EHS-PR-001 –

Interstate Environmental Management Framework (IEMF)

Applicability

Interstate Network

Publication Requirement

Internal / External

Primary Source

N/A

Document Status

Version #	Date Reviewed	Prepared by	Reviewed by	Endorsed	Approved
1.0		Michael Moller	Catherine Bowlzer	Ben Leske	Peter Winder, Group Executive, Interstate Network
1.1	August 2020	Michael Moller	Catherine Bowlzer	Ben Leske	Peter Winder, Group Executive, Interstate Network

Amendment Record

Amendment Version #	Date Reviewed	Clause	Description of Amendment
1.0	N/A		N/A
1.1	May 2020	Multiple	Minor updates

1.1	August 2020	Appendix B	Minor updates to reflect project status.

Table of Contents

Table of Contents

1 Introduction

1.1 Purpose

The Interstate Environmental Management Framework (the Framework) is a document that:

- Describes desired outcomes and processes for the prevention and management of environmental impacts resulting from the operation of the standard gauge Interstate Rail network;
- Sets out the responsibilities and accountabilities within ARTC (the Railway Manager) and others in this regard; and
- Identifies key management systems that support the delivery of environmental compliance across the ARTC Interstate Network.

1.2 Scope

The Framework document is strictly focussed on the function of ARTC's Interstate Network business unit operations and its' contractors, in undertaking railway activities: control of railway operations and routine railway infrastructure maintenance activities.

In accordance with conditions D2 and D3 of the Critical State Significant Infrastructure (SSI 7475), this plan has been prepared to outline how the terms of the conditions of approval (CoA) will be addressed and complied with, regarding operational activities (see table 1 over page).

All other approval requirements and mitigations identified are tabled and addressed in the Pre-operation Compliance Report for the Parkes to Narromine component of Inland Rail, inclusive of the Northwest Connection near Parkes.

Table 1: Parkes to Narromine conditions of approval requirements for an Environmental Management System or equivalent.

CoA ID	Description	Relevant section
D1	An **Operational Management Plan (OEMP)** must be prepared in accordance with the Guideline for the Preparation of Environmental Management Plans (DIPNR, 2004) to detail how the performance outcomes, commitments and mitigation measures made and identified in the EIS and Submissions Report will be implemented and achieved during operation. This condition (**Condition D1**) does not apply if **Condition D2** of this approval applies.	D2 Applies
D2	An OEMP is not required for the CSSI if the Proponent has an **Environmental Management System (EMS)** or equivalent as agreed with the Secretary, and can demonstrate, to the written satisfaction of the Secretary, that through the EMS: (a) the performance outcomes, commitments and mitigation measures, made and identified in the EIS and Submissions Report, and terms of this of approval can be achieved; (b) issues identified through ongoing risk analysis can be managed; and (c) procedures are in place for rectifying any non-compliance with this approval identified during compliance auditing, incident management or any other time during operation.	This Framework Document
D3	The performance measures and mitigation measures detailed in the OEMP must address the maintenance of culverts with respect to blockages, siltation and scouring.	See Pre-operation Compliance Report
D4	The OEMP or EMS (or equivalent) as agreed with the Secretary must be submitted to the Secretary for information at least one (1) month prior to the commencement of operation of the CSSI.	Submitted

Major capital upgrades and construction activities will be subject to additional environmental assessment requirements under Federal and State laws and regulations.

1.3 Responsibilities

All ARTC procedures and work instructions outline responsibilities for specific activities. Some key responsibilities are summarised below with others outlined throughout the document.

Roles	Responsibilities
Chief Executive Officer	Approve the ARTC Environmental Policy. Authorise any communication with media representatives and the general public on all matters concerning the Environmental Management System including but not limited to; environmental incidents and emergencies, environmental complaints and procedures and very high/high environmental risks effects and consultation with the public.
Executive Committee	Approve the Environmental Management System.
Operational Safety and Environment Review Committee (OSERC)	Monitor and review the performance and effectiveness of all elements of the EMS. Identify existing and emerging environmental risks. Ensure compliance with legal, statutory and internal policies and procedures requirements. Advise the CEO and Executive Safety and Environment Committee on environmental issues that may impact upon ARTC's environmental performance. Review the occurrence of major environmental incidents and the corrective actions. Regularly review environmental risks on the Corporate Risk Register and recommend appropriate changes as necessary. Review and approve new and revised Corporate level environmental documents.
Group Executive (GE) / General Managers (GM)	Initiate any preventative measures to mitigate, rectify or prevent environmental harm arising from activities, incidents, breaches or audits. Ensure that alliance partners and contractors who are engaged to undertake activities on property managed by ARTC, have the systems in place to meet the requirements of the EMS. Ensure that the environmental aspects of projects are assessed and managed in accordance with ARTC's requirements. Ensure that all rail operators comply with the ARTC EMS.
Principal Advisor Safety and Environment	Provide advice to the GE Interstate to enable the above objectives of the Committee to be fulfilled. Oversee the impact and responses to legislative and policy developments in the environmental field, which may have material impact on ARTC. Report breaches and non-conformances of the EMS to the GE Corporate Services and Safety. Ensure appropriate risks and environmental matters are assessed and maintained in the ARTC Risk Register. Keep the GM Risk, Safety and Environment (and others as appropriate) up to date on all material environmental matters and any significant environmental incidents.

	Liaise with regulatory authorities and industry bodies as required and ensuring compliance with all laws and regulations as appropriate.
	Promptly advise the GM Risk, Safety and Environment upon receipt of any statutory notice and take appropriate action in support of responding to that notice.
Senior Environment & Community Advisors	Develop and promote the IEIMF to control adverse environmental impacts.
	Promptly reporting all environmental incidents.
	Maintaining records in accordance with the IEMF.
Environment & Community Advisors	Ensure that environmental incidents, non-conformances and complaints within ARTC are reported, recorded, investigated and corrective actions are managed (and monitored) and recommendations implemented.
	Provide technical expertise, advice and appropriate training in environmental management matters to enable ARTC employees.
	Liaison with Environmental Regulators as required.
Managers Project Managers	Ensure that new employees, alliance partners and contractors inducted to their place of work are aware of their responsibilities as outlined in the EMS and specific to their position and training.
	Ensure that employees with environmental responsibilities have appropriate training.
	Ensure systems are in place and/or followed and functioning to comply with relevant legislation.
	Complete TBEIAs for all rail maintenance activities.
Network Controllers Train Transit Managers	Comply with relevant plans, procedures and instructions.
	Report all environmental incidents and complete the Pollution Report.
	Undertake external notification to environmental authorities as required.
Employees	Adhering to procedures developed by ARTC.
	Identifying, assessing and avoiding or mitigating any adverse environmental impact that may result from carrying out activities including the construction and maintenance of ARTC infrastructure.
	Reporting any environmental incident or breach to the appropriate Environmental Advisor and respective Corridor Manager and providing any support necessary to facilitate the investigation and reporting of any environmental incident.
Alliance Partners Contractors	Comply with all applicable environmental legislation and the ARTC EMS.
	Report promptly to ARTC any environmental incident or complaint.
	Ensure their employees, contractors and sub-contractors comply with applicable legislation and align with ARTC's EMS.

1.4 Related Documents

The following documents support this framework:

- ENV-PR-001 Environmental Management System

- ENV-WI-002 Pollution Incident Response
- ENV-PR-004 EMP for Operators on the ARTC Network
- ENV-WI-004 Standard Environmental Management Measures
- ENV-PR-005 Environmental Site Inspection
- ENV-WI-005 Task Based Environmental Impact Assessment
- RLS-PR-001 Risk Management
- RLS-PR-044 Emergency Management
- EGP-20-01 Project Management
- ENV-FM-025 Pollution Report
- ENV-FM-024 Environmental Incident Checklist
- ENV-GL-001 State Environmental Limitations
- EGP-10-01 Asset Management System
- COR-PR-011 Incident Investigation
- COR-PR-012 Incident Reporting
- LEG-PR-003 Internal Audit Procedure

1.5 Definitions

The following terms and acronyms are used within this document:

Term or acronym	Description
ARTC	Australian Rail Track Corporation Ltd.
ARTC Corporate Headquarters	11 Sir Donald Bradman Drive, Keswick Terminal, South Australia 5035.
ARTC Map	ARTC's Geographical Information System that contains datasets of known places of environmental sensitivity such as waterways, cultural heritage, flora and fauna within the rail corridor and extending 500m either side.
ARTC Risk Matrix	A standardised method of scaling risk analysis across different aspects of the business including environment, financial, and safety.
Consultation Manager	ARTC's online enquiry and complaints handling system used to record and track enquiries and complaints and the work done to address them.
Contaminated Land Database (CLD)	ARTC's Contaminated Land Database (excludes State regulatory databases).
Contam-Map Library	ARTC's SharePoint Library of contaminated land reports and associated information used to populate the Contam-Map Register. This forms part of the ARTC CLD.

Term or acronym	Description
Contam-Map Register	ARTC's SharePoint Register of contaminated land and dataset information used to inform priorities and exposure risks. This forms part of the ARTC CLD.
Ellipse	ARTC's asset management system.
Enterprise Risk Management System (ERMS)	A system that is utilised to record and manage risks, controls, treatments and actions across the whole of the organisation, including projects. CGR foundation is ARTC's mandated Enterprise Risk Management System.
Enviro Essentials	Legal compliance system.
Enviroline	ARTC's enquiry and complaints handling service.
Environmental Incident Response Contractor	A pre-approved contractor with the required qualifications and competencies to carry out environmental incident response activities.
Environmental Management System (EMS)	Part of an organisation's overall management system that focuses on the development and implementation of its environmental policy and the documenting and management of very high/ high environmental risks.
Environmental Non-Conformance	The absence of, or failure to, implement or maintain documented environmental requirements.
Environmental Risks	An organisation's activities or services (e.g. infrastructure maintenance, train operations) that can cause actual or potential threat of adverse effects on living organisms and the environment.
Formal Risk Assessment	A full, documented risk assessment that identifies risks, causes, consequences and controls associated with organisational objectives, operational activities, projects and change.
Noise Prediction Tool (NPT)	An online tool that provides quantitative noise assessment useful for determining impact on noise sensitive receivers.
OSERC	Operational Safety and Environment Review Committee
Site Inspection	The process used to assess site environmental performance and to identify potential environmental non-conformances.
Standard Environmental Management Measures (SEMMs)	A set of management measures developed to manage common environmental impacts identified during routine infrastructure maintenance activities.
Task Based Environmental Impact Assessment (TBEIA)	A document detailing the environmental impacts and associated SEMMs for maintenance tasks performed by ARTC.
Track Access Agreement (TAA)	A legal agreement between ARTC and an Operator which defines the conditions under which ARTC agrees to grant the Operator access to the network.
WI	Work Instruction

2 Management Systems

ARTC is the rail infrastructure manager for the defined Interstate Rail Network that runs through Queensland, New South Wales, Victoria, South Australia and Western Australia. In this role, ARTC manages the operation of the rail network and the maintenance of the rail infrastructure.

The rail infrastructure that ARTC maintain include the rail track, sleepers, associated electrical components, level crossings, as well as structures including bridges, culverts and buildings associated with rail operation.

To help ensure ARTC's role as rail infrastructure manager is carried out according to relevant state and federal requirements, ARTC have developed a range of processes and systems to manage, plan, assess and review the environmental aspects of maintenance and operations.

2.1 Environmental Management System

ARTC operates under an Environmental Management System (EMS) that provides a structured framework for the consideration, evaluation, management, compliance and reporting of environmental issues associated with ARTC, operator and contractor activities on the rail network. ARTC has developed the EMS in consideration of ISO14001 – Environmental Management Systems.

ARTC's EMS outlines processes that are designed to guide compliance with environmental laws, statutes, regulations and corporate policies while managing ARTC's environmental impacts.

The EMS is used in accordance with the Environmental Management System Procedure.

2.1.1 SharePoint EMS

The SharePoint EMS site is the central location for recording key environmental information including:

- Environmental Site Inspections;
- Environmental Incidents;
- Contaminated Sites;
- Legislation Reviews;
- Environmental Training Conducted; and
- Operator EMP reviews and refuelling approvals.

ARTC monitor and report on the information within the SharePoint EMS to help the continuous improvement of ARTC's environmental management.

2.2 Asset Management System

ARTC's asset management system Ellipse is used to manage and track the condition, maintenance requirements, monitoring commitments and compliance requirements for all ARTC assets.

ARTC assets include all track and rail infrastructure as well as environmentally relevant sites including, but not limited to the following:

- Contaminated sites;
- Heritage structures, sites and buildings;
- Noise walls;
- Fauna furniture;
- Environmental monitoring equipment / locations;
- Invasive weed species sites; and
- Threatened species and threatened community locations.

All assets within Ellipse have maintenance and monitoring requirements, including relevant frequencies and dates that informs ARTC's environmental compliance priorities.

Use of the Ellipse system is governed by the Asset Management System Procedure.

The environmental asset class strategy guides the framework for how environmental related sites are entered, maintained, assessed and prioritised for rectification management (if required).

2.3 Geographical Information System

ARTC Map is ARTC's internal GIS mapping system that supports primary EIA process for rail maintenance activities. ARTC Map contains state, commonwealth and ARTC developed environmental, planning and geotechnical datasets for Qld, NSW, Vic, SA and WA. Data including land contamination, threatened species sightings, cultural heritage and surface water locations are included to provide a single desktop resource for assessing the environmental values across the ARTC network.

All data within ARTC Map is updated on a regular basis, or as the data source provider allows and extends outside of the rail corridor where possible to provide regional context and ensure potential offsite environmental impacts are captured in EIA activities.

ARTC have several supporting materials and training options to guide use in the ARTC Map system.

2.4 Incident and Corrective Action Management System

Incidents, investigations and corrective actions are entered, tracked and close out using the ARTC No Harm system. This system is supported by a data analytics system to allow for the immediate view and interpretation of data, allowing for focused decision making.

2.5 Complaints Management System

ARTC maintain a centralised database of all complaints and enquiries via the Consultation manager system. The system logs relevant details, tracks and closes actions. The system allows for interpreted reporting of data.

Complaints and enquiries most commonly relate to, but are not limited to:

- Vegetation management;
- Noise; and
- Vandalism and Trespass.

The Interstate Community Notification and Complaint Management Guideline provides guidance in the appropriate management processes to ensure ARTC communities are notified of works and complaint response are consistent (see section 5.1.2 for more detail).

3 Environment Policy and Legal Requirements

3.1 ARTC Environment Policy

ARTC environmental policy is provided in Appendix A.

3.2 Legal

ARTC operates under the legal jurisdictions of South Australia, Victoria, Western Australia, New South Wales, Queensland and the Commonwealth of Australia. ARTC employees may access a Compliance Register which lists laws applicable to ARTC in all of these jurisdictions.

Subscription services to a number of external standards are available to employees to help inform of legislative changes and as a consolidated source of up-to-date legislation. This includes a subscription to Enviro Essentials which acts as ARTC's primary source of updated environmental legislation and informs ARTC of updates specific to all states ARTC operate in.

Environmental compliance requirements including lease conditions, are tracked and updated on an as needed basis, when key dates are reached, when new legislation is released or when legislation is revised and updated. Compliance requirements are incorporated into ARTC processes and documents as necessary with all compliance requirements tracked, managed and recorded using compliance tracking registers.

3.3 Environmental Planning

ARTC has developed state specific Environment and Planning Compliance manuals that consider specific legislative requirements in relations to the delivery of asset maintenance. The manuals identify key requirements and any exemptions relevant to ARTC activities.

3.3.1 Annual Work Plans

The Interstate's Annual Work Plans (AWPs) detail ARTC's maintenance activities and locations for the year based. The AWPs allow ARTC to budget time, money and other resources to the highest priority maintenance activities, with suitable lead time to ensure all planning and assessment requirements are completed.

AWPs are reviewed annually for consideration of the potential of:

- environmental planning or license requirements;
- impact to known sites of contamination or sensitivities such as invasive or protected vegetation communities; and
- impact to local communities and residents.

This process is documented within the Interstate Environmental Impact Assessment template.

3.3.2 Sustainability

Elements of sustainability is embedded into everyday decisions. As identified in section 3.3.1 above, consideration is also given, during this process, to design and product selection, assessment of ongoing maintenance and strategic opportunities.

Specific requirements as part of legislated inputs will be embedded as required into relevant systems and processes, to ensure ownership and performance against the obligation.

3.4 Environmental Compliance

The Interstate Business Unit have multiple compliance inputs across all states in which the ARTC operate. This provides for assurance oversight of major project approvals, operating licenses, lease agreements, existing site conditions and state specific regulations.

3.4.1 Obligations Management

The Interstate Business Unit hold obligations within the asset management system that allows for the identification and management of obligations (see section 2.2 above).

The system supports the ability to undertake key activities in order to ensure compliance is achieved by way of:

- Site identification, detail and location, specific to the location and requirements;
- Scheduling of activities including site inspections, audits and reporting;
- Condition scoring and assessment of site controls and conditions;
- Escalation processes;
- Short- and long-term planning and budgeting for condition response; and
- Reporting.

3.4.2 Environmental Assurance Activities

The Interstate Environmental Assurance Guideline supports identifies the assurance framework and key activities in which the Interstate environment function undertake assurance activities. This supports the Interstate Business Unit to achieve the compliance obligations associated with the delivery of its operations.

4 Risk Management

This section outlines ARTC's approach to risk assessment and management at a corporate and project level.

4.1 Risk Hierarchy

ARTC identify and manage risks at a corporate level as guided by the Risk Management Procedure. The Risk Management Procedure defines a tiered risk structure with the following categories:

- Top Risk Events – a risk determined by the Executive as a high-level risk event which could adversely affect the achievement of the company's objectives. Top Risk Events are the "Parent" risks to subsidiary risks from the other risk tiers.
- Enterprise Wide – a risk that has been identified as affecting more than one part of ARTC, commonly a specific breakdown of a "Top Risk Event" risk.
- Operational - a risk owned by a particular part of ARTC, related to a particular Division, or a specific type of task.
- Geographic/Location – a risk that is specific to a particular geographical vicinity, section of track or specific location.
- Programme – a risk that is relevant to a particular programme of projects that is usually able to be closed at the end of the programmes.
- Project – a risk that is relevant to a particular project that is usually able to be closed at the end of the project.

4.2 Primary Environmental Risks

In relation to the core business activities, ARTC's primary environmental risks are derived from the following aspects:

- Noise and vibration;
- Incidents and emergencies;
- Air quality;
- Environmentally sensitive or significant areas;
- Contaminated land;
- Statutory planning and approvals;
- Environmental legislation; and
- Biodiversity.

4.3 Risk Assessment Process

The levels of risk assessment relevant to environmental risks are Formal Risk Assessment and Environmental Impact and Planning Assessment.

All risks are assessed using Bow Tie Analysis where risk causes, consequences and controls are identified in sequence with inherent, current and target risk ratings allocated according to the severity and likelihood of the consequences. All risk ratings correspond to those defined in the ARTC Risk Matrix and range from low to very high.

ARTC's enterprise wide environmental risks are all assessed regularly using Formal Risk Assessment.

4.3.1 Projects

All projects will assess and manage risks specific to the project. The ARTC Project Manager is responsible for assessing and rating all project risks including risks relating to environmental aspects.

Assessment of environmental risks related to individual rail maintenance activities is generally accomplished using a Task Based Environmental Impact Assessment (TBEIA). TBEIAs assess the risk of conducting a particular activity in a specific location and determine what site-specific controls are appropriate to address the risks identified. Please see section 5.1 for more details.

All project risk management is conducted in accordance with the Project Management Procedure.

4.4 Controls

All risks will be evaluated to determine the degree of control required for each risk and whether the activity associated with the risk should be undertaken using the existing and proposed controls or whether more controls are required.

ARTC allocate controls to all risks to reduce the risk to an acceptable level. All controls are tracked and managed through the ERMS with individual control owners responsible for implementing the controls.

5 Environmental Impact Assessment and Management

5.1 Routine Infrastructure Maintenance

Within all states environmental legislation guides the environmental assessment and approval process, ARTC have adopted a consistent process nationally which addresses the general environmental duty,

5.1.1 Annual Work Plans

ARTC organises all routine infrastructure maintenance activities according to AWPs. AWPs allow suitable lead time to organise all aspects of maintenance activities including the type of EIA required to carry out activities and where environmental site inspections will be completed.

AWPs are reviewed and adjusted on an annual basis. Information entered in Ellipse throughout the year is used to inform maintenance priorities and is balanced based on budget and track access restrictions.

As described in section 3.3.1 above, the Interstate Environmental Impact Assessment template is used to document the annual review of the AWP in consideration of environmental requirements.

5.1.2 Task Based Environmental Impact Assessment

A TBEIA is a form style environmental assessment that has been developed specifically for day to day rail maintenance activities where impacts are low and readily identifiable.

TBEIAs identify potential impacts to indigenous and non-indigenous heritage, flora and fauna, water, air quality and sensitive receivers based on a desktop assessment. All permit and approval requirements, controls and activity limitations will also be identified as part of a TBEIA.

ARTC will assess all environmental impacts for routine infrastructure maintenance activities according to the Task Based Environmental Impact Assessment WI and the associated TBEIA form, except where activities are specifically excluded (see section 6.1.3).

5.1.2.1 Assessment of Predicted Noise

The Noise prediction tool (NPT), is used to assess noise impacts when works are proposed outside of standard working hours and/or near sensitive receivers such as residences.

Sensitive receivers identified as potentially impacted according to the NPT will be notified according to the TBEIA WI, the Maintenance Noise Guideline and relevant state legislation. *The Interstate Community Notification and Complaint Management Guideline provides guidance in the appropriate management processes to ensure ARTC communities are notified of works.*

5.1.3 Excluded Activities

Where rail maintenance activities represent small scale and low intensity works, a TBEIA may not be required. A relevant Environment Advisor will provide advice regarding the need to complete a TBEIA in these situations. Any activity not requiring a TBEIA will be managed in accordance with SEMMs as relevant.

5.2 Supporting Tools

The series of tools outlined in the following table assist in the completion of TBEIAs and improve environmental awareness generally. Access to these tools is available to all ARTC employees.

Tool name	Description and use	Impacts assessed
ARTC Map	See section 2.3. Provides employees with a readily accessible display of known environmental values within and adjacent to the rail corridor. ARTC Map will be used in initial desktop environmental impact assessments for all TBEIA activities.	Indigenous heritage, non-indigenous heritage, flora, fauna, water, contaminated land
Contaminated Land Database (CLD)	The CLD contains details on sites that have been assessed for contamination or may be contaminated. Locations on the CLD are displayed geographically on ARTC Map to enable staff to easily identify known potentially, and actually contaminated land. The CLD will be used in all EIA activities to assess whether land contamination is a factor that must be mitigated.	Contaminated land
Noise Prediction Tool (NPT)	The NPT is used to assess noise impacts when works are proposed outside of standard working hours and/or near sensitive receivers such as residences and hospitals. Sensitive receivers identified as potentially impacted according to the NPT will be notified according to the TBEIA WI, the Maintenance Noise Guideline and relevant state legislation.	Noise, sensitive receivers
State Environmental Limitations	The State Environmental Limitations Guideline outlines the statutory restrictions relevant to ARTC maintenance activities and will be considered when undertaking a TBEIA.	Permits, approvals and activity limitations
iAuditor	An online mobile system to capture and report site inspections, incidents, hazards and nears misses.	Incidents and non-conformances

5.3 Additional Assessment

Where maintenance activities are scheduled in sensitive areas, pre-work planning inspections are conducted by Environmental Advisors to identify whether further assessment is required or whether certain SEMMs may be appropriate.

Where potential environmental impacts are suspected or likely based on a TBEIA, additional assessments will be arranged to be completed by a Suitably Qualified Person prior to the activity commencing. Where an additional assessment outlines controls further to the SEMMs, these will be included in the list of controls to be implemented as part of the maintenance activity.

5.4 Standard Controls

ARTC's SEMMs for maintenance activities are listed within the SEMMs WI and are incorporated into the TBEIA form. For each maintenance activity, SEMMs relevant to the maintenance task will

be selected from the TBEIA form. Additional controls will be selected and utilised where potential impacts to sensitive sites are identified as per the TBEIA WI or any additional assessment.

6 Operators on ARTC Network

6.1 Rail Operators

Rail operators are required under their respective Track Access Agreement (TAA) to submit an EMP relating specifically to their operations conducted on the ARTC network.

The requirements for rail operators accessing the ARTC Network are outlined in the EMP for Operators on the ARTC Network Procedure.

6.2 ARTC Contribution

ARTC contributes to the management of environmental effects from trains operating on the Network as the network manager. However, ARTC has limited ability to manage these effects.

A number of potential environmental impacts from operator activities that require ARTC management have been identified. These are:

- Noise and vibration from rolling stock affecting surrounding communities;
- Regulator involvement and reputational damage; and
- Land and water pollution from accidents and incidents.

See section 7 and 8 for an outline of ARTC's processes that help to manage these potential impacts.

7 Environmental Incident Management

Environmental incidents that occur in relation to ARTC and rail operator activities are managed in accordance with the Pollution Incident Response WI and the Reporting Procedure. Rail accidents and emergencies are managed in accordance with the Emergency Management Procedure.

7.1 Incident Response

Following identification of an environmental incident, ARTC will take all reasonable and practicable steps to stop, reduce and/or prevent further impacts. Where ARTC does not have the resources or necessary specialist equipment to undertake immediate response actions, an Environmental Incident Response Contractor will be engaged.

The controls used to minimise risks to human health and the environment and to contain or control a pollution incident are outlined in the Pollution Incident Response WI.

7.2 Internal Reporting

All pollution incidents will be immediately reported to ARTC Network Control except where external notification is not required, or another arrangement is in place. For pollution incidents reported to Network Control, Train Transit Managers will ensure the immediate completion of the Pollution Report and any subsequent notification obligations.

Other environmental incidents (e.g. non-conformances, damage to heritage items) will have an Event Summary Report A prepared and forwarded to an Environment Advisor for follow-up. All details of environmental incidents are recorded on the SharePoint EMS.

7.3 External Notification

All state specific requirements for external notification are included in the Pollution Report and explained in the Pollution Incident Response Work Instruction.

Major projects may require post construction reporting following the identification of environmental incidents.

7.4 Incident Investigation

All incident investigations will recommend corrective actions on a case-by-case basis depending on the type of incident, the severity and the potential for further impact. Corrective actions typically include:

- Site clean-up;
- Increased site inspections and monitoring;
- Increase environmental awareness (re-training, tool-box meetings); and
- Review and improve existing environmental controls.

Environmental incident investigation is undertaken in accordance with the Investigation Procedure.

8 Complaints Management

The operation of trains and the carrying out of maintenance activities on the rail network has a number of potential environmental effects which may impact sensitive receivers adjacent to the corridor. As the land manager, ARTC administer the receipt and management of community complaints related to environmental effects including noise, air and/or land pollution.

ARTC undertake the following in the management of community complaints:

- Ensure compliance with applicable regulatory requirements;
- Investigate and resolve complaints related to ARTC infrastructure or land;
- Maintain a complaint register for the ARTC network; and
- Liaise with operators to resolve complaints as required.

Complaints are managed through Consultation Manager and include phone calls and emails to ARTC personnel, onsite enquiries, formal correspondence and Enviroline messages or emails.

8.1 Enviroline

Enviroline is ARTC's complaints handling service for pollution complaints (e.g. noise, dust, spills). Enviroline is operated by the Community Relations Officer for all states that ARTC operates in.

9 Training and Competency

ARTC environmental inductions and training are provided to employees according to how each employees role relates to the content provided. The current modules include:

- ARTC Environmental Induction;
- Environmental Incident Management Induction;
- Pesticide Use and Recording Induction; and
- Noise Prediction Tool.

All ARTC employees complete the ARTC environmental induction and the Induction Procedure sets out the processes by which managers will induct employees, contractors, consultants and visitors to ARTC.

Training is provided to employees according to the training matrix with the following topics forming the primary modules available:

- Completing a Task Based Environmental Impact Assessment;
- Erosion and Sediment Control; and
- Environmental Awareness for Maintenance and Construction.

Environmental training sessions and the attendees are recorded in the Training Register on the SharePoint EMS. Environmental training and inductions are reviewed and updated on an annual basis, and where legislative and ARTC procedural changes require it.

9.1 Environmental Awareness

Environmental Toolbox Talks have been developed to help communicate key environmental and community information to maintenance and project teams. The Toolbox Talks provide ARTC staff with information to aid in improving environmental performance during maintenance works:

An Environmental Field Guide has been developed and is intended to assist staff involved in ARTC's maintenance activities by identifying environmental management measures that can be adopted to prevent environmental and community impacts.

10 Auditing and Review

10.1 Document Governance

The review and approval of ARTC documents varies depending on who the owner of the document is. For documents relevant to the carrying out of maintenance activities the following applies:

- All new and revised Corporate level documents are reviewed and approved by the OSERC.
- All new and revised division specific WIs are reviewed and approved by the division Group Executive.
- All new and revised local documents are reviewed and approved by the division Environment Team.

All documentation and information is managed in compliance with the document management procedure.

10.2 Environmental Site Inspections

Environmental Site Inspections are used by ARTC to ensure that all requirements of relevant legislation are addressed, permits and approvals are complied with and the EMS is implemented. Environmental site inspections are managed according to the Environmental Site Inspection Procedure with details noted using the iAuditor application. All site inspections are recorded on ARTC's SharePoint EMS for reporting and auditing purposes.

10.3 Independent Audits

Independent audits will be undertaken as required, based on the source of requirement. This may be due to requirements within licenses, leases or conditions of approval following project completion.

10.4 Internal Audits

ARTC conduct internal audits to ensure compliance, improve performance and provide assurance that ARTC's current controls are effective at managing key risks. Internal audits occur approximately annually according to the in force Internal Audit Plan and can be focussed on ARTC's EMS or environmental compliance generally.

All internal audits are completed according to ARTC's Internal Audit Procedure.

Appendix A – ARTC Environment Policy

POLICY

Environmental Policy

The ARTC Environmental Policy provides a framework for continual improvement of an Environmental Management System and sets our commitments for managing potential environmental risks.

In all our activities we commit to:

- Preventing or minimising pollution and the generation of waste
- Systematically reviewing our Environmental Management System to ensure that our significant risks are identified and managed, our environmental objectives and targets are current and our legal and other requirements are addressed
- Ensuring corrective action in response to non-compliance and other related environmental related complaints with minimal delay
- Having a robust relationship with all environmental agencies and regulators
- Ensuring that agreements made between contractors and rail operators comply with the ARTC Environmental Management System
- Ensuring that employees are appropriately inducted and have sufficient competencies to perform their duties
- Periodically reviewing and auditing our Environmental Management System, including this Environmental Policy

John Fullerton
Chief Executive Officer
1 December 2014

Appendix B – Compliance Table

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
P2N Submissions Report					
Section 8.1	Response to Submissions	The approach to environmental mitigation and management for the proposal involves:			
		* Project design – as described in section 7.1 of the EIS, the proposal incorporates measures to avoid and minimise impacts.	Noted		
		* Mitigation measures – the updated mitigation measures are provided in section 8.2 of this report.	Noted		
		* ARTC's Environmental Management System – would be used to manage the construction and operation of Inland Rail, including the proposal. The management system would provide the framework for implementing the construction and operation environmental management plans described below, and any conditions of other approvals, licences, or permits.	The IEMF outlines the ARTC Interstate environmental management practices.		
		* Inland Rail NSW Construction Noise and Vibration Management Framework – describes how ARTC proposes to manage construction noise and vibration for Inland Rail in NSW as a whole, including management measures, processes, and the approach to additional assessment where required. A copy of the framework is provided in Appendix H of the EIS.	Noted - not relevant to the operations of North-West Link		
		* Proposal specific CEMP and OEMP – prepared to guide the approach to environmental management during construction and operation, as described in sections 8.1.1 and 8.1.2 of this report. The CEMP and OEMP would:	As above		
		* outline the environmental management practices and procedures to be followed	The IEMF outlines the ARTC Interstate environmental management practices.	See Interstate Environmental Management Framework (IEMF) COR-PO-005 Asset Management Policy COR-PO-007 Environmental Management Policy Environmental Protection Licence 3142	See section 2 of the IEMF
		* document processes for demonstrating compliance with the commitments made in this EIS, the submissions report (to be prepared), and relevant approval conditions	The IEMF outlines the ARTC Interstate environmental management practices. Appendix B (this table) addresses specific actions to meet compliance with the commitments made in the EIS, Submissions Report and relevant CoA .		
		* be prepared in consultation with relevant agencies and in accordance with the Guideline for the Preparation of Environmental Management Plans (Department of Infrastructure, Planning and Natural Resources, 2004).	Construction: Noted		

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
		* Environmental performance outcomes – establishes the intended outcomes to be achieved by the project. The environmental performance outcomes are provided in 8.3.	Construction: Noted - not relevant to the operations of North-West Link	Construction: Noted - not relevant to the operations of North-West Link	
Section 8.1.2	Response to Submissions	The OEMP would include:		Interstate Environmental Management Framework (IEMF) COR-PO-005 Asset Management Policy COR-PO-007 Environmental Management Policy Environmental Protection Licence 3142	Refer Section 2 of the IEMF
		* a description of activities to be undertaken during operation	Refer Section 2 of the IEMF		
		* an environmental risk analysis to identify the key environmental performance issues associated with the operation phase	Refer Section 4.2 of the IEMF		
		* statutory and other obligations that the proponent is required to fulfil during operation, including approvals, consultations and agreements required from authorities and other stakeholders under key legislation and policies	Refer Table 1, Section 3.2, Section 5 and Appendix B (this Table) of the IEMF		
		* a description of the links with ARTC's Environmental Management System, and the EPL relevant to the proposal	ARTC operates under an Environmental Management System (EMS) that provides a structured framework for the consideration, evaluation, management, compliance and reporting of environmental issues associated with ARTC, operator and contractor activities on the rail network. Compliance requirements are incorporated into ARTC processes and documents as necessary with all compliance requirements tracked, managed and recorded using compliance tracking registers.		
		* overall environmental policies, guidelines and principles to be applied to operation	The IEMF outlines overall environmental policies, guidelines and principles to be applied to operation		
		* roles and responsibilities for relevant employees involved in operation, including relevant environmental training and induction requirements	Section 1.3 of the IEMF		
		* incident and contingency management procedures	Section 2.1.1, Section 2.4 and Section 7 of IEMF		
		* details of how environmental performance would be managed and monitored to meet acceptable outcomes, including what actions would be taken to address identified potential adverse environmental impacts.	Section 2.1.1 and Section 10 of IEMF		
O1.1	Response to Submissions	An OEMP would be prepared to detail the approach to environmental management during operation, as described in section 8.1.2 of this report and in accordance with the conditions of approval.	The IEMF, including Appendix B-D details the approach to environmental management during operation in accordance with the conditions of approval.		
		The proposal would be operated in accordance with the approved OEMP.			

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
O2.1	Response to Submissions	The operation of level crossings that have been subject to changes as part of the proposal would be reviewed after the proposal commences operation to confirm: a) that the level of protection continues to be appropriate b) that the infrastructure is appropriate for the traffic conditions.	Level crossings will be inspected and reviewed in accordance with the ARTC Code of Practice for Level Crossings.	Section 16 - ARTC CoP Track and Civil	See section 2.2 of the IEMF
O3.1	Response to Submissions	Culverts would be regularly inspected and maintained to ensure functionality and minimise blockage of fish passage.	All culverts installed or existing are entered into the Asset Management Systems and assigned condition monitoring as per the ARTC Technical Maintenance Plan (TMP). The system then generates the active requirements which are tracked and monitored. ARTC have additional mechanisms within the TMP for general and specialist inspections as needed. Regular rack patrols also run the full track line to visually inspect the corridor and track for any issues. The Technical Standard – Structures Inspection and the Structures Inspection Procedure outline the Asset inspection regime and Defect Classifications for corrective action. The documents are provided as Appendix C and D of the IEMF.	Technical Standard - Structures Inspection (ETE-09-01) Structures Inspection Procedure (ETE-09-02)	
O3.2	Response to Submissions	Annual inspections would be undertaken for weed infestations and to assess the need for control measures.	Regular track patrols also run the full track line to visually inspect the corridor and track for any issues, including weeds.		
		Any outbreak of noxious and/or weeds of national environmental significance would be managed in accordance with the Noxious Weeds Act 1993, the Weeds of National Significance Weed Management Guide, and the requirements of relevant authorities.	Noted.		
O4.1	Response to Submissions	The proposal would be operated with the aim of achieving the operational noise and vibration criteria identified by the noise and vibration assessment, the requirements of the conditions of approval, and the relevant environment protection licence.	During the staged operation of P2N, including the North-West Link, Interstate will operate in accordance with the IEMF and condition L2 of the Environmental Protection Licence 3142 (refer Appendix E) It is noted that the ONVR has been completed and approved for implementation by Inland Rail.	See Interstate Environmental Management Framework (IEMF) COR-PO-005 Environmental Protection Licence 3142 Asset Management Policy COR-PO-007 Environmental Management Policy Parkes to Narromine - Operational Noise and Vibration Review (ONVR) - At property treatment scoping – assessment - May 2019 (3-0001-240-EEC-00-RP-0004)	
O4.2	Response to Submissions	Once Inland Rail has commenced operation, operational noise and vibration compliance monitoring would be undertaken at representative locations to compare actual noise performance against that predicted by the noise and vibration assessment.	As above	Interstate Environmental Management Framework (IEMF) COR-PO-005 Asset Management Policy COR-PO-007 Environmental	See section 2.2 of the Interstate Environmental Management Framework

