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Communications System	✓	✗	✓	✗	✓
47	Check communication system for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Safety & Emergency Equipment	✓	✗	✓	✗	✓
48	Ensure that all safety and emergency equipment is fitted and check for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Derailment Catch System	✓	✗	✓	✗	✓
49	Check <u>derailment</u> catch system for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Height, Slew and Reach Restrictors	✓	✘	✓	✘	✓
50	Check height, slew and reach restrictors and locking devices for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Elevated Work Platforms (EWPs)	✓	✘	✓	✘	✓
51	Check crane or EWP for correct function/damage.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	General	✓	✘	✓	✘	✓
52	Is Road-rail vehicle generally in good condition for the road network?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

This road-rail vehicle has been examined for general condition against the above checklist	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Unsatisfactory
---	--

Comments

Sample only

Authorized Representative of Rolling Stock Examiner					
Name		Signature		Date	
Position		Phone			



IV. Appendix 4

Road-Rail Vehicle Certificate Template



Infrastructure Maintenance Rolling Stock Certificate

Criteria	Details
Applicant Name	
Applicant Contact Details	
Vehicle Name / Type	
Vehicle Registration Number	
Vehicle Owner (if different to applicant)	
Vehicle Owner Details	
Access Track Gauge	<input type="checkbox"/> Standard (1435 mm)
Allowed to access track under live overhead	<input type="checkbox"/> Yes (See Electrical labels for <u>conditions</u>) <input type="checkbox"/> No
Insulation Status	<input type="checkbox"/> Insulated <input type="checkbox"/> Non-Insulated <input type="checkbox"/> Switchable

Sample only

Any Restrictions / Constraints:

Infrastructure Manager		
Name:	Signature:	Date:
Rolling Stock Reliability Engineer		
Name:	Signature:	Date:

EXPIRY DATE:

The above vehicle is approved to access and operate on the Adelaide Tram Network with above restrictions and compliance with this certificate. This certification is valid **until the date specified above.**

Certificate Number:



V. Appendix 5

Assessment for on Track Plant in 600V OHW Areas



Assessment for On-Track Plant in 600V OHW Areas

Plant / Vehicle Details			
Vehicle Make:		Vehicle Year:	
		Vehicle Rego:	

Assessment Criteria – by Examining Company				
Reference	Compliance		Evidence	Comments
	Yes	No		
Equipotential Bonding	<input type="checkbox"/>	<input type="checkbox"/>		
Electromagnetic Compatibility	<input type="checkbox"/>	<input type="checkbox"/>		
Protection from Overhead Line Equipment	<input type="checkbox"/>	<input type="checkbox"/>		
Working and Travelling under Live Overhead Equipment	<input type="checkbox"/>	<input type="checkbox"/>		
On and Off Tracking Vehicles	<input type="checkbox"/>	<input type="checkbox"/>		
Sign Off				
Name:		Title:		
Company Details:				
Signature:		Date:		

Approval Conditions – by T1 Infrastructure Engineer				
Conditions / Limitations	Yes	No	N/A	Comments
Prohibited from 600V OHW areas unless Isolated, Earthed and Certificate of Isolation issued to PRES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Permitted to Travel in live 600V OHW areas with Restrictions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Permitted to Travel in live 600V OHW areas without Restrictions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Permitted to Work in live 600V OHW areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Permitted to On/Off Tracking in live 600V OHW areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sign Off				
Name:		Title:		
Signature:		Date:		
Valid Until:				

VI. Appendix 6

Certification Label

ADELAIDE TRAM NETWORK CERTIFIED


VEHICLE ID.....

VALID UNTIL.....

RESTRICTIONS.....

.....

STANDARD GAUGE


Torrens Connect[®]

VII. Appendix 7

Annual Certificate Confirmation Form



Infrastructure Maintenance Rolling Stock Annual Certificate

Criteria	Details
Vehicle Name / Type	
Vehicle Registration Number / Unique Identifier	
Date of Initial Certificate	