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
		Compliance monitoring requirements would be defined as part of the operational noise and vibration review.	As above	Management Policy ARTC Licence 3142 Environmental Protection Licence 3142	
		The results of monitoring would be included in an operational noise and vibration compliance report, prepared in accordance with the conditions of approval.	As above		
O5.1	Response to Submissions	The proposal would be managed in accordance with the air quality management requirements specified in the environment protection licence.	During the staged operation of P2N, including the North-West Link, Interstate will operate in accordance with the IEMF and condition O3, O4.6-O4.15 of the Environmental Protection Licence 3142 (refer Appendix E)		
O5.2	Response to Submissions	Maintenance service vehicles and equipment would be maintained and operated in accordance with the manufacturers' specifications.	Maintenance service vehicles and equipment will be maintained and operated in accordance with the manufacturers' specifications.		
O6.1	Response to Submissions	During any maintenance work where soils are exposed, sediment and erosion control devices would be installed in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004).	During the staged operation of P2N, including the North-West Link, Interstate will operate in accordance with the IEMF and condition L1.1 of the Environmental Protection Licence 3142 (refer Appendix E)	Environmental Protection Licence 3142	
O6.2	Response to Submissions	ARTC's existing spill response procedures would be reviewed to determine applicability and suitability during operation. The adopted procedure would include measures to minimise the potential for impacts on the local community and the environment as a result of any leaks and spills	As above	As above	
O7.1	Response to Submissions	The proposal would be managed in accordance with the water quality management requirements specified in the environment protection license for ARTC and ARTC's Environmental Management System.	During the staged operation of P2N, including the North-West Link, Interstate will operate in accordance with the IEMF and condition O3 of the Environmental Protection Licence 3142 (refer Appendix E)	Interstate Environmental Management Framework (IEMF) COR-PO-005 Asset Management Policy COR-PO-007 Environmental Management Policy Environmental Protection Licence 3142	
O8.1	Response to Submissions	A safety awareness program would be developed and implemented to educate the community regarding safety around trains. This would focus on community and rural property operators who cross the rail corridor to access their properties.	Noted - not relevant to the staged operations of P2N, including North-West Link. This will apply once the project commences operations under the definition of Inland Rail (as outlined in the EIS).		
O9.1	Response to Submissions	O9.1 Prior to operation commencing, the sustainability management plan would be reviewed and updated, and relevant initiatives would be implemented during operation.	As above		
O10.1	Response to Submissions	The recommended adaptation measures would be reviewed, and a final list of adaptation measures for implementation during operation would be confirmed and implemented.	As above		
		Operational management and maintenance procedures would include measures relating to potential climate change risks, as listed in chapter 23 of the EIS.	As above		

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
		Emerging opportunities to manage potential climate change impacts on the proposal would continue to be monitored.	As above		
O11.1	Response to Submissions	The waste management measures listed in Table 24.8 of the EIS would be implemented where practicable during operation.	Noted - not relevant to the staged operations of P2N, including North-West Link. Interstate will manage waste during operations and maintenance activities in accordance with its Standard Environmental Management Measures	See Interstate Environmental Management Framework (IEMF) Operation: ENV-WI-004 Standard Environmental Management Measures ENV0WI-005	See section 2 of the IEMF
O12.1	Response to Submissions	Operation would be undertaken in accordance with ARTC's standard operating procedures.	Interstate will undertake operations and maintenance activities in accordance with ARTC's standard operating procedures, and with IEMF.	See Interstate Environmental Management Framework (IEMF) COR-PO-005 Asset Management Policy	As above
Environmental Performance Outcomes					
5. Air quality	Response to Submissions	The project is designed, constructed and operated in a manner that minimises air quality impacts (including nuisance dust and odour) to minimise risks to human health and the environment to the greatest extent practicable.	During the staged operation of P2N, including the North-West Link, Interstate will operate in accordance with the IEMF and condition O3, O4.6-O4.15 of the Environmental Protection Licence 3142 (refer Appendix E).	ENV-WI-004 Standard Environmental Management Measures Environmental Protection Licence 3142	As above
6. Biodiversity	Response to Submissions	The project design considers all feasible measures to avoid and minimise impacts on terrestrial and aquatic biodiversity. Offsets and/or supplementary measures are assured which are equivalent to any remaining impacts of project construction and operation.	Not applicable to the staged operation by Interstate of P2N, including the North West Link.	Design and Construction: Please refer to the Parkes to Narromine Environmental Impact Statement, Construction Environment Management Plan and Flora and Fauna Management Plan. Additionally, as per the Parkes to Narromine Conditions of Approval (CSSI 7475), biodiversity credits will be retired for the project in accordance with a Biodiversity Offset Strategy, which is currently being prepared for the project.	

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
7. Climate Change	Response to Submissions	The project is designed, constructed and operated to be resilient to the future impacts of climate change.	Operation: the project site will be operated in accordance with the design and current ARTC standards and procedures addressing the potential concerns relating to the impact of climate change. This includes appropriate rail husbandry relating to potential rail breaks and track buckles and the management of the stress-free temperature of the rail. Design and Construction: Please refer to the Parkes to Narromine Flood Design Report	Parkes to Narromine Environmental Impact Statement Parkes to Narromine Flood Design Report	See section 2 of the IEMF
8. Flooding	Response to Submissions	The project minimises adverse impacts on existing flooding characteristics. Construction and operation of the project avoids or minimises the risk of, and adverse impacts from, infrastructure flooding, flooding hazards, or dam failure.	Design and Construction: Please refer to the Parkes to Narromine Flood Design Report	Parkes to Narromine Flood Design Report	
9. Health and Safety	Response to Submissions	The project avoids, to the greatest extent possible, risk to public safety.	Design and Construction: Please refer to the Parkes to Narromine Environmental Impact Statement and the Traffic, Transport and Access Management Plan. Operation: the track and associated assets will be operated in accordance with ARTC's Safety Management System. All dangerous goods are stored, handled and transported in accordance with relevant regulatory requirements and Australian Standards.		
10. Heritage	Response to Submissions	The design, construction and operation of the project facilitates,to the greatest extent possible, the long term protection, conservationand management of the heritage significance of items of environmental heritage and Aboriginal objects and places.The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage and Aboriginal objects and places.	Interstate will undertake operations and maintenance activities in accordance with ARTC's standard operating procedures, and with the IEMF to avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage and Aboriginal objects and places.	Interstate Environmental Management Framework (IEMF) ENV-WI-004 Standard Environmental Management MeasuresENV0WI-005 Task based Environmental Impact	See section 2 of the IEMF

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
11. Noise and vibration - amenity	Response to Submissions	Construction noise and vibration (including airborne noise, groundborne noise and blasting) are effectively managed to minimise adverse impacts on acoustic amenity. Increases in noise emissions and vibration affecting nearby properties and other sensitive receivers during operation of the proposal are effectively managed to protect the amenity and well-being of the community.	Operations will be undertaken in accordance with the NSW Environmental Protection Licence 3142.	Construction: Please refer to the Parkes to Narromine Environmental Impact Statement, Construction Environmental Management Plan and Noise and Vibration Management Plan. Operation: See Interstate Environmental Management Framework (IEMF)Operations will be undertaken in accordance with the NSW Environmental Protection Licence 3142.	
12. Noise and vibration - structural	Response to Submissions	Construction noise and vibration (including airborne noise, groundborne noise and blasting) are effectively managed to minimise adverse impacts on the structural integrity of buildings, items including Aboriginal places and environmental heritage, and nearby road infrastructure. Increases in noise emissions and vibration affecting environmental heritage as defined in the Heritage Act 1977 during operation of the proposal are effectively managed.	During the staged operation of P2N, including the North-West Link, Interstate will operate in accordance with the IEMF and condition L2 of the Environmental Protection Licence 3142 (refer Appendix E) It is noted that the ONVR has been completed and approved for implementation by Inland Rail.	Construction: Please refer to the Parkes to Narromine Environmental Impact Statement, Construction Environmental Management Plan, Noise and Vibration Management Plan and Heritage Management Plan.	
13. Protected and sensitive lands	Response to Submissions	The project is designed, constructed and operated to avoid or minimise impacts on protected and sensitive lands.	Interstate will undertake operations and maintenance activities in accordance with ARTC's standard operating procedures, and with the IEMF to avoids or minimises impacts, to the greatest extent possible, on protected and sensitive lands.	Construction: Please refer to the Parkes to Narromine Environmental Impact Statement, Construction Environmental Management Plan, and Heritage Management Plan. Operation: see Interstate Environmental Management Framework (IEMF) Operation: ENV-WI-004 Standard Environmental Management Measures ENV0WI-005 Task based Environmental Impact	See section 2 of the IEMF

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
14. Socio-economic, land use, property, agriculture and biosecurity	Response to Submissions	The project minimises adverse social and economic impacts and capitalises on opportunities potentially available to affected communities.The project minimises impacts to property and business and achieves appropriate integration with adjoining land uses, including maintenance of appropriate access to properties and community facilities, and minimisation of displacement of existing land use activities, dwellings and infrastructure.	Noted – not considered directly applicable to the staged operation of P2N, including the North-West Link. As part of Inland Rail as a whole, the proposal provides for the development of an efficient and sustainable route for the transport of freight between Brisbane and Melbourne. The proposal provides opportunities for regional economic development, by enabling local and regional businesses to access Inland Rail via regional transport hubs. Impacts to existing land use and properties are minimised, where practicable. The proposal is appropriately integrated with adjoining land uses, and access to private properties is maintained. The proposal is appropriately integrated with local and regional land use planning strategies.	Please refer to the Parkes to Narromine Environmental Impact Statement and Social Impact Management Plan.	
15. Soils	Response to Submissions	The environmental values of land, including soils, subsoils and landforms, are protected. Risks arising from the disturbance and excavation of land and disposal of soil are minimised, including disturbance to acid sulfate soils and site contamination.	Interstate will undertake operations and maintenance activities in accordance with ARTC's standard operating procedures.	Construction: Please refer to the Parkes to Narromine Environmental Impact Statement, Construction Environmental Management Plan and Soil and Water Management Plan.	
16. Sustainability	Response to Submissions	The project reduces the NSW Government's operating costs and ensures the effective and efficient use of resources. Conservation of natural resources is maximised.	Noted – considered applicable to Inland Rail operations.	Please refer to the Parkes to Narromine Environmental Impact Statement.	

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
17. Traffic, transport and access	Response to Submissions	Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts.The safety of transport system customers is maintained.Impacts on network capacity and the level of service are effectively managed.Works are compatible with existing infrastructure and future transport corridors.	As above	Please refer to the Parkes to Narromine Environmental Impact Statement and the Traffic, Transport and Access Management Plan.	
18. Visual amenity	Response to Submissions	The project minimises adverse impacts on the visual amenity of the built and natural environment (including public open space) and capitalises on opportunities to improve visual amenity.	As above	Please refer to the Parkes to Narromine Environmental Impact Statement (EIS)	
19. Waste	Response to Submissions	All wastes generated during the construction and operation of the proposal are effectively stored, handled, treated, reused, recycled and/or disposed of lawfully, and in a manner that protects environmental values.	Interstate will manage waste during operations and maintenance activities in accordance with its Standard Environmental Management Measures	Operation: see Interstate Environmental Management Framework (IEMF) ENV-WI-004 Standard Environmental Management Measures ENV0WI-005 Task based Environmental Impact	
20. Water - hydrology	Response to Submissions	Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised. The environmental values of nearby, connected and affected water sources, groundwater and dependent ecological systems including estuarine and marine water (if applicable) are maintained (where values are achieved) or improved and maintained (where values are not achieved). Sustainable use of water resources.	Noted – no expected long-term impacts to on surface water and groundwater hydrology are expected from operation of P2N, including the North-West Link.	Please refer to the Parkes to Narromine Flood Design Report for Project impacts assessment.	

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
21. Water - quality	Response to Submissions	The project is designed, constructed and operated to protect the NSW Water Quality Objectives where they are currently being achieved, and contribute towards achievement of the Water Quality Objectives over time where they are currently not being achieved, including downstream of the project to the extent of the project impact including estuarine and marine waters (if applicable).	As above	Operation: see Interstate Environmental Management Framework (IEMF) ENV-WI-004 Standard Environmental Management Measures ENV0WI-005 Task based Environmental Impact	see section 2 of the IEMF
P2N SSI 7475 Conditions of Approval					
A1	Conditions of Approval	The CSSI must be carried out in accordance with the terms of this approval and generally in accordance with the description of the CSSI in the Inland Rail – Parkes to Narromine Environmental Impact Statement, Volumes 1-6 (prepared by GHD and dated June 2017) and the Inland Rail – Parkes to Narromine Submissions Report (ARTC, dated February 2018).	Noted		
A2	Conditions of Approval	The CSSI must be carried out generally in accordance with all procedures, commitments, preventative actions, performance criteria and mitigation measures set out in in the EIS as amended by the Submissions Report unless otherwise specified in, or required under, this approval.	Noted		
A3	Conditions of Approval	In the event of an inconsistency between the EIS as amended by the Submissions Report or any other document required under this approval, and a term of this approval, the term of this approval prevails to the extent of the inconsistency.	Noted		
		Note: For the purpose of this condition, there will be an inconsistency between a term of this approval and any document if it is not possible to comply with both the term and the document.			
A4	Conditions of Approval	The Proponent must comply with all requirements of the Secretary in relation to:	Noted		
		(a) the environmental performance of the CSSI;			
		(b) any document or correspondence under the terms of this approval in relation to the CSSI;			
		(c) any notification given to the Secretary under the terms of this approval;			
		(d) any audit of the construction or operation of the CSSI;			
		(e) compliance with the terms of this approval (including anything required to be done under this approval);			
		(f) the carrying out of any additional monitoring or mitigation measures; and		Noted.	

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
		(g) in respect of ongoing monitoring and management obligations, compliance with an updated or revised version of a guideline, protocol, Australian Standard or policy required to be complied with under this approval.		Noted.	
A7	Conditions of Approval	Any document that must be submitted, or approval that must be obtained, within a timeframe specified in or under the conditions of this approval may be submitted within a later timeframe agreed with the Secretary. The Proponent must seek the Secretary's agreement at least 14 days before the date on which the document is required to be submitted, or approval must be obtained. This condition does not apply to the immediate written notification required in respect of an incident under Condition A36.		Noted.	
A10	Conditions of Approval	The CSSI may be constructed and operated in stages. Where staged construction or operation is proposed, a Staging Report (for either or both construction and operation as the case requires) must be prepared and submitted to the Secretary for information. The Staging Report must be submitted to the Secretary no later than one (1) month prior to the commencement of construction of the first of the proposed stages of construction (or if only staged operation is proposed, one (1) month prior to the commencement of operation of the first of the proposed stages of operation).	Please refer to the Parkes to Narromine: Operational Staging Report	Parkes to Narromine: Operational Staging Report (5-0000-240-EEC-00-RP-0004).	
A11	Conditions of Approval	The Staging Report must:	As above	Pas above	
		(a) if staged construction is proposed, set out how the construction of the whole of the CSSI will be staged, including details of work and other activities to be carried out in each stage and the general timing of when construction of each stage will commence and finish;			
		(b) if staged operation is proposed, set out how the operation of the whole of the CSSI will be staged, including general details of work and other activities to be carried out in each stage and the general timing of when operation of each stage will commence and finish (if relevant);			
		(c) specify how compliance conditions will be achieved across and between each of the stages of the CSSI; and			
		(d) set out mechanisms for managing any cumulative impacts arising from the proposed staging.			
A12	Conditions of Approval	The CSSI must be staged in accordance with the Staging Report, as submitted to the Secretary.	As above	As above	

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
A13	Conditions of Approval	Where staging is proposed, the terms of this approval that apply or are relevant to the works or activities to be carried out in a specific stage must be complied with at the relevant time for that stage.	As above	As above	
A14	Conditions of Approval	Where changes are proposed to the staging of construction or operation, a revised Staging Report must be prepared and submitted to the Secretary for information no later than one (1) month prior to the proposed change in the staging.	Noted	Noted.	
A24	Conditions of Approval	The Compliance Tracking Program in the form required under Condition A22 of this approval must be implemented for the duration of construction and for a minimum of one (1) year following commencement of operation, or for a longer period as determined by the Secretary based on the outcomes of independent environmental audits, Environmental Representative Monthly Reports and regular compliance reviews submitted through Compliance Reports. If staged operation is proposed, or operation is commenced of part of the CSSI, the Compliance Tracking Program must be implemented for the relevant period for each stage or part of the CSSI.	The Parkes to Narromine: Compliance Tracking Program (5-0000-EEC-240-00-RP-0001) has been implemented for the staged operation of North-west Connection, will be implemented for the first year of operation following the resumption of existing operations on P2N (brownfield section) and for the first year of operation of Stage 2.	Parkes to Narromine: Compliance Tracking Program (5-0000-EEC-240-00-RP-0001). Parkes to Narromine: Operational Staging Report (5-0000-240-EEC-00-RP-0004).	
A30	Conditions of Approval	A Pre-Operation Compliance Report must be prepared and submitted to the Secretary for information no later than one (1) month before the commencement of operation. The Pre-Operation Compliance Report must include: (a) details of how the terms of this approval that must be addressed before the commencement of operation have been complied with; and (b) the commencement date for operation.	Parkes to Narromine: Pre-operation Compliance Report (5-0000-240-EEC-00-RP-0003) as submitted prior to staged operation of the North-west Connection. An updated Pre-operation Compliance Report will be submitted to address the requirements of the remainder of the Parkes to Narromine Project (Resumption of Existing Operations and Stage 2) a minimum of one month prior to the resumption of the existing operations on P2N (brownfield section).	Parkes to Narromine: Pre-operation Compliance Report (5-0000-240-EEC-00-RP-0003).	
A31	Conditions of Approval	Operation must not commence until the Pre-Operation Compliance Report has been submitted for information to the Secretary.	As above	As above	
A33	Conditions of Approval	The Environmental Audit Program, as submitted to the Secretary, must be implemented and complied with for the duration of construction and for the first two years of operation.	The Environmental Audit Program will be implemented as per the Conditions of Approval.	Environmental Audit Program (3-0001-240-EEC-00-RP-0003)	
A34	Conditions of Approval	All independent environmental audits of the CSSI must be conducted by a suitably qualified, experienced and independent team of experts in auditing and be documented in an Environmental Audit Report which: (a) assesses the environmental performance of the CSSI, and its effects on the surrounding environment;	As above	As above	

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
		(b) assesses whether the project is complying with the terms of this approval; and			
		(c) recommends measures or actions to improve the environmental performance of the CSSI.			
A35	Conditions of Approval	The Proponent must submit a copy of the Environmental Audit Report to the Secretary with a response to any recommendations contained in the audit report within six (6) weeks of completing the audit.	As above	As above	
B7	Conditions of Approval	The Complaints Management System must include a Complaints Register to be maintained recording information on all complaints received about the CSSI during the carrying out of any works associated with the CSSI and for a minimum of six (6) months following the completion of construction of the CSSI. The Complaints Register must record the:	Refer Section 2.5 and Section 8 of the IEMF	Interstate Environmental Management Framework (IEMF)	
		(a) number of complaints received;			
		(b) number of people affected in relation to a complaint; and			
		(c) the nature of each complaint and means by which the complaint was addressed and whether and how resolution was reached.			
B8	Conditions of Approval	The Complaints Register must be provided to the Secretary upon request, within the timeframe stated in the request.	Noted	As above	
B9	Conditions of Approval	The following facilitates must be available within one (1) month prior to the commencement of works and for six (6) months following the completion of construction of the CSSI and appropriately broadcast to collect and manage community enquiries and complaints:	Included as part of the Interstate Complaints Management System.	As above	
		(a) a 24 hour toll-free telephone number for the registration of complaints and enquiries about the CSSI;			
		(b) a postal address to which written complaints and enquires may be sent;			
		(c) an email address to which electronic complaints and enquiries may be transmitted; and			
		(d) a system for managing unresolved complaints.			
		Note: The telephone number must be manned and not automatically divert to a message bank.			
D1	Conditions of Approval	An Operational Management Plan (OEMP) must be prepared in accordance with the Guideline for the Preparation of Environmental Management Plans (DIPNR, 2004) to detail how the performance outcomes, commitments and mitigation measures made and identified in the EIS and Submissions Report will be implemented and achieved during operation. This condition (Condition D1) does not apply if Condition D2 of this approval applies.	Not Triggered		

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
D2	Conditions of Approval	An OEMP is not required for the CSSI if the Proponent has an Environmental Management System (EMS) or equivalent as agreed with the Secretary, and can demonstrate, to the written satisfaction of the Secretary, that through the EMS:	Interstate Environmental Management Framework (IEMF)	Interstate Environmental Management Framework (IEMF) COR-PO-005 Asset Management Policy COR-PO-007 Environmental Management Policy ARTC Licence 3142	See section 2 of the IEMF
		(a) the performance outcomes, commitments and mitigation measures, made and identified in the EIS and Submissions Report, and terms of this of approval can be achieved;	This Table as part of the IEMF		
		(b) issues identified through ongoing risk analysis can be managed; and	Refer Section 4 of the IEMF		
		(c) procedures are in place for rectifying any non-compliance with this approval identified during compliance auditing, incident management or any other time during operation.	Refer Section 10 of the IEMF		
D3	Conditions of Approval	The performance measures and mitigation measures detailed in the OEMP must address the maintenance of culverts with respect to blockages, siltation and scouring.	All culverts installed or existing are entered into the Asset Management Systems and assigned condition monitoring as per the ARTC Technical Maintenance Plan (TMP). The system then generates the active requirements which are tracked and monitored. ARTC have additional mechanisms within the TMP for general and specialist inspections as needed. Regular rack patrols also run the full track line to visually inspect the corridor and track for any issues. The Technical Standard – Structures Inspection and the Structures Inspection Procedure outline the Asset inspection regime and Defect Classifications for corrective action. The documents are provided as Appendix C and D of the IEMF.	ARTC Technical Standard Structures Inspection (ETE-09-01) Structures Inspection Procedure (ETE-09-02)	
D4	Conditions of Approval	The OEMP or EMS (or equivalent) as agreed with the Secretary must be submitted to the Secretary for information at least one (1) month prior to the commencement of operation of the CSSI.	The IEMF was submitted prior to staged operations of North-west Connection. The IEMF will be updated and submitted to address the requirements of Resumption of Existing Operations and Stage 2 prior to resumption of existing operations to clearly map out the requirements for the project moving forward.	Interstate Environmental Management Framework (IEMF)	

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
E11	Conditions of Approval	The Proponent must prepare an Operational Noise and Vibration Review (ONVR) to confirm noise and vibration control measures that would be implemented for the operation of the CSSI. The ONVR must be prepared in consultation with the EPA and impacted sensitive receivers. Where barrier options (e.g. noise walls or mounds) are proposed to be implemented, consultation must also be undertaken with the relevant councils. The ONVR must: a) Confirm the appropriate operational noise and vibration objectives and levels for adjoining development, including existing sensitive receivers. b) Confirm the operational noise and vibration predictions based on the final design. Confirmation must be based on an appropriately calibrated noise model (which has incorporated additional noise monitoring and concurrent traffic counting, where necessary for calibration purposes) c) Identify sensitive receivers at which the criteria set out in the Rail Infrastructure Noise Guideline (EPA, 2013) and predicted to be exceeded once the CSI is operational and in 2040. d) Review the suitability of the operational noise mitigation measures identified in the EIS and Submission Report and where necessary, investigate and identify feasible and reasonable noise and vibration mitigation measures required to achieve the noise criteria outlined in the RING. e) Describe the final suite of noise and vibration mitigation measures that will be implemented, including the timing of implementation in accordance with Condition E12. f) Include a consultation strategy to seek feedback from directly affected landowners on the noise and vibration mitigation measures; and g) Procedures for the management of operational noise and vibration complaints. The ONVR is to be verified by a suitably qualified and experienced noise and vibration expert. The ONVR is to be undertaken at the Proponent's expense and submitted to the Secretary for approval within three (3) months of construction commencing.	An Operational Noise and Vibration Review (ONVR) has been prepared for the Parkes to Narromine Project, in consultation with the Environment Protection Authority (EPA) and Department of Planning, Industry and Environment (DPIE). It is noted that the ONVR has been completed and approved for implementation.	Parkes to Narromine - Operational Noise and Vibration Review - At property treatment scoping assessment, May 2019 (3-0001-240-EEC-00-RP-0004)	See section 2 of the IEMF

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
E13	Conditions of Approval	Within 12 months of, and at 10 years after, the commencement of operation of the CSSI, the Proponent must undertake monitoring of operational noise to compare actual noise performance of the CSSI against the noise performance predicted in the review of noise mitigation measures required by Condition E11. The Proponent must prepare an Operational Noise Compliance Report (ONCR) to document this monitoring. The Report must include, but not necessarily be limited to:	ARTC will undertake operational noise monitoring at North-west Connection within 12 months of commencement of operations (Stage 1) and at 10 years of operation of North-west Connection (Stage 1) to verify noise predictions for this greenfield section. Operational noise monitoring will be undertaken for the Parkes to Narromine Line within 12 months of commencement Inland Rail operations (Stage 2) and at 10 years of operation of Inland Rail (Stage 2) to verify noise predictions for the full CSSI rail traffic.		
		(a) noise monitoring to assess compliance with the operational noise levels predicted in the review of operational noise mitigation measures required under Condition E11;			
		(b) methodology, location and frequency of noise monitoring undertaken, including monitoring sites at which CSSI noise levels are ascertained, with specific reference to locations indicative of impacts on sensitive receivers;			
		(c) details of any complaints and enquiries received in relation to operational noise generated by the CSSI between the date of commencement of operation and the date the report was prepared;			
		(d) any required recalibrations of the noise model taking into consideration factors such as noise monitoring and actual train movements;			
		(e) an assessment of the performance and effectiveness of applied noise mitigation measures together with a review and if necessary, reassessment of mitigation measures; and			
		(f) identification of additional measures to those identified in the review of noise mitigation measures required by Condition E11, that would be implemented with the objective of meeting the criteria outlined in the Rail Infrastructure Noise Guideline, when these measures would be implemented and how their effectiveness would be measured and reported to the Secretary and the EPA.			
		The ONCR is to be verified by a suitably qualified and experienced noise and vibration expert. The ONCR must be submitted to the Secretary and the EPA for information within 60 days of completing the operational noise monitoring.			

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
E23	Conditions of Approval	For the first 15 years of operation, the Proponent must prepare a Flood Review Report(s) after the first defined flood event for any of the following flood magnitudes that occur – the 5 to 10 year ARI event, 10 to 20 year ARI event, 20 to 100 year ARI event. The Flood Review Report (s) must prepared by a suitably qualified and experienced hydrologist(s) and include:	Flood monitoring and reporting requirements will commence upon Stage 1 and Resumption of Existing Operations. This is a result of the physical structure (the new railway), that alters the flooding regime, being in place at the completion of construction.		
		(a) a comparison of the observed extent, level, and duration of the flooding event against the impacts predicted in (or inferred from) the EIS, the Flood Design Report required by Condition E21 and the requirements specified in Condition E22; and			
		(b) identification of the properties and infrastructure affected by flooding during the reportable event;			
		(c) where the observed extent and level of flooding or other flooding or erosion impacts exceed the predicted impacts due to the CSSI with the consequent effect of adversely impacting on property(ies), structures and infrastructure, and / or exceed the requirements specified in Condition E22, identification of the measures that would be implemented to reduce future impacts of flooding related to the CSSI works, including the timing and responsibilities for implementation.			
		A copy of the Flood Review Report(s) must be submitted to the Secretary for information and OEH and relevant council(s) within three (3) months of finalising the report(s).			
		Additional flood mitigation measures must be developed in consultation with the affected property / structure / infrastructure owners, OEH and the relevant council(s), as relevant, and implemented within the timeframes specified in the Flood Review Report(s).			
E24	Conditions of Approval	The Proponent must develop a methodology for spatially defining how the length(s) of the rail corridor impacted by a flood event will be determined for the purposes of Condition E23. The methodology must be developed in consultation with OEH and submitted to the Secretary for approval prior to the commencement of operation of the CSSI.	A methodology for spatially defining how the length of the rail corridor impacted by a flood event will be determined for the purposes of CoA E23 is currently being developed in consultation with OEH and DPIE.		

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
E25	Conditions of Approval	Flood information including flood reports, models and geographic information system outputs, and work as executed information from a registered surveyor certifying finished ground levels and the dimensions and finished levels of all structures within flood prone land, must be made available to the relevant council(s), OEH and the SES upon request. The relevant councils, OEH and the SES must be notified in writing that the information is available no later than one (1) month following the completion of construction. Information requested by a relevant council, OEH or the SES must be provided within three (3) months.	Noted		
E47	Conditions of Approval	Within 12 months and 10 years of commencing operation of the CSSI, the Proponent must prepare a Level Crossing Performance Report to confirm the operational traffic impacts of the level crossings on the State and local road network. The review of the operation of the level crossings that interact with the State and local road network must be carried out in consultation with RMS and the relevant councils, and include: (a) updated traffic analysis of movements on these roads; (b) assessment of the level of service at these level crossings (queue length, queuing time delay); (c) assessment of the performance of the level crossing treatment outlined in the Public Level Crossing Treatment Report required by Condition E44; (d) all reported near misses and collisions at level crossings within the project area; and (e) mitigation measures to manage any actual or predicted road network performance impacts. Mitigation measures to manage any actual or predicted road network performance impacts must be implemented within one year of the completion of each report. The Report must include an implementation plan of the identified mitigation measures. The Level Crossing Performance Report must be submitted to the Secretary, RMS and relevant councils for information within 60 days of its completion.	ARTC will undertake a review of the two public level crossing within North-west Connection within 12 months of the commencement of staged operations at North-west Connection (Stage 1). ARTC will undertake a review of the whole P2N alignment (excluding the two public level crossing at North-west Connection) within 12 months of commencement the operation of Inland Rail (Stage 2) A final review of the Parkes to Narromine alignment will occur within 10 years of operations of Inland Rail (Stage 2). This will capture the full Parkes to Narromine project being at Inland Rail operational functionality and include the Northwest Connection.	Section 16 - ARTC CoP Track and CivilSee Interstate Environmental Management Framework (IEMF) COR-PO-005 Asset Management PolicyCOR-PO-007 Environmental Management Policy Environmental Protection Licence 3142	See section 2 of the IEMF
E52	Conditions of Approval	Spoil Mounds are to be located: (a) within the existing rail corridor; (b) at least 50 metres from any watercourse or culvert or where the rail formation is predicted to be overtopped during a flood event; (c) at least 500 metres from any residence;	All permanent spoil mounds resulting from the Parkes to Narromine Project will comply with the requirements of CoA E52.	Environmental Protection Licence 3142	

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
		(d) outside the line of sight of drivers approaching level crossings; and			
		(e) outside the drip lines of trees located on private property.			
		Note: For the purpose of Condition E52(e), the Proponent must not affect trees outside of the rail corridor for the purpose of preventing those trees' driplines overhanging spoil mounds.			
E53	Conditions of Approval	Spoil mounds are to comply with the following requirements:	All permanent spoil mounds resulting from the Parkes to Narromine Project will comply with the requirements of CoA E53.		
		(a) maximum height must not exceed the top height of the upgraded rail line;			
		(b) not result in the clearing or covering of native vegetation beyond that described in the EIS and Submissions Report;			
		(c) not result in heritage impacts beyond that described in the EIS and Submissions Report;			
		(d) not result in additional changes to the upstream flooding regime beyond those described in the EIS and Submissions Report;			
		(e) not affect the downstream flood regime;			
		(f) not impede the flow of water through culverts;			
		(g) not contain any contaminated soil classified as unsuitable for the proposed land use, acid sulphate soils or green waste;			
		(h) are to be stabilised during construction of the CSSI; and			
		(i) are to be stabilised prior to operation of the CSSI.			
E54	Conditions of Approval	The construction and operation of the parts of the CSSI located within 200 kilometres of the Siding Spring Observatory, must comply with the 'Good Lighting Design Principles' as described in the Department's 'Dark Sky Planning Guideline'.	When maintenance works are required to be undertaken overnight, suitable lighting will be used that limits light spill.	Environmental Protection Licence 3142	
E55	Conditions of Approval	The Proponent must construct and operate the CSSI with the objective of minimising light spillage to residences. All lighting associated with the construction and operation of the CSSI must be consistent with the requirements of Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting. Notwithstanding, the Proponent must provide mitigation measures to manage any residual night-lighting impacts to protect residences adjoining or adjacent to the CSSI, in consultation with affected landowners.		As above	

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
E56	Conditions of Approval	The Proponent must consult with all landowners whose visual amenity from their residence is identified highly impacted by the CSSI (as per Table 5 of Technical Report 10 in the EIS) to determine the mitigation measures that will be implemented to maintain visual amenity. The Proponent must come to an agreement with the landowner on the mitigation measures and implement the measures prior to the operation of the CSSI.	Noted	Parkes to Narromine Environmental Impact Statement.	
E71	Conditions of Approval	All reasonably practicable erosion and sediment controls must be installed and appropriately maintained to minimise any water pollution. When implementing such controls, any relevant guidance in the Managing Urban Stormwater series must be considered.	Operations and maintenance will be undertaken in accordance with the NSW Environmental Protection Licence 3142. Where relevant the guidance in the Managing Urban Stormwater series will be considered.	Parkes to Narromine Soil Construction Environment Management Plan and Water Management Plan. Environmental Protection Licence 3142	
E72	Conditions of Approval	In the event that soils suspected to be contaminated are unexpectedly found, the Proponent must engage a suitably experienced and qualified contaminated land consultant to undertake further investigations to determine the type and extent of any contamination. The investigation must be undertaken in accordance with guidelines made or approved under the Contaminated Land Management Act 1997 (NSW). The results of the investigation must be documented in a Site Contamination Assessment Report.	Operations and maintenance will be undertaken in accordance with the NSW Environmental Protection Licence 3142. Where relevant the Contaminated Land Management Act 1997 (NSW) will be consulted for any unexpected finds of contaminated soils.	Environmental Protection Licence 3142	
E73	Conditions of Approval	Where the results of the site investigations indicate that the contamination poses unacceptable risks to human health or the environment under either the present or proposed land use, the Proponent must engage a suitably experienced and qualified contaminated land consultant to develop and implement any necessary remediation measures. The remediation measures must be documented in a Remediation Report.	As above	As above	
E74	Conditions of Approval	If remediation is required under Condition E73, a Site Audit Statement and Site Audit Report must be prepared by a NSW EPA Accredited Site Auditor. Contaminated land must not be used for the purpose approved under the terms of this approval until a Site Audit Statement is obtained that declares the land is suitable for that purpose and any conditions on the Site Audit Statement have been complied with.	As above	As above	
E75	Conditions of Approval	A copy of the Site Audit Statement and Site Audit Report must be submitted to the Secretary and relevant council(s) for information no later than one (1) month before the commencement of operation.	As above	As above	

CoA / Commitment ID	Source	Condition of Approval / Commitment / Performance Outcome	Operational Compliance	ARTC Documentation	ARTC System
E76	Conditions of Approval	Nothing in Conditions E72 to E75 prevents the Proponent from preparing a single Site Contamination Report or Remediation Report or obtaining a single Site Audit Statement and Site Audit Report for the entire CSSI.	Noted		
E77	Conditions of Approval	In addition to the performance outcomes, commitments and mitigation measures specified in the EIS and the Submissions Report, all practicable measures must be implemented to minimise the emission of dust and other air pollutants during the construction and operation of the CSSI.	During the staged operation of P2N, including the North-West Link, Interstate will operate in accordance with the IEMF and condition O3, O4.6-O4.15 of the Environmental Protection Licence 3142 (refer Appendix E)	Parkes to Narromine Air Quality Management Plan. Operation: see Interstate Environmental Management Framework (IEMF) COR-PO-005 Asset Management Policy COR-PO-007 Environmental Management Policy ARTC Licence 3142	See section 2 of the IEMF
E78	Conditions of Approval	Waste generated during construction and operation is to be dealt with in accordance with the following priorities:	Interstate will manage waste during operations and maintenance activities in accordance with its Standard Environmental Management Measures	Noted.	
		(a) waste generation is to be avoided and where avoidance is not reasonably practicable, waste generation is to be reduced;		Noted.	
		(b) where avoiding or reducing waste is not possible, waste is to be re-used, recycled, or recovered in accordance with the requirements of the Protection of the Environment Operations Act 1997 and its regulations; and		Noted.	
		(c) where re-using, recycling or recovering waste is not possible, waste is to be treated or disposed of at a waste management facility or premise lawfully permitted to accept the materials or in accordance with a Resource Recovery Exemption or Order issued under the Protection of the Environment Operations (Waste) Regulation 2014, or to any other place that can lawfully accept such waste.		Noted.	
E79	Conditions of Approval	Waste generated outside the site must not be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a licence or waste exemption under the Protection of the Environment Operations Act 1997, if such a licence is required in relation to that waste.	See Interstate Environmental Management Framework (IEMF) Operation: ENV-WI-004 Standard Environmental Management Measures ENV0WI-005	See section 2 of the Interstate Environmental Management Framework (IEMF)	
E80	Conditions of Approval	All waste generated during construction and operation must be classified in accordance with the EPA's Waste Classification Guidelines, with appropriate records and disposal dockets retained for audit purposes.	As above	As above	

Appendix C – ETE-09-01 Structures Inspections

Structures Inspection

ETE-09-01

Applicability

ARTC Network Wide SMS

Publication Requirement

Internal / External

Primary Source

Document Status

Version #	Date Reviewed	Prepared by	Reviewed by	Endorsed	Approved
2.6	19 Aug 19	National Bridges & Structures Engineer	Stakeholders	Manager Standards	General Manager Technical Standards 20/08/2019

Amendment Record

Amendment Version #	Date Reviewed	Clause	Description of Amendment
1.0	01 Jul 06		First issue. Includes minor editorial changes following final approval of Risk & Safety Committee.
2.0	13 Nov 09		Applicability changed to ARTC Network and some minor corrections to Defect Categories and terminologies. BFB inspection regime reverted to existing monthly intervals
2.1	18 Jun 10		Banner added regarding mandatory requirements in other documents and alternative interpretations.
2.2	24 Oct 11	3	Changes to Frequency and Scheduling of Inspections. Minor editorial change to remove CRN applicability box.
2.3	10 Feb 14	Various	Various changes and clarifications throughout. Clause 7.1 updated with addition of intervention criteria table for Fibre Composite Bridges. Addition of

			new clause 7.5 Redundant Structures.
2.4	18 Jun 15	Various	Review of Documents to align with Ellipse 8 and AS7636 Railway Structures. Approved by OSERC 13 Nov 2015
	20 Nov 15		Minor editorial updates and document rebranded
2.5	1 Jul 16	Various	Editorial changes Engineering Inspection for large culverts, large retaining walls and tunnels downgraded to Visual Inspection. Communications Towers added to structures group. Exposure and Condition Rating removed as they are no longer utilised. Material Properties and Capacity Factors removed as they are now in AS 5100 and AS 7636.
2.6	19 Aug 19	Various	Editorial changes Reference to EGP-10-01 Asset Management System and EGW-10-01 Data Classification – Structures (Work Instruction) added. Culvert description added. Inspection scope improved and, inspection work clarified further. Inspection frequencies for In Service and Redundant structures separated. Visual inspection frequency for tunnel increased from 3 to 2 yearly in lieu of the removal of Laser scanning. Special inspection for Sound Barrier gate added. Scheduled special inspection latitude for frequencies extra than 40 days added. General inventory requirements added. Priority and repair codes changed to align with asset management system. Priority Modification and Management of Repair Priorities clarified. Mandatory Defect Data added. Submission timeframes slightly improved. Document Records section added. In Appendix 1 – timber underbridge and culvert interventions amended.

Table of Contents

Mandatory requirements also exist in other documents.

Where alternative interpretations occur, the Manager Standards shall be informed so the ambiguity can be removed. Pending removal of the ambiguity the interpretation with the safest outcome shall be adopted.

1 Introduction

This document forms an integral part of Section 9 of the ARTC Track and Civil Code of Practice and details the requirements for the inspection of structures.

All inspections shall also comply with the requirements of EGP-10-01 Asset Management System and EGW-10-01 Data Classification – Structures (Work Instruction).

EGP-10-01 details management of asset and work management system and, EGW-10-01 details capturing of all nameplate attributes, asset configurations, asset description and defect attributes.

Culvert could be defined as arch, pipe or boxed shaped covered opening having walls, invert and roof cast integrally. Culvert unit could also have link slab roof suspended between adjoining box units. The deck width of ballasted culvert is measured between the ballast walls.

All culverts with an opening less than 500mm, typically track cess drainage pipes, are inspected and maintained by Civil Team personnel.

2 Levels of Inspection

2.1 Engineering Inspections

2.1.1 Purpose

An Engineering Inspection (also known as Level 3 inspection by other authorities) is a detailed inspection carried out on a structure by a structures engineer to assess:

- The physical condition and performance.
- The structural integrity.
- Corrective and preventative management requirements.

2.1.2 Scope

The scope of an Engineering Inspection shall include:

1. Review of previous engineering and visual defect reports, load rating reports, engineering investigation reports, specific maintenance management systems and procedures for specific bridges where documents are made available.
2. Review and update the inventory information as necessary.
3. Review, and update where necessary, the condition of defect, mandatory defect data and repair priority of previously identified defects. Recommend any short-term mitigation actions required to ensure safe operation until permanent repair of the defect can be completed.
4. Identify any new defects in all elements and components (including below water level where required) requiring maintenance. Recommend the repair priority and any short-term mitigation actions required to ensure safe operation until permanent repair of the defect can be completed. Upload defects with associated photographs in the asset management system

(AMS). All inspections shall be carried out from proximity that will enable capturing all essential details of defects adequately. For all steel elements and components, the inspection should be carried out from no more than at arm's length.

5. Capture a photographic record of the structure if required.
6. Undertake measurements and non-destructive testing as required to determine the extent of deterioration.
7. Site measurements of structural elements and components either to confirm drawing dimensions or to ensure adequate details are available for load rating purposes.
8. Identify rate of deterioration likely to occur in any elements prior to the next Engineering Inspection to ensure it is adequately accounted for in the load rating.
9. Prior to undertaking load rating of bridges, all matters listed in AS 5100 Part 7 – Clause 5: "Matters for resolution before design commences" must be resolved unless otherwise already clarified in the ARTC structures standards.
10. Provide a comprehensive load carrying capacity of the structure, including identifying under-strength elements. Load rating must be provided for all elements/components of bridge superstructure and only steel elements/components of bridge trestles/piers. The elements/components to be analysed, but not limited to, must include main girders/beams, cross girders, stringers, truss elements, deck slabs, bracing and all element connections and, any splices in them.
11. Where previous load rating is available then the rating must be reviewed and updated as required to account for any further and/or foreseen deterioration in that element and, also to align with current standards.
12. Provide/review a fatigue assessment of steel elements.
13. Identify elements which warrant further investigation.
14. Nominate those defects which require specific monitoring as part of a Special Inspection.
15. Engineering report must encompass all critical findings e.g. defects, load rating results, temporary speed restrictions for trains or load limit for road bridges, any special inspections and structures/elements that warrant special investigation. All calculations, software modelling and any other relevant materials associated with inspection and analysis must accompany the report.
16. Liaise with the structures personnel as deemed necessary.

2.2 Visual Inspections

2.2.1 Purpose

A Visual Inspection (also known as Level 2 inspection by other authorities) is carried out on a structure by a structures inspector to assess:

- The physical condition of structures.
- The structure is safe for operational purposes.

2.2.2 Scope

The scope of a Visual Inspection shall include:

1. Review of previous defect report.
2. Review and update the inventory information.
3. Review, and update where necessary, the condition of defect, mandatory defect data and repair priority of previously identified defects. Recommend any short-term mitigation actions required to ensure safe operation until permanent repair of the defect can be completed. Identify any new defects in all elements requiring maintenance, including below ground for timber piles where deemed necessary. Recommend the repair priority and any short-term mitigation actions required to ensure safe operation until permanent repair of the defect can be completed. Upload defects with associated photographs in the AMS as required.
4. Capture a photographic record of the structure if required.
5. Identify defects in elements which warrant further investigation.
6. Two types of communication towers that must be inspected by structures inspector are steel lattice or truss towers and concrete or timber mono poles. The inspection of communication towers also entails the following:
    a. Necessity to isolate microwave dishes, which emit radioactive waves, when accessing top of a tower. Where required, structures representative to arrange isolation of microwave dishes through ARTC Property Manager.
    b. Drone must not be flown within 10m of any microwave dish.
    c. Provide coordinates and adequate description of location of communication towers with reference to nearest track kilometrage.
    d. Each leg of lattice tower must be identified in clockwise manner by gluing a numbered 50 x 50mm plaque on exposed face or replace damaged plaque as required. Elements must be identified between the legs by bays, starting at Bay 1 at ground level between 1st and 2nd horizontal bracing from footing. All other conventions to be as per Inventory Standard: ETG-09-01.
7. Liaise with the structures personnel as deemed necessary.

2.3 Special Inspection

2.3.1 Purpose

A Special Inspection is undertaken outside of the prescribed inspection schedule of engineering and visual inspections. The reasons for special inspections are varied and include, but not limited to:

- Monitor specific defects.
- Reassessment of defects.
- Inspect for anticipated hazards following an event such as heavy rain, an earthquake or fire.
- Following an unforeseen event, such as impact from a road vehicle or derailed rolling stock.

The inspection is usually carried out by a structures inspector, or suitable person as nominated by the structures representative.

2.3.2 Scope

The scope of the Special Inspection shall be developed by the structures representative and documented prior to commencing the Special Inspection. The scope may include, but not limited to:

1. Review of any previous inspection and testing reports.
2. Review of the condition of previously identified defects or structural deficiencies.
3. Identify any additional maintenance or repair treatments.
4. Record a photographic evidence of any defective element.
5. Identify structures and/or elements which warrant further investigation.

2.4 Track Patrol

A Track Patrol is carried out to check the general serviceability of a structure for rail operations. Track Patrols assess such matters as the track geometry over underbridges, any general abnormality in structures and any build-up of debris around the structures.

All abnormalities shall be reported to the structures representative for further assessment.

3 Technical Maintenance Plan

All nominated inspections shall be carried out within the required timeframes (latitudes) nominated in Section 4 Table 2 below.

An Engineering Inspection may nominate the inspection frequency for engineering, visual or special inspections for that structure, but recommendations shall not be greater than the mandated frequencies. An engineering waiver must be sought for any alteration in mandated inspection frequencies and latitudes.

Table 1 below documents the mandated minimum inspection frequency for each type of structure on operational lines as well as for redundant structures:

Asset Class	**Structure Type**	**Span Material** **(includes Fibre Composite/** **Timber Deck/transom)**	**Engineering Inspection Frequency (Years)** **(Maximum period between inspections)**	**Visual Inspection Frequency (Years)** **(Maximum period between inspections)**
In Service Structures				
Engineering Inspections and Visual Inspection				
Bridge	Underbridge	Steel aged up to 40 years	12	2
		All other Steel (includes wrought iron)	6	2

Asset Class	Structure Type	Span Material (includes Fibre Composite/ Timber Deck/transom)	Engineering Inspection Frequency (Years) (Maximum period between inspections)	Visual Inspection Frequency (Years) (Maximum period between inspections)
In Service Structures				
		Concrete aged up to 40 years	12	2
		All other Concrete (includes Masonry)	6	2
		Timber	N/A (Capacity of timber elements is now based on pre-determined pipe sizes for all Grade F22 standard components)	1
	Overbridge	Steel & Concrete aged up to 40 years	12	2
		Timber	N/A (refer underbridges)	1
		All others	6	2
	Footbridge	Steel & Concrete aged up to 40 years	12	3
		All others	6	3
Culvert	Culverts	All	N/A	2
Tunnel	Tunnel	All	N/A	3
Miscellaneous Structures	Retaining walls ≥ 2m high and Comms Towers	All	N/A	2
	All Other Structures	All	N/A	4
Redundant Structures				
Redundant Structures	All	All	N/A	2
Special Inspection				
Bridge	Underbridge	Broad Flange Beam (BFB) spans over roadways	N/A	Monthly

Asset Class	Structure Type	Span Material (includes Fibre Composite/ Timber Deck/transom)	Engineering Inspection Frequency (Years) (Maximum period between inspections)	Visual Inspection Frequency (Years) (Maximum period between inspections)
In Service Structures				
Bridge & Culvert	All	Temporary Supports	N/A	3 monthly

Table 1 – Inspection Frequencies

Engineering Inspections take precedence over Visual Inspection. Therefore, a Visual Inspection is not required to be undertaken in conjunction with an Engineering Inspection.

4 Inspection Latitude

All inspections shall be completed within the latitude shown in the Table 2 below:

Engineering Inspection	
All	10% of days between any scheduled Engineering Inspection and the next Visual Inspection.
Visual Inspection	
All	10% of days between any scheduled Engineering Inspection and the next Visual or between 2 Visuals or between Visual and next Engineering Inspection.
Special Inspection	
Unscheduled	As soon as practicable following trigger event.
Scheduled	7 days for frequencies < 40 days, 14 days for 40 to 180 days and 10% as for Visual Inspection above for > 180 days.

Table 2 – Inspection Latitude

The Structures Representative shall seek an engineering waiver where inspection cannot be undertaken within the specified latitude for a scheduled inspection.

5 Inspection Requirements

All identified defects shall be recorded in AMS, in accordance with the data requirements specified below and in EGW-10-01.

5.1 Defect Category

During an inspection, each defect is required to be allocated a Defect Category and the actions undertaken as nominated in the Table 3 below:

Defect Category	Inspector Response	Structures Representative Response
A	Immediately stop trains in the case of an underbridge, culvert or tunnel; or close if an overbridge or footbridge. Advise Structures representative immediately for further assessment	As soon as Practicable
B	Immediately impose a 20km/h speed restriction in the case of an underbridge, culvert or tunnel. For footbridges and overbridge, the area is to be barricaded. Advise Structures Representative immediately for further assessment.	Assess within 24 hours of notification.
C	Report to Structures representative within 2 working days.	Assess within 2 working days of notification.
D	Report to Structures representative within 5 working days.	Assess within 7 days of notification.
MONITOR		
M	Record in inspection report, and submit within the timeframes described in Table 5.	Assess within 4 weeks of submission when requested by the Inspector.

Table 3 – Defect Category

The engineer / structures inspector shall use engineering judgement and/or experience when determining the Defect Category for each individual defect. ***Section 7 – Appendix 1*** *provides a general guide to defect limits and associated actions to be taken by the inspector. The defect categories against defect types and sizes for individual elements are typically based on defects being located at the most highly stressed areas of the elements.*

5.1.1 Category A to D Defects

Each defect, i.e. a deficiency with a Category of A to D, shall be allocated the following by the inspector:

- Element.
- Element Location.
- Defect type and location.
- Repair Priority.
- Recommendation.

5.1.1.1 Element

The structural element on which the defect has been found shall be identified.

5.1.1.2 Element Location

The location of the element that has the defect shall be defined as follows:

- For underbridges, and any other structure with spans parallel to the track, all descriptions are based on observations from the start of a structure, which is the end with the lowest kilometrage using the following abbreviations.
    - A – Abutment.
    - S – Span.
    - P – Pier.

  All elements shall be numbered from the Downside (left hand side when facing in direction of increasing kilometrage) progressing to the Upside (right hand side).
- For overbridges, culverts and any other structure with spans perpendicular to the track the numbering system shall be the same as for an underbridge with the start of a structure located on the Down Side of the track.

  All elements shall be numbered from the highest kilometrage side (left hand side when facing the Upside rail) progressing to the lowest kilometrage side (right hand side).

5.1.1.3 Defect Type and Location

A standard defect type and the location of the defect within the element shall be nominated.

5.1.2 Repair Priority

For each defect identified or reassessed during the inspection the inspector shall recommend a repair priority code as specified in Table 4 below. The repair priority shall take into account, but not be limited to, the following factors:

- the criticality of the structure and/or element under consideration.
- The severity of the defect.
- the urgency and nature of the work that will be performed.

Repair Priority Code	Rectification Period
E - Emergency	Rectification work to commence within 24 hours.
P1 – priority 1	Within 7 days
P2 – priority 2	Within 28 days
P3 – Priority 3	Up to 6 months
P4 – Priority 4	Up to 1 year
P5 – Priority 5	Up to 2 years
PN - no action required	Monitor

Table 4 – Repair Priority Codes

5.1.2.1 Recommendation

Depending on the nature of the defect, the inspector may recommend a short term action to be implemented such as:

- Impose a temporary speed limit on the structure.

- A special inspection of the defect, until the defect is rectified and/or.
- Temporary work, such as propping, until the defect is rectified.

The appropriate inspection interval should be set for monitoring the short-term actions (if different from the normal inspection cycle for the structure or element of the structure).

Recommended short-term actions shall be recorded in the defect comments by the inspector. The structures representative shall be responsible for reviewing the defect and actioning any short-term actions as required.

5.1.3 Category M - Monitor

Defects allocated as Defect Category M need to be recorded and monitored for further deterioration.

The defect shall be inspected at each inspection to assess if any rectification work is required.

5.1.3.1 Priority Modification

The structures representative has authorisation to change the repair priority assigned to the defect by the inspector or his own assessments. Sufficient justification and controls to support any such changes shall be documented appropriately.

The structures representative shall not modify the defect category assigned by an inspecting engineer without his prior written approval or approval of National Bridges & Structures Engineer (NBSE).

5.1.3.2 Management of Repair Priorities

Where the structures representative has determined that repair work on a critical defect (A-D) will not be performed within the allocated rectification period in Table 4 above then the criticality and repair priority of that defect must be re-assessed.

5.1.4 Mandatory Defect Data

The structures management system shall record the data and documentation required by the structures representative to assess and manage the risk of each defect to ensure the operational safety of the network.

To ensure sufficient data is recorded by the inspector, completion of the following attributes in the system is mandatory for submission of a defect:

- Equipment Reference (asset's unique ID number).
- Component identification and location.
- Defect type, size and category.
- Repair Priority.
- Date defect found.
- Recommendations for any repairs with any speed restrictions, inspection frequency changes or any other mitigation actions.
- Photos of Category A to D defects and photos of M defects as required.

5.2 Load Rating

As part of an Engineering Inspection, the structures engineer shall undertake a load rating for the bridges for the “As-New” and “As-Is” conditions and fatigue assessment in accordance with the procedures documented in the ARTC Code of Practice – Section 9 and Structures Inspection Procedure ETE-09-02.

Load rating shall be carried out for all elements of superstructure of every bridge and only for bridge substructures constructed of steel unless otherwise specified in the scope of work.

The elements to be analysed must include, but not limited to, the following:

- Main girders/beams.
- Cross girders.
- Stringers.
- All truss posts, diagonals, portals, etc.
- Bracing.
- Deck slabs.
- Connections of the above components.
- Splices in the above components.
- Critical gusset plates, stiffeners or any other elements likely to be overstressed under traffic.

Prior to undertaking load rating of bridges, all matters listed in AS 5100.
Part 7 - Clause 5: “Matters for resolution before design commences” must be resolved unless otherwise already clarified in the current ARTC structures standards.

6 Structures Inspection Submission Timeframes

All submissions of inspection and/or load rating reports to structures representative shall be completed within the timeframes shown in Table 5 below following the on-site inspection of individual structures:

Submission	Timeframes
Engineering Inspection	
Provide list of all defects identified, including Category M defects	2 weeks after inspection of individual structure
Submission of draft engineering report	10 weeks after inspection of all nominated structures
Submission of final engineering report	14 weeks after inspection of all nominated structures unless otherwise extended by structures representative
Visual and Special Inspection	
Provide list of all defects identified, including Category M defects	2 weeks after inspection of individual structure
Submission of final Report by external inspectors, if required	4 weeks after inspection of all nominated structures

Table 5: Structures Inspection Submission Timeframes

7 Document Records

Where communication is verbal or via e-mail with the structures representative, to meet the required timeframes in Table 5, the structures representative shall subsequently document all such communications in the AMS within a reasonable timeframe.

Structures representative to ensure all engineering and visual reports, load rating, defects, calculations, photos and any associated documents are uploaded against respective structure in the AMS within a reasonable timeframe.

8 Appendix 1 – Intervention Criteria Guidelines

This appendix provides a general guide to defect limits and associated actions to be taken by the inspector. The inspector shall use engineering judgement and experience when determining the Defect Category for each individual defect.

In general, the limits and defect sizes have been set on the basis of them being located at the most highly stressed area of the elements.

8.1 Asset Class - Bridge

Description	Defect Type	Defect Size	Defect Category
A. Bridges – Steel (includes Wrought Iron)			
For steel, including wrought iron and broad flange beam bridges, items in the table are defined as follows: ***Main structural elements*** are main girders, cross girders, stringers, truss chords, diagonals and verticals, columns, trestle legs and headstocks. ***Primary structural components*** are typically a flange or web and may consist of multiple plates and/or angles. ***Bearing zone components*** are bearing plates, bearing stiffeners and bearings. ***Secondary structural components*** are bracing, gusset plates, web stiffeners, tie bars, etc. For concrete / masonry substructures, refer “Bridges – Concrete”.			
Main Structural Element (excluding Broad Flange Beams)	Crack in a primary structural component	> 80mm long	A
		10 – 80mm long	B
		< 10mm long	C
Broad Flange Beams	Crack in a primary structural component	> 25mm long	A
		≤ 25mm long	B
Main Structural Element	Corrosion loss in sectional area of any primary structural component	> 50%	B
		20 - 50%	D
		< 20%	M
	Missing	Any	A
Bearing Zone	Crack in a bearing zone component	> 250mm	C
		50 – 250mm	D
		< 50mm	M
	Corrosion loss in sectional area of any individual component	> 50%	D
		≤ 50%	M

Description	Defect Type	Defect Size	Defect Category
	Missing	Any	A
	Bearings locked in position	No movement	M
Secondary Structural Components	Crack	Any	D
	Corrosion loss in sectional area of any individual component	> 50%	D
		≤ 50%	M
	Missing	Any	B
Cast iron caissons of lattice girder truss bridges	Any crack	≥ 200m long	D
		< 200mm long	M

Impact Damage			
Main Structural Element (excluding Trestles)	Out of alignment (causing misalignment to track)	> 50mm	A
		30 – 50mm	B
		< 30mm	D
	Major structural damage	Structure likely to be unable to carry load	A
	Girder flange outstand deformed vertically	> 60% of outstand	B
		30 – 60% of outstand	C
		< 30% of outstand	M
	Flange deformed horizontally within bracing bay	> 60mm	B
		30 – 60mm	C
		< 30mm	M
	Element deformed horizontally	> 20mm between bracing bays	C
		≤ 20mm between bracing bays	M
	Notched	> 30mm	B
		≤ 30mm	C
Trestle	Column deformed in any direction	> 100mm	A
		50 – 100mm	B
		25 – 49mm	D
		< 25mm	M
Fasteners			
Main Elements - Splice/End Connections	Missing	> 25%	A
		5 - 25%	D
		< 5%	M
	Loose/Corroded Heads	> 25%	B
		5 - 25%	D
		< 5%	M
Main Elements - Components Connection	Missing (% in a group of any group of 10 continuous rivets or bolts)	> 40%	A
		10 - 40%	D
		< 10%	M
	Loose/Corroded Heads (% in a group of any group of 10 continuous rivets or bolts)	> 40%	B
		10 < 40%	D
		< 10%	M

Main Elements - Others	Missing/Loose/Corroded Heads	> 40%	B
		10% < 40%	D
		< 10%	M
Bearings	Missing bedding grout and/or HD bolts	> 30% per bearing	D
		≤ 30% per bearing	M
Secondary Elements – Connections to Main Members/ Splices, etc	Missing bolts/rivets	> 25%	B
		≤ 25%	M
	Loose/Corroded Heads	> 25%	D
		≤ 25%	M
Stitching rivets	Slackness due to excessive wear & tear	> 2mm play	D
		≤ 2mm play	M
	Corrosion in head	> 75%	D
		≤ 75%	M

B. Bridges – Timber					
Girder/Solid Headstock	Pipe/trough in any girder or solid headstock	UNDERBRIDGES (To maintain current TOC following actions must be implemented)		OTHER BRIDGES	
		Defect Size	Action	Defect Size	Category
		> 225mm	Replace immediately		
		201 - 225mm	Replace within 2yrs	> 250mm	A
		176 - 200mm	Replace within 3yrs	226-250mm	B
				200-225mm	C
		150 - 175mm	Replace within 4yrs	151-199mm	D
		< 150mm	Replace within 5yrs	50*-150mm	M
	Crushing	Any	Replace immediately	Any	B
	Troughing	> 150mm	Replace immediately	As for girder above	
		100 - 150mm	Replace in 1yr		
Corbel	Pipe/trough	Crushing	Replace immediately	Crushing	Replace immediately
		> 125mm	Replace within 1yr	>125	Replace within 1yr
Girder	Mid span deflection	Exceeds values tabulated below. (Span is the distance between centre line of supports)		B	

		Span (m)	< 4	4 - 5	5 – 7	> 7
		Deflection (mm)	8	10	15	20
Waling Headstock	Rotted out				B	
Body Bolts	Loose in a connection		> 25%		D	
			< 25%		M	
Corbel bolts	Loose in a connection		> 25%		D	
			< 25%		M	
Trestle Bolts	Loose in a connection		> 25%		D	
			< 25%		M	

Piles		UNDERBRIDGES (To maintain current TOC the following actions must be implemented)		OTHER BRIDGES	
		Defect Size	Action	Defect Size	Defect Category
	Section loss in > 50% of piles in any trestle or abutment	N/A		>75%	A
	Section loss in > 25% of piles in any trestle or abutment	N/A		> 75%	B
	Section loss in any pile	N/A		> 75%	C
		50 - 75%	Replace within 1 year	50-75%	D
		40* - 49%	Monitor	40*-49%	M
	Pumping	Any	Stump immediately	Any	D
Transoms	Rotted Out	3 Adjacent		B	
		2 Adjacent		C	
		One isolated		M	

Member	**Defect Type**	**Defect Size**	**Defect Category**
Transom Bolts	Missing	3 in adjacent transoms	B
		2 in adjacent transoms	C
		Both bolts in a transom	M

Member	Defect Type	Defect Size	Defect Category
Decking	Split or rotted out	> 30%	C
		20%* - 30%	M
BridgeWood decking	Surface checking	> 8mm	D
		≤ 8mm	M
	Crushing	Any	B
	Delamination (bubbles)	Any	C
Any Timber Section	Termite infestation	Any evidence of damage	D
C. Bridges – Concrete			
Superstructure structural elements include beams and decks. ***Substructure elements*** include piers, abutments, wingwalls, pile caps, piles and footings.			
Superstructure structural elements	Impact damage	Structure likely to be unable to carry load	A
	Differential deflection between units under live load	Visible	C
	Cracking	> 3mm	C
		1*- 3mm	M
	Spalled concrete with reinforcement exposed and corroding	> 30% cross section loss to exposed reinforcement	D
		< 30% cross section loss to exposed reinforcement	M
	Spalled concrete with prestressed tendon exposed	Any	C
Substructure structural elements	Cracking	More than 10mm wide	C
		3* - 10mm wide	M
	Spalled concrete with reinforcement exposed and corroding	> 40% cross section loss to exposed reinforcement	D
		< 40% cross section loss to exposed reinforcement	M
	Vertical/Lateral dislocation	> 50mm	C
		10* - 50mm	M
Deck – joint between slabs	Fouling with ballast/debris	Debris likely to cause deterioration of joint	D
Bearings	Fouling with ballast/debris or any other degradation	Debris likely to cause deterioration of bearing.	D
Bearing Pads	Missing bearing area	> 30%	D
		≤ 30%	M

Member	Defect Type	Defect Size	Defect Category
D. Bridges – Masonry and Concrete Arch			
For piers, abutments, wingwalls and reinforcement see "Bridges – Concrete".			
Arch Ring	Brickwork dislocation	> 50% in any square metre missing or unbonded	B
		20 - 50% in any square metre missing or unbonded	D
		10* - 19% in any square metre missing or unbonded	M
	Lateral cracking	> 3mm wide, through & across full arch width. Visible differential movement under live load	B
		2 - 3mm & not through & across	D
		< 2mm & not through & across	M
	Longitudinal cracking	> 6mm wide & > 2m long along arch	D
		3 - 6mm	M
	Distortion of profile	> 50mm – detectable by undulations in top line of spandrel walls/parapets or track	D
		20* - 50mm	M
Other than Arch	Brickwork dislocation	> 50% in any square metre missing or unbonded	D
		20 - 50% in any square metre missing or unbonded	M
Spandrel Wall	Displacement	Lateral > 30mm or > 20mm lateral + 20mm tilt	D
		15* - 30mm	M
Invert floor	Heaving	> 100*mm	M
Any other	Brickwork dislocation	Nil	D

E. Bridges – Fibre Composite			
Beams, Decks and Transoms	Coating Chipping (excludes decking)	> 25mm in diameter	D
		≤ 25mm in diameter	M
		> 5mm deep	D
		≤ 5mm deep	M
	Cracking	Any	C
	Crushing at support	Any	C
	Fire / Ultra Violet Radiation damage	Any	C
	Accidental / intentional damage	Any	C
	Excessive wear	Any	C

Member	Defect Type	Defect Size	Defect Category
F. Bridges – Miscellaneous Items			
Waterway Area			
Bridge Waterway	Scouring under Pier/Abutment	Safety Critical Issue	B
		> 10% loss in bearing area	C
		≤ 10% loss in bearing area or non-safety critical issue	M
	Blockage due to debris build-up	> 10% loss in waterway area	D
		≤ 10% loss in waterway area	M
Walkways, Refuges and Decking			
Handrails	Missing/Broken/ Loose/Decayed	Safety Critical Items	B
		Non-safety critical items	M
Deck	Walkway/refuge planks broken, decayed, missing or displaced	Causing safety concerns	B
		Not causing safety concerns	M
Deck-Nails, Screws	Protrusion above deck	> 10mm	C
		≤ 10mm	M
Clearance Signs	Missing	Any	D
	Illegible	Any	D
Footbridges			
Stairway	Broken front edges, protruding reinforcement or excessive slope	Safety Critical Items	B
		Non-safety critical items	M
Road/Pedestrian Safety Aspects			
Safety Screens/Barrier	Missing/Broken	Safety Critical Items	B
		Non-safety critical items	M
Road & Pedestrian Traffic Barriers	Missing/Broken/ Loose/Decayed	Safety Critical Items	B
		Non-safety critical items	M
Clearance Signs	Missing	Any	D
	Illegible	Any	D
Ballast	Falling	Any	B

8.3 Asset Class – Culvert

Member	Defect Type	Defect Size	Defect Category
A. Culverts			
For undefined elements and components refer to "Asset Class – Bridges".			
Culvert	Collapse	Subsidence of formation/ballast that undermines track safety	A
		Subsidence of formation/ballast that does not undermine track safety	M
	Blocked – preventing flood flow	> 20%	D
		≤ 20%	M
	Cracked Barrel	> 50mm wide	B
		10mm – 50mm	D
		< 10mm	M
	Joint/Broken Separated	Any defect within 2m from nearest rail or between toes of high embankment or within influence line of traffic loading.	D
	Deformation	> 50*mm	D
Expanda / Rotaloc PVC / Berolina or HDPE Plastic liners for CSP	Abrasion in sectional area	> 25%	C
		10% - 25%	D
		< 10%	M
	Fire / Ultra Violet Radiation damage	any	C
Headwall/ Wingwall	Cracked	> 50mm wide	B
		10 – 50mm wide	D
		< 10mm	M
Apron	Scouring under apron	> 150mm deep	D
		≤150mm deep	M
Floor	Heaving	> 150mm	D
		≤150mm	M

Note Where the defect size is less than that shown with asterix (*) for intervention for Defect Category, there is no need to record the defect.*

8.4 Asset Class – Tunnels

Intervention criteria guideline shall be in accordance with the "Asset Class – Bridges" for the appropriate element type and material.

8.5 Asset Class – Miscellaneous Structures

Intervention criteria guideline shall be in accordance with the "Asset Class – Bridges" for the appropriate element type and material.

8.6 Redundant Structures

Intervention criteria guideline shall be in accordance with the "Asset Class – Bridges" for the appropriate element type and material for undefined elements.

Description	Defect Type	Defect Size	Defect Category
A. Redundant Structures			
Primary redundant structures are typically bridges, tunnels, water structures, platforms and loading banks.			
Structure	Integrity	Refer to 'Asset Class – Bridges'.	
Vehicle and/or pedestrian access barricade	Damaged/Missing	Safety critical items	B
		Non-safety critical items	M
Fence	Damaged/Missing	Safety critical items	B
		Non-safety critical items	M
Signage	Illegible/Damaged/Missing	Safety critical items	B
		Non-safety critical items	M
Any other issues relating to safety of traffic operation or people on or in vicinity of redundant structures	Other Safety issues	Safety critical items	B
		Non-safety critical items	M

Appendix D – ETE-09-02 Structures Inspections Procedure

Division / Business Unit: Corporate Services & Safety
Function: Engineering (Track & Civil)
Document Type: Procedure

Structures Inspection Procedure

ETE-09-02

Applicability

ARTC Network Wide SMS

Publication Requirement

Internal / External

Primary Source

Procedure Document Status

Version #	Date Reviewed	Prepared by	Reviewed by	Endorsed	Approved
1.7	19 Aug 19	National Bridges & Structures Engineer	Stakeholders	Manager Standards	General Manager Technical Standards 20/08/2019

Amendment Record

Amendment Version #	Date Reviewed	Clause	Description of Amendment
1.0	08 Dec 09		Originally published as ETN-09-01 Structures Inspection Manual version 1.0 Working Draft. Reissued as a Procedure.
1.1	18 Jun 10		Banner added regarding mandatory requirements in other documents and alternative interpretations.
1.2	31 Oct 11	Appendices	Updates to Appendix B, E, F & P. Minor editorial change to remove CRN applicability box.
1.3	12 Nov 12	Appendix B	Updated with pre-approved amendment (Nov 2011) to remove CRN related lines & data following hand over of CRN Network effective 15 January 2012.
1.4	10 Feb 14	Various	Updated inspection process for Bridge Wood panels, Fibre Composite products, 'Expanda' & 'Rotaloc' pvc pipes / liners and Redundant Structures.

1.5	18 Jun 15	Various	Review of Documents to align with Ellipse 8 and AS7636 Railway Structures Approved by OSERC 13 Nov 2015
	20 Nov 15		Minor editorial updates and document rebranded
1.6	28 Jul 16	Various	Minor editorial changes
			Exposure/Condition Rating of Elements deleted to align with ETE-09-01.
			References to BMS and BMS related processed deleted to align with EGP-10-01 and EGW-10-01
1.7	19 Aug 19	Various	Minor editorial changes and addition of references
			Added back structures management system process
			Added ‘at arm’s length’ visual inspection
			Underground inspection of timber bridges transferred from Engineering Inspection to Visual Inspection
			Enhanced ‘Assessment of Previously Reported Defects’, ‘Data Recording’ and ‘Repair Priority’ sections
			‘T44 design road vehicle’ replaced with ‘nominated road traffic’ and added new load limit sign for road bridges.
			‘Berolina Liner’ added to Appendix E
			Sonar and Naked Eye methods of underwater inspection added to Appendix I
			Review of documents to align with Appendices A to L

Table of Contents

Mandatory requirements also exist in other documents.

Where alternative interpretations occur, the Manager Standards shall be informed so the ambiguity can be removed. Pending removal of the ambiguity the interpretation with the safest outcome shall be adopted.

1 Introduction

1.1 Purpose

This document forms an integral part of Structures Inspection Standard ETE–09–01 and describes the system and processes for inspecting structures on the Australian Rail Track Corporation's (ARTC) network.

1.2 Scope

Section 9 of the ARTC Code of Practice identifies the minimum requirements for the inspection of structures.

This Structures Inspection Procedure applies to all structures under ARTC's responsibility and provides guidance for the processes for undertaking the following inspections:

- Engineering Inspections.
- Visual Inspections.
- Special Inspections.
- Track Patrol Inspections.

The systematic inspection of structures forms the basis of good asset management practice. The outcomes from the inspection process are used to:

i. Provide data on the current condition, performance and environment of a structure including the severity and extent of defects. The data enables those responsible for managing structures on ARTC's network to assess if a structure is currently safe for use and fit for purpose, and provides sufficient data for actions to be planned where structures do not meet these requirements.

ii. Provide analyses, assessments and processes where there is a change in condition, cause of deterioration, rate of deterioration, maintenance requirements, effectiveness of maintenance and structural capacity.

iii. Provide data for asset management planning in order to deliver an acceptable level of service.

iv. Compile, verify and maintain inventory data.

1.3 Procedure Owner

The General Manager Technical Standards is the Procedure Owner and is the initial point of contact for all queries relating to this Procedure.

1.4 Responsibilities

The Business Unit is responsible for implementing this procedure.

1.5 Reference Documents

The following documents are supported by this Procedure:

- ARTC Track & Civil Code of Practice Section 9 Structures.
- ETG-09-01 Structures Inventory.
- ETE-09-01 Structures Inspection.
- EGP-10-01 Asset Management System.
- EGW-10-01 Data Classification – Structures (Work Instruction).

2 Structures Management System

For effectiveness of structure management, it is important that data associated with an asset is as complete as possible, of high quality and consistent with other data collected on the network.

To ensure the *completeness of the data*, the Asset Management System (AMS) provides a means for recording, storing and accessing critical data for all structures on the network. A flowchart of the structures management processes is provided in Figure 1 below.

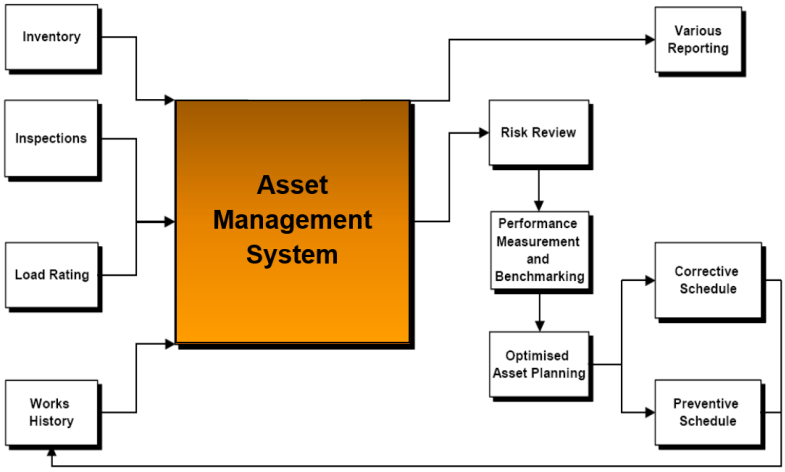


Figure 1 – Structures Management Processes

3 Engineering Inspection

The purpose and scope of an Engineering Inspection is provided in the Standard ETE-09-01 Structures Inspection.

Further general information for specific types of structures and load rating of bridges is provided in Appendices A – L of this procedure.

Appendices A to L, as listed below:

Appendix A	Inspection of Steel Structural Elements.
Appendix B	Inspection of Timber Structural Elements.
Appendix C	Inspection of Concrete Structural Elements.
Appendix D	Inspection of Fibre Composite Structural Elements.
Appendix E	Inspection of Structural Liners for Pipes.

Appendix F	Inspection of Masonry Structural Elements.
Appendix G	Inspection of Tunnels.
Appendix H	Inspection of Substructure Elements.
Appendix I	Inspection of Underwater Structural Elements.
Appendix J	Inspection of Miscellaneous Structures.
Appendix K	Inspection of Redundant Structures.
Appendix L	Load Rating of Bridges.

These appendices provide general guidance only and it is expected the structures engineer will use appropriate engineering judgement and experience when recommending actions from an Engineering Inspection.

3.1 Inspection Procedure

The process of undertaking an Engineering Inspection is as follows:

3.1.1 Pre-Inspection Investigation

Prior to undertaking an Engineering Inspection, the structures engineer should review the available relevant historical information for the structure, including:

i. Available inspection and engineering investigation reports.

ii. Maintenance history.

iii. Outstanding defects and proposed Major Periodic Maintenance.

iv. Defects identified for future observation from previous inspections.

v. Structural issues that have been recorded since the last inspection.

vi. “As-New” and “As-Is” load rating and load effects from current traffic from previous inspections and/or investigations.

vii. Nominated train operating configurations.

viii. Train loading history and previous fatigue assessments.

ix. Underwater Inspections (including assessing the need to undertake a further underwater inspection as part of this Engineering Inspection).

3.1.2 “As-New” Load Rating

Where a structure does not have an “As-New” load rating in terms of LA design rail traffic loading or nominated road vehicle loading in accordance with AS 5100.7 and construction drawings are available the rating should be calculated prior to undertaking the on-site inspection, so that there is a better understanding of the structurally critical elements. The drawing dimensions should later be confirmed by site measurements and rating results corrected as necessary.

The load assessment should identify:

- The capacity of each primary and secondary element.
- All splices and connections as deemed essential.

- The equivalent train load effects for each primary and secondary element and all concerned components for each nominated train consist.
- The equivalent road vehicle load effects for each primary and secondary element and all concerned components for each nominated road traffic.

The load rating should be determined in accordance with the “Load Rating of Bridges”, which is included in Appendix L.

3.1.3 Fatigue Assessment

Prior to undertaking the on-site inspection, the fatigue assessment should be updated to include the train loading history for the period since the last fatigue assessment, so there is a better understanding of the critical elements that have reached or are approaching the end of their theoretical remaining fatigue lives.

Fatigue assessment for road bridges and culverts are not required unless otherwise included in the scope of work.

3.1.4 Preparation for Inspection

In preparation for the inspection, the structures engineer should liaise with the local structures representative and/or the structures inspector to ensure the appropriate arrangements are in place to undertake the inspection, including:

- Track protection.
- Inspection access arrangements.
- Safety equipment.
- Arrangements with relevant authorities/stakeholders.

The structures inspector must prepare a Safety Plan and submit to ARTC’s nominated representative for approval.

3.1.5 Detailed Inspection

The detailed inspection should cover all elements and components of the structure, including below water level. The individual elements of the bridge should be visually examined either with the naked eye at arm’s length or through the use of appropriate equipment such as mirrors, telescopic equipment or video recording in order to identify structural defects. All steel elements and components such as splices, connections, bearings, etc. of underbridge must be inspected from no more than at arm’s length.

Review of Equipment Register

The structures engineer is required to review the existing equipment register information currently held in AMS for the structure and identify:

- Additional information to make the inventory data complete.
- Modifications to correct any errors or changes arising from maintenance work, to the existing information.

Photographic Record of Structure

For each structure, the following photographic records that form part of the equipment register information are required:

1. A view along the deck system.
2. One or two views (depending on the size of the structure) showing the elevation of the structure.
3. One or two representative photographs of more complex structures such as trusses.

The structures engineer should review the existing photographs in AMS for that structure and take additional photographs if currently inadequate or there has been a substantive change.

Following the inspection, the structures engineer should advise the structures representative of any required changes to the equipment register. The structures representative should review the proposed changes and arrange for the changes to be made in AMS.

Assessment of Previously Reported Defects

At the start of the inspection procedure, the structures engineer should review the status of all existing defects. Depending on the rate of deterioration of the defect the structures engineer should record one of the following:

- No Change - The original defect category and repair priority (where appropriate) allocated to the defect does not change.
- Re-Assess - The defect is reassessed, and a new defect category and repair priority recorded.
- Remove - The defect is not considered to be an issue any longer and is therefore not required to have any further monitoring at the next inspection.
- Completed - If a defect has been repaired but is still identified as an outstanding defect, the structures representative should be notified.
- Outstanding - If a defect has been reported as repaired but is still outstanding, the structures representative should be notified.

New Defect Identification

New defects identified by the structures engineer during an inspection shall have a defect record created in AMS. The defect record shall be created in accordance with this section of the CoP, and as per the data requirements specified in EGW-10-01.

Establishing the cause of an observed defect is crucial to determining the severity of a defect. If the structures engineer is unable to determine the mechanism responsible for the cause of a defect, further input should be sought from a specialist engineer. If the cause of a defect cannot be identified and the level of risk cannot be determined, further investigation should be recommended.

Data Recording

All defect information obtained during the Engineering Inspection must be uploaded to the AMS unless otherwise instructed to provide in hard and/or soft copies.

All defects should contain a clear and concise scope of work to allow forward planning and budget estimate. The information should include:

i. Inventory
ii. Photographic records of ALL defects.
iii. Outstanding Defects.
iv. New Defects.
v. Maintenance Works.

vi. Any changes to Inspection Frequency.

vii. General Information.

The structures inspector does not have permission to change Inventory in the AMS. The inspector should provide written advice of any changes related to these records.

The information should include all the required inventory attributes, whether controlled or uncontrolled, for that structure.

The structures inspector should provide the structures representative with the following information:

- Attribute information where there is currently no information.
- Information where there are changes required.

The structures representative should arrange for the information to be included in the AMS.

Repair Priority

All defects should be allocated a repair priority as shown in Table 1 below:

Repair Priority Code	Description	Rectification Period
E	Emergency	Rectification work to commence within 24 hours
P1	Priority 1	Within 7 days
P2	Priority 2	Up to 28 days
P3	Priority 3	Up to 6 months
P4	Priority 4	Up to 1 year
P5	Priority 5	Up to 2 years
PN	no action required	Monitor (include in Capital/MPM for repair in future)

Table 1: Repair Priority Codes

Specific Requirements for Engineering Inspections

In addition to the inspection requirements outlined above for all structures, it is necessary to undertake specific inspection and/or testing as listed below in Table 2:

Structure Type	Inspections / Testing	Procedure Reference
Steel and Wrought Iron Structures	• Magnetic Particle and Dye Penetrant testing.	Appendix
Substructures submerged in permanent water	• Underwater Inspection	Appendix I

Table 2 – Additional Inspection Requirements

3.1.6 Site Measurements

Site measurements should be undertaken to either confirm drawing dimensions or when drawings are not available, to ensure accurate dimensions of elements are available for load rating.

3.1.7 "As-Is" Load Rating

Where the condition of an element has deteriorated to the extent that it's "As-New" load carrying capacity has been affected, a new rating for the element should be determined for the "As-Is" condition.

Where elements have a capacity of less than nominated rail/road traffic, the following information should be recorded for each deficient element:

- Location.
- Description of Deficiency.
- Member Rating.
- Capacity Ratio.
- Speed Restriction for current traffic where railway bridge or culvert has inadequate load carrying capacity (to provide a capacity ratio of ≥ 1.0).
- Load limit expressed in terms of axle loads for road bridges where capacity is less than nominated road traffic load.

3.1.8 Structures Management Strategies

Following completion of the fieldwork and "As-Is" load rating, the Structures Engineer should develop recommendations for:

Corrective Maintenance

Maintenance work or mitigation measures to defects that represent either an immediate or an unacceptable risk to train operations must be assigned an appropriate repair priority.

Preventive Maintenance

Rehabilitation work should be grouped into similar types of work that can be addressed during a single Major Periodic Maintenance (MPM) activity. Usually the work would be limited to Defect Category M defects and strengthening of deficient elements but may include Category A-D defects if the rectification timeframes coincide with the MPM program. The recommendations for MPM work should take into account corrective work already programmed for that structure.

Special Inspections

The structures inspector may recommend that Special Inspections are undertaken to monitor specific defects. Where a Special Inspection is currently being undertaken, the structures inspector may recommend a change in the inspection frequency if appropriate or recommend the special inspections are no longer required.

Engineering and Visual Inspections

The structures engineer may recommend an increase in the frequency of Engineering and/or Visual Inspections where deemed necessary.

The structures engineer should take into account the overall condition of the structure and the criticality of the line when developing the recommendations.

3.2 Inspection Review

3.2.1 Defects

The structures representative should review all defects within the specified timeframes.

3.2.2 Mitigation/Maintenance Work

Corrective Maintenance

The structures representative should allocate the corrective maintenance work to be actioned within the timeframe allowed by the allocated Repair Priority the structures representative should also arrange any short-term mitigation actions recommended by the structures engineer.

Preventive Maintenance

For preventive maintenance work, the structures representative should develop MPM strategies for the structure taking into account the recommendations of the structures inspector.

3.3 Engineering Inspection Report

Draft Engineering Report

The structures engineer should submit a draft soft copy of engineering report containing a summary of critical defects with photos, deficient elements, speed restrictions, load ratings, fatigue assessments, recommended inspection frequencies and short-term mitigation actions within the timeframes identified in the Inspection Standard, ETE–09–01.

Final Engineering Report

Following successful resolution of any issues, the structures engineer should upload the report, including all ratings, calculations, etc., into AMS unless otherwise instructed to provide in hard and/or soft copies.

The structures representative shall ensure any requirement for special inspections, speed restrictions, etc. is actioned in AMS.

4 Visual Inspection

The purpose and scope of a Visual Inspection is provided in the Standard ETE-09-01 Structures Inspection.

Further general information for specific types of structures is provided in the appendices of this procedure. These appendices provide general guidance only and it is expected the structures inspector will use appropriate judgement and experience when recommending actions from a Visual Inspection.

4.1 Inspection Procedure

The process of undertaking a Visual Inspection is as follows :

4.1.1 Pre-Inspection Investigation

Prior to undertaking a Visual Inspection, the structures inspector should review the available relevant historical information for the structure, including:

- Available inspection, engineering and any investigation reports.
- Maintenance history.
- Outstanding defects and planned Major Periodic Maintenance.
- Deficiencies identified for future observation.
- Structural issues that have been recorded since the last inspection.

4.1.2 Preparation for Inspection

In preparation for the Inspection, the structures inspector should liaise with the structures representative to ensure the appropriate arrangements are in place to undertake the Inspection, including:

- Safety Plan.
- Track protection.
- Inspection access arrangements and safety equipment.
- Arrangements with relevant authorities/stakeholders.

4.1.3 Visual Inspection

A visual inspection covers all elements of any structure above ground and water level. The individual elements of the bridge should be visually examined either with the naked eye or using appropriate equipment such as mirrors or telescopic equipment in order to identify structural defects.

Steel Bridges: Non-destructive testing, such as MPI and Dye Penetrant, may be necessary for specific steel structures from time to time.

Timber Bridges: The inspection of timber bridges should include timber boring, below ground level inspection and underwater examination at least every 4years or more frequently depending on degree of deterioration recorded at the previous inspection.

Review of Equipment Register

The structures inspector is required to review the existing equipment register data currently held in AMS for the structure and identify either:

- Additional information to make the equipment register data complete.
- Modifications to correct data errors or changes arising from maintenance work.

Photographic Record of Structure

For each structure, the following photographic records that form part of the equipment register are required:

- A view along the deck system.
- One or two views (depending on the size of the structure) showing the elevation of the structure.
- One or two representative photographs of more complex structures such as trusses.

The structures inspector should review the existing photographs in AMS for that structure and take additional photographs if currently inadequate or there has been a substantive change.

Following the inspection, the structures inspector should advise the structures representative of any required changes to the equipment register. The structures representative should review the proposed changes and arrange for the changes to be made AMS.

Assessment of Previously Reported Defects

At the start of the inspection procedure, the structures inspector should review the status of all existing defects.

Where existing defect records are incomplete, or the defect has changed (i.e. the measurement or severity has increased), the structures inspector should update the defect data entry as necessary.

Where the existing defect has not changed, no further action is required by the structures inspector.

All existing defects shall be retained in AMS, even if the defect is deemed to be inert over multiple inspections. The structures inspector may recommend to ARTC's designated representative that a defect should be closed in AMS if it has been rectified or the record is identified as being erroneous.

New Deficiency Identification

New defects identified by the structures inspector during an inspection shall have a defect record created in AMS. The defect record shall be created in accordance with this section of the CoP, and as per the data requirements specified in EGW-10-01.

Establishing the cause of an observed defect is crucial to determining the severity of a defect. If the structures inspector is unable to determine the mechanism responsible for the cause of a defect, further input should be sought from a specialist engineer. If the cause of a defect cannot be identified and the level of risk cannot be determined, further investigation should be recommended.

The structures inspector should take into account the required response timeframes documented in Table 5a in ETE-09-01.

Photographic records are required for all defects.

Data Recording

All defect information obtained during the Visual Inspection must be uploaded to the AMS unless otherwise instructed to provide in hard and/or soft copies.

All defects should contain a clear and concise scope of work to allow forward planning and budget estimate. The information should include:

i. Inventory
ii. Photographic records of ALL defects.
iii. Outstanding Defects.
iv. New Defects.
v. Maintenance Works.
vi. Any changes to Inspection Frequency.
vii. General Information.

The structures inspector does not have permission to change Inventory in the AMS. The inspector should provide written advice of any changes related to these records.

The information should include all the required inventory attributes, whether controlled or uncontrolled, for that structure.

The structures inspector should provide the structures representative with the following information:

- Attribute information where there is currently no information.
- Information where there are changes required.

The structures representative should arrange for the information to be included in the AMS.

4.2 Inspection Review

4.2.1 Defects

The structures representative shall review all defects within the specified timeframes.

4.2.2 Mitigation/Maintenance Work

Corrective Maintenance

The structures representative should allocate the corrective maintenance work to be actioned in accordance with the agreed repair priorities. The structures representative should also arrange for any short-term mitigation actions to be implemented.

Preventive Maintenance

For preventive maintenance work, the structures representative should review the outcomes of the Visual Inspection against the proposed MPM works for the structure and make modifications as required.

4.2.3 Overall Review of Inspection

Following successful resolution of all of the above issues the structures representative should upload the accepted visual inspection known conditions into AMS.

The structures representative shall ensure any requirement for special inspections, speed restrictions, etc. is actioned in AMS.

5 Special Inspection

The purpose and scope of a Special Inspection is provided in ETE-09-01.

5.1 Inspection Procedure

Special Inspections should generally be carried out in accordance with Section 4.1 of this Procedure.

6 Track Patrol

The purpose and scope of a Track Patrol inspection is provided in Standard ETE-09-01 Structures Inspection.

6.1 Inspection Procedure

Track Patrols should be carried out in accordance with ARTC Code of Practice (Track & Civil).

6.2 Data Recording

All defects should be reported to the structures representative, who should arrange for assessment and upload into AMS.

7 Appendix A – Inspection of Steel Structural Elements

7.1 Steel Degradation

In general, steel deteriorates in service in the following ways:

a. Erosion or corrosion at exposed surfaces, and at timber or concrete interfaces.

b. Cracking in elements or welds.

c. Relaxation of fastenings.

d. Distortion due to overload, or from direct impact from road or rail vehicles.

e. Fatigue from repetition of external loading.

7.2 Inspection Methods

The principal inspection methods are:

Visual

Most cracks in steel bridges are first detected by visual inspection. Once a crack is found, other non-destructive inspection methods, such as dye Penetrant and magnetic particle, are used to further clarify the extent of the crack.

The usual and most reliable sign of fatigue cracks is the oxide or rust stains that develop after the paint film has cracked. Experience has shown that cracks have generally propagated to a depth between one-fourth and one-half the plate thickness before the paint film is broken, permitting the oxide to form. This occurs because the paint is more flexible than the underlying steel.

In Broad Flange Beams inspect for notches caused by impact from vehicles or equipment. Report on loss of section on completion of grinding as required.

Inspect for water build-up, especially in areas that could cause corrosion.

Inspect for loose fasteners. The most reliable sign for loose structural fasteners is the leaching of rust stains from the interface of the connecting elements.

Elements are to be observed under load where possible, and any excessive movement in elements or fastenings is to be noted.

Hammer Test

When elements are tapped lightly with an inspector's hammer, it will help to identify loose plates and fastenings, the extent of corrosion, and effectiveness of corrosion protection. Care must be taken that hammering does not cause unnecessary destruction of protection systems.

Specialist inspection methods, including X-Ray, Ultrasonic, Acoustic Emission, and Laboratory analysis of steel samples, are beyond the normal scope of Visual Inspections and Engineering Inspections.

Advanced Inspection Techniques

Magnetic Particle Testing (MPI) or flaw detection penetrant dye will detect suspected cracking not clearly visible. The concerned area is to be properly cleaned to an acceptable level to perform the testing.

7.3 Element Inspection

General

Examine elements for:

- Corrosion and section loss.
- Buckled webs, web stiffeners and flanges.
- Cracks in webs, flanges and welds.
- Loose bolts, rivets, plates and bars.
- Distortion from corrosion products.
- Stain trails indicating hidden corrosion.
- Polished surfaces indicating movement between elements.

Particular defect areas to be examined are:

Main Girders (Plate Web or Rolled Section)

1. Corrosion under transoms or decking, at toes of bottom flange angles between flange plates, around bearings, at abutments and piers, at bracing connections, in rivet and bolt heads.
2. Loose rivets or bolts in flange angles, splices, bracing connections, web stiffeners and splices, bearing plates.
3. Cracks in bottom flange (tension zone), particularly in the area of mid-span.
4. Cracked welds in flange/flange fillets, web stiffeners with diaphragm bracing, bottom of web stiffeners, web/flange fillets.
5. Notches in bottom flanges from road vehicle impact, particularly in Broad Flange Beams.
6. Cracks, loss of section or buckling in webs at ends of girders.
7. Buckled webs of unstiffened girders.

Cross Girders

1. Corrosion under transoms or decking, at toes of bottom flange angles between flange plates, around bearings, at abutments and piers, at bracing connections, in rivet and bolt heads.
2. Cracks in flanges and webs at ends of girders.
3. Loose rivets or bolts in connections.

Stringer Girders

1. Corrosions under transoms or decking.
2. Cracks in bottom flange, particularly in the area of mid-span.
3. Cracks in top fillets at ends of girders.
4. Loose rivets or bolts in connections.
5. Detailing.

Bearings

1. Corrosion at flange plate/end bearing stiffener connections.

2. Cracks in bearing or bed plates.
3. Cracked welds between flanges and bearing plates.
4. Loose, broken or missing holding down bolts, studs, and clips.
5. Ineffective sliding, roller or segmented expansion bearings.
6. Expansion bearings not working and segmented bearings lying over.

Truss Girders

1. Corrosion in top and bottom chords, batten plates and lacing bars, portal and wind bracing over tracks, gusset plates, rivet and bolt heads.
2. Misalignment or distortion in chords.
3. Cracks in cleats and connector plates.
4. Loose rivets or bolts and turnbuckles.
5. Damaged steelwork from equipment or loads traveling out-of-gauge.

Stepways / Stairways

1. Corrosion at base connection, stepway risers, stringer webs, tread cleats and clips.
2. Loose bolts and clips to treads.

Trestles

1. Corrosion around baseplates, between angles in bracing, in rivet heads and holding down bolts.
2. Loose rivets or bolts in connections to girders or bracing.
3. Loose turnbuckles in bracing.

Piers/Caissons

1. Corrosion at crosshead connection at water or ground level.
2. Excessive movement of any element under load.
3. Cracks in cylinder walls.

Corrugated Steel Pipes

1. Corrosion in corrugation.
2. Distortion in pipe profile.
3. Breakdown of coating.
4. Change in invert alignment indicating bedding failure.

Rivets

There are two types of rivets in the bridge system:

- Structural rivets – rivets that need to be tightly fitted e.g. rivets connecting stringer to cross girder or lacing bars to top and bottom chords. Inspect for leaching of rust stain or looseness apparent to a hammer tap.

- Stitching rivets – that do not need to be tightly fitted to hold the elements together e.g. rivets connecting diagonal lacing bars or lacing bar spacers in truss bridges. Inspect for slackness due to excessive wear and tear.

Deflection

Deflection in steel elements is normally small. Any clear movement under live load is to be measured, or closely estimated, and reported.

Temporary Supports

Inspect visually for soundness and effective support, including footing, foundation and drainage. Packing and wedges are to be tightened and secured as necessary. Where temporary supports have been in service for more than 1year they must be thoroughly inspected in the same manner as other elements of the structure.

7.4 Broad Flange Beam

Introduction

Broad Flange Beam (BFB) spans over roadways are subject to a significant risk of fatigue and/or brittle fracture if damaged by road vehicle impact. The beams become brittle when the ambient temperature is less than 13°C. In order to minimize this risk all such structures are included in a special inspection program during winter months.

Inspection

The spans are to be examined for evidence of flange damage, i.e. cracking, notching, bruising, distortion, scores, and bends) as well as grinding or other repairs. Note that cracks can develop from previously ground or repaired areas.

Inspection must be carried out from close proximity to enable measurement of defects, and to give a reasonable chance of detection of cracking on any surface of the flanges.

Where there are welded flange plates special attention must be given to the BFB flange in the proximity of the welds, as there is a possibility of crack initiation and propagation from welds.

Recording

Each notch is to be individually measured and recorded. Where the flange is bent laterally or vertically, an estimate of the distance is to be recorded. The report should indicate whether damage is in the BFB flange, or the flange plate, or both.

Site action to be taken when cracking or damage occurs.

Where any cracking is found in the BFB bottom flange / flange plate / cover plate area, the structures representative is to be informed immediately and a speed restriction imposed, or the track closed, or the bridge temporarily supported, depending on the extent of the crack as detailed below.

If the track is not closed the bridge must be monitored very closely and a speed restriction imposed to suit. A significant risk and rapid crack growth exist with any un-plated BFB showing any crack, or a plated span showing cracks in both BFB and plate flanges. Plated flanges showing cracks in one element, but not in both, are less of a risk.

If a span is temporarily supported at a crack, trains may run indefinitely up to 50km/h depending on the quality of the supports.

If a span is not temporarily supported at a crack, the following action is required:

- If the flange is plated and a crack up to 25mm exists in either the BFB flange or in the flange plate, speed is to be limited to 20km/h, and the crack is to be checked after each train.
- If the crack is greater than 25mm but less than 100mm, road traffic is to be suspended during the passage of rail traffic.
- If the crack is greater than 100mm, rail traffic must NOT be permitted.
- Where the flange is not plated or both flange and flange plate are cracked, rail traffic may be permitted if the crack is up to 25mm long. Rail speed must be limited to 20km/h, road traffic must be stopped during the passage of each train, and the crack is to be checked after each train.
- Where the flange is not plated or both flange and flange plate are cracked, and the crack is over 25mm, rail traffic is to be stopped.

Repair method

No welding, straightening or cutting is to be done on BFB spans without the prior approval of ARTC.

7.5 Additional Inspection Requirements

When undertaking an Engineering Inspection for a Steel Bridge the structures inspector shall provide the following additional information:

Non-Destructive Testing

Non-destructive testing (NDT) shall be carried out on site to verify cracks and crack lengths where:

- Cracks on wrought iron structural elements exceed 50mm.
- Any new crack, or any extension to a previously noted crack, on steel structural elements.

The NDT shall include:

- Magnetic Particle Testing.
- Liquid Penetrant Testing.

The structures inspector is required to have the competency to undertake the testing or arrange for the testing to be undertaken by someone with sufficient competency. The minimum level of competency acceptable to ARTC is successful completion of National Unit of Competency in “MEM24001B – Perform basic penetrant testing” and “MEM24003B – Perform basic magnetic particle testing”.

8 Appendix B – Inspection of Timber Structural Elements

8.1 BridgeWood Decking

The BridgeWood decking consists of specially designed and treated plywood panels which are specifically designed for both road and rail bridge applications. It requires the similar examinations to traditional hardwood timber components to ensure continued safety of traffic operation.

8.2 Timber degradation

In general, timber deteriorates in service only when attacked by outside agencies. These can be categorized as follows:

- Weathering at exposed surfaces.
- Decay or rot.
- Insect attack, whether termites or borers.
- Fire.
- Mechanical damage from vehicles or equipment.
- Checks and splits.

Of the above categories, decay and insect attack usually cause deterioration inside an element and therefore are the hardest to measure.

8.3 Inspection methods

The principal timber inspection methods are:

Visual

All bridge elements are to be inspected for indications of deterioration or damage such as:

- Weathering, cracks, shakes, splits.
- Bubbles, especially in laminated panel indicating internal de-lamination.
- Surface decay where elements join or where elements project behind abutments.
- Damp sides of elements, especially of timber decking.
- Indicators of internal decay such as troughing, sides bulging, brooming out of fibres, body bolts hanging out or loose in their holes.
- Termite or fungus attack.
- Crushing of elements, especially headstocks, at seating and joints.
- Spike killing of transoms.
- Loose or missing bolts, including transom bolts.

Hammer Testing

Hammering, or sounding, a timber element gives an indication of internal deterioration. The presence of delamination, rot or termite attack may cause a hollow sound when struck by the

hammer, indicating boring is required. The hammer should weigh about 1kg, with one face flat and the other face spiked.

Bore and Probe

Test boring is carried out with a 10mm auger in order to locate internal defects such as pipes, rot or termites. Holes are bored square to the face of girders, corbels, headstocks, piles, sills and other elements, as necessary. Boring must not be overdone and holes are to be preservative treated and plugged, leaving the plug 20mm proud. Unused holes are to be plugged flush. The extent of an internal pipe or other defect is found and measured with a feeler gauge made from 4mm steel wire with one end flattened and about 4mm bent over at right angle. By probing down the bore hole, the extent of a defect can be felt, measured and recorded.

NOTE: No boring of BridgeWood decking is required because the Engineered Wood Product is not subject to piping or internal rot as in sawn hardwood.

Deflection Test

A deflection test gives an indication of girder condition and riding quality.

Total deflection of a girder under designated train is the difference between the mid-point deflection and an average of deflections at end of corbels supporting that girder in the tested span and recorded.

If deflection limits are exceeded at permitted track speed, temporarily reduce train speed to suit. If the limit is exceeded at 20km/h, the structures representative is to be advised the same day.

8.4 Inspection procedure

The following inspections are to be undertaken by the inspector:

Transoms

Inspect for weathering, splitting, crushing, spike killing, fire damage, condition at rail seating, and condition at girder bearings for intermediate transoms.

Ballast Walls

Inspect for general condition, tightness of bolts, and capacity to retain ballast.

Runners

Inspect for general condition and tightness of bolts.

Decking

Determine the general condition of the timber decking. Note the number, size and location of pieces split, or with more than twenty percent (20%) section loss.

Ballast Logs

Inspect for general condition and tightness of bolts.

Girders

Inspect visually and hammer test for soundness. Bore new holes and probe girders at least every 4 years. Inspect compound girders individually. If necessary, the inspector may undertake additional boring, preferably using existing holes, depending on state of the timber.

Girders are to be inspected for signs of decay, particularly where this may be occurring on the top surface under the decking of ballast top spans. Bore girders horizontally at mid depth over corbel ends or sill face and at centre span.

Where a pipe is found over 125mm wide, cross bore vertically at the location and note size and position of the pipe. Where inspection raises any doubt or where termites appear active, additional boring is to be carried out as necessary.

Check the bearing areas for crushing of the beams near the bearing seat. Investigate for decay and insect damage by visual inspection and sounding and/or probing at the ends of the beams where dirt, debris, and moisture tend to accumulate.

Investigate the area near the supports for the presence of horizontal shear cracking. The presence of transverse cracks on the underside of the girders or horizontal cracks on the sides of the girders indicate the onset of shear failure.

Inspect the zones of maximum tension for signs of structural distress. The maximum tension generally occurs at the bottom half of the middle third of the beam span. Tension cracks in timber break the cell structure perpendicular to the grain and are typically preceded by the appearance of horizontal shear cracks.

Corbels

Inspect in a similar manner to girders. Bore holes to be 300mm from each end, and at the centre, but clear of bolt holes. Where packing is installed, the location, size and type are to be noted.

Headstocks

Inspect visually and hammer test for soundness. Identify solid and double waling types. Bore and probe ends of elements if hammer test indicates internal decay. Give special attention to corbel seatings and to pile bearings. Inspect waling headstocks for loose bolts and for bearing on pile shoulders.

Bracing

Inspect all horizontal and diagonal bracing visually and hammer test for soundness. Inspect for loose bolts, and effectiveness of bracing in restraining side-sway.

Sills

Inspect visually and hammer test for soundness. Identify solid and double waling types. Inspect for loose bolts, straps, decay of undersides on concrete bases, and bearing of walings on pile shoulders.

Piles

Inspect visually and hammer test for soundness. Bore new holes and probe piles at headstock level, ground level and below ground level at least every 4years. If necessary, the inspector may undertake additional boring, preferably using existing holes, depending on state of the timber.

To inspect below ground level, use a backhoe where possible, to excavate to a depth of 500mm, or more if necessary, and bore at trench bottom. Where spliced piles show signs of vertical or sideways movement, the splice rails and pipe stumps are to be exposed and inspected. All excavations are to be backfilled, rammed, and scour protection reinstated. Where inspection raises any doubt or where termites appear active, additional boring is to be carried out as necessary.

Spliced and planted piles are to be specially noted. Depth of splice, or of plant footing, below bottom waling is to be noted. Where piles have a surrounding concrete collar or invert, the concrete must not be cut away for inspection unless extensive pile necking or piping is evident.

Inspect piles in permanent water at least every 4years, or more frequently depending on deterioration shown at the previous inspection, or if major scouring is suspected. The underwater inspection should be carried out in accordance with the guidance of this Procedure.

When the cross-sectional area of a pile is found to be degraded to 50% of its original cross-sectional area the following procedure is required. The defect is to be rated a Defect Category D. Subsequently any such degraded pile that is assessed to be performing satisfactorily and deemed to be able to remain in place, must then have 2yearly cyclic boring carried out.

Abutment sheeting and wing capping

Inspect for general condition and for ability to retain backfill. Inspect sheeting behind girders of end spans.

Walkways and Refuges

Inspect for overall safety.

Truss spans

Inspect truss elements generally, as for girder spans. Bore new holes and probe top chords, bottom chords, cross girders, stringers and end posts at element ends. Tighten tension elements, taking care to avoid crushing of timber in joints.

Timber box drains

Inspect visually for general condition and note any indication of failure of roof or wall timbers.

Temporary supports

Inspect visually for soundness and effective support, including footing, foundation and drainage. Packing and wedges are to be tightened and re-spiked where necessary. Where temporary supports have been in service for more than 1year they must be thoroughly inspected, including new bore holes, in the same manner as other elements of the structure.

Termites and Fungus

Termite infestations found either visually or by boring during inspection are to be reported to the Structures Representative immediately. Suspected areas of fungal attack could be inspected by prodding the exposed surface with a sharp probe to detect areas of softness compared to the surrounding good timber.

Screwing Up

During the inspections, all bolts are to be inspected and tightened as necessary.

Packing is to be inspected, repacked and spiked as necessary.

Site condition

All dry grass, flood debris, and other foreign matter that may cause a fire hazard, or may accelerate timber decay, must be removed from the immediate vicinity of the bridge element.

9 Appendix C – Inspection of Concrete Structural Elements

9.1 Concrete Degradation

In general, concrete deteriorates in service in the following ways:

a. Weathering or spalling at exposed faces, resulting from erosion, poor quality concrete, chemical action, water action, corrosion of reinforcement, low cover to reinforcing bars, crushing at bearing surfaces and poorly compacted concrete.

b. Cracking from loading changes, including settlement.

c. Mechanical damage, especially collision damage from road or rail vehicles, or abrasion.

9.2 Inspection Methods

The principal inspection methods are:

Visual

Visual inspection will detect most defects in concrete structural elements. The inspector is to look for signs of:

- Weathering or spalling of surfaces or mortar joints.
- Cracking within elements or at joints.
- Stains on surfaces indicating reinforcement corrosion.
- Crushing especially at bearings or at pre-stressing anchorage points.
- Changed alignment of elements:
  - Vertically, e.g. abutments.
  - Horizontally, e.g. deck camber.
  - Laterally, e.g. footings and culverts.

Cracking in concrete structural elements is an indicator of weakness in the element. Cracks must be examined for size and movement under load, and details recorded. Shrinkage or hairline cracks need be noted only.

Cracking or crushing around pre-stressing anchorages must be noted.

Length, width, and location of cracks are to be measured. A short line scribed across the midpoint of a crack will give easy indication of further movement. Reference points scribed at each end of the line can be measured to indicate changes in crack width.

Examine all elements for the unplanned ingress of water. Scuppers, weep holes, and other outlets are to be cleared of rubbish. Any water build-up, or seepage into unwanted areas, is to be reported.

Hammer Test

Hammer testing, where surfaces are tapped lightly with an examination hammer, can indicate “drumminess” (a dull hollow sound) and potential spalling areas.

Advanced Inspection Techniques

Where the cause of cracking or bulging of an element cannot be explained by visual inspection, specialist testing such as X-Ray, Ultrasonic, and Acoustic Emission can be used to examine the internal condition of structures and the underlying cause of the observed defects. The inspector is to note such concerns for follow-up by the Structures Representative.

9.3 Locations

Bearing Areas

Examine bearing areas for spalling where friction from thermal movement and high bearing pressure could cause the concrete to spall. Check for crushing of the stem near the bearing seat. Check the condition and operation of any bearings.

Shear Zones

Investigate the area near the supports for the presence of shear cracking. The presence of transverse cracks on the underside of the stems or diagonal cracks on the sides of the stem indicate the onset of shear failure. These cracks represent lost shear capacity and should be carefully measured.

Tension Zones

Check for deteriorated concrete in the tension zones, which could result in the debonding of the tension reinforcement. This would include delamination, spalls, and contaminated concrete. Cracks greater than 2mm wide are considered wide cracks and indicate extreme bending stresses. They should be measured and recorded.

Cracks

Check for efflorescence from cracks and discoloration of the concrete caused by rust stains from the reinforcing steel. In severe cases, the reinforcing steel may become exposed due to spalling. Document the effective cross section of reinforcing steel since section loss will decrease live load carrying capacity of the element.

Deflection

Deflection in concrete elements is normally small. Any clear movement under normal traffic load is to be measured and reported.

Diaphragms

Diaphragms should be inspected for flexure and shear cracks as well as typical concrete defects. Cracks in the diaphragms could be an indication of overstress or excessive differential deflection between adjacent beams.

Areas Exposed to Drainage

Check around scuppers, inlets or drain holes for leaking water or deterioration of concrete.

10 Appendix D – Inspection of Fibre Composite Structural Elements

10.1 Fibre Composite Degradation

In general, Fibre Composite products deteriorate in service in the following ways:

Surface cracking

- When overstressed due to excessive loading a non-structural coating or paintwork on element will show signs of fine cracks or spalling at bottom and on side surfaces at load point.
- On impact the coating may spall, split or crack. Small localized damage is of no immediate engineering concern however, all damages should be reported.

Crushing

- Crushing at load points (on edges at bearings or around bolt holes) is most likely an indication of excessive loading. The coating will show signs of discoloring/spalling. All such discoloring/spalling shall be reported.

Wear and tear

- Excessive wear and tear or overstressing at bolt holes will show signs of discoloring or spalling in the coating. Loose fasteners will indicate wearing in threads of material.

Fire Damage

- The coating can be subject to fire damage in much the same way as timber however, the Fibre Composite product itself will withstand intense heat/fire.
- To determine the extent to which the element is affected, any lose or charred material must be removed until unburned material is exposed. If the fire damage is limited to the protective layer no immediate engineering concern exists however all fire damages should be reported.

10.2 Inspection

- Fibre Composite material will not rot or decay and it is resilient to any attack by termites or fungus.
- A close visual inspection is to be made of all exposed surfaces.
- No boring for inspection purpose shall be undertaken as it will not reveal any internal defects.
- No chemical etching or hard tapping with any object shall be undertaken.

10.3 Inspection Methods

The principal inspection methods are:

Visual

Visual inspection will detect most defects in fibre composite structural elements. The inspector is to look for signs of:

- Cracking within elements or at joints.
- Stains or discolouring on surfaces indicating overstressing of localized area.

- Crushing especially at bearings or load points.
- Changed alignment of elements:
  - Cracking in structural elements is an indicator of weakness in the element. Cracks must be examined for size and movement under load, and details recorded. Shrinkage or hairline cracks need be noted only.
  - Length, width, and location of cracks are to be measured. A short line scribed across the midpoint of a crack will give easy indication of further movement. Reference points scribed at each end of the line can be measured to indicate changes in crack width.

Hammer Test

Hammer testing, where surfaces are tapped lightly with an examination hammer, can indicate "drumminess" and potential spalling areas.

Advanced Inspection Techniques

Where the cause of cracking or bulging of an element cannot be explained by visual inspection, specialist testing such as X-Ray, Ultrasonic, and Acoustic Emission can be used to examine the internal condition of structures and the underlying cause of the observed defects. The inspector is to note such concerns for follow-up by the Structures Representative.

10.4 Locations

Bearing Areas

Examine bearing areas for spalling where friction from thermal movement and high bearing pressure could cause the fibre composite to wear/spall. Check for crushing of the stem near the bearing seat. Check the condition and operation of any bearings.

Shear Zones

Investigate the area near the supports for the presence of shear cracking. The presence of transverse cracks on the underside of the stems or diagonal cracks on the sides of the stem indicate the onset of shear failure. These cracks represent lost shear capacity and should be carefully measured.

Tension Zones

Check for cracks in the tension zones, which could result in the debonding of any tension reinforcement. This would include delamination and spalls. All cracks must be measured and recorded.

Cracks

Check for efflorescence from cracks and discoloration of the coating caused by overloading.

Deflection

Deflection in elements is normally small. Any clear movement under normal traffic load is to be measured and reported.

11 Appendix E – Inspection of Structural Lining for Pipes

11.1 General

- Approved pipe lining for use on the ARTC network are:
  - Berolina Liner.
  - Expanda.
  - Rotaloc.
- The above pipe products provide alternative methods of fabricating new drainage pipes or lining the interior surfaces of severely corroded corrugated steel pipes (CSP) to strengthen them to railway design loading 300LA.
- The liners are designed to sustain full design load without sharing any design loads with the existing corroded pipe.
- The annulus between the liner and the CSP pipe is pressure grouted with cementitious grout.
- These products are made from PVC or HDPE Plastic.
- ARTC has approved use of Expanda, Rotaloc and Beroliner pipes/liners for pipes up to 1000mm, 1500mm and 2000mm diameter respectively. If any additional products are approved they will be published in the Type Approval listing.

11.2 Degradation

Unlike steel and concrete, polyethylene and PVC don't corrode in acidic conditions and don't need protective coatings that need to be maintained. The liners are continuous and don't have fasteners, bolts, etc.

In general, the products deteriorate in service in the following ways:

Deformation

- As