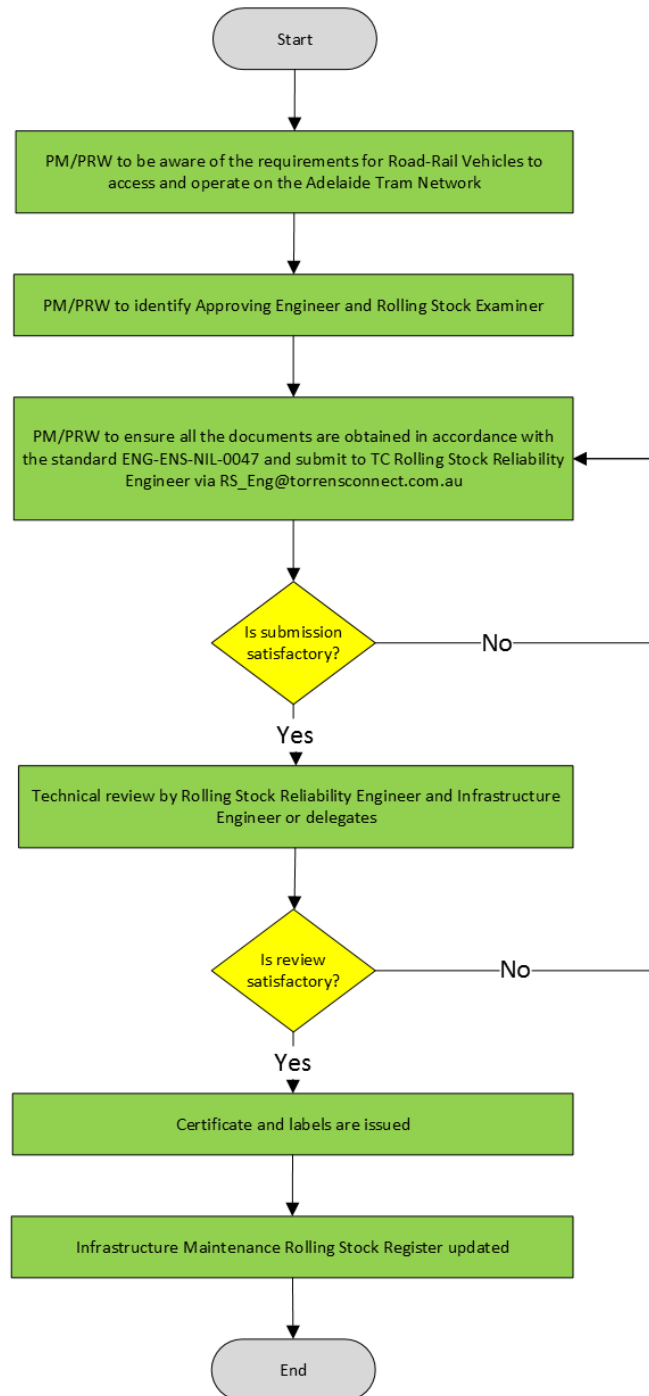
I / We confirm the following:

Item No.		Pass	Fail
		✓	x
1	That regular servicing has been carried out and includes <u>all</u> of the check items detailed in the <i>General Condition Examination form</i> used at the initial certification.	<input type="checkbox"/>	<input type="checkbox"/>
2	No modifications have been undertaken to the vehicle since the initial certification.	<input type="checkbox"/>	<input type="checkbox"/>
3	The vehicle has not been involved in any accidents or incidents since the initial certification.	<input type="checkbox"/>	<input type="checkbox"/>
4	Twist test has been carried out annually since the initial certification.	<input type="checkbox"/>	<input type="checkbox"/>
5	Crack testing of the steel axle has been carried out annually since the initial certification. (Only for road-rail vehicles)	<input type="checkbox"/>	<input type="checkbox"/>
6	Equipotential bonding testing has been carried out annually since the initial certification.	<input type="checkbox"/>	<input type="checkbox"/>
7	All records are available for audit.	<input type="checkbox"/>	<input type="checkbox"/>
8	The vehicle is fit for purpose.	<input type="checkbox"/>	<input type="checkbox"/>

Name:	Signature:	Date:
Company Details:		
Acknowledged by TC Project Manager / Person Responsible for the Works		
Name:	Signature:	Date:
Title:		

VIII. Appendix 8

Certification and Approval Process Flow Chart



- ENG-FRM-RSG-0005 Certification and Application Form - **Applicant/Owner**
- ENG-FRM-RSG-0006 Documents Review Checklist - **Approving Engineer (appointed by TC)**
- ENG-FRM-RSG-0011 General Condition Examination - **Rolling Stock Examiner (approved by TC)**
- ENG-FRM-RSG-0003 Assessment for 600V OHW Areas - **Rolling Stock Examiner (approved by TC)**
- ENG-FRM-RSG-0002 Annual Confirmation - **Applicant/Owner**
- ENG-FRM-RSG-0001 Certificate - **Rolling Stock Reliability Engineer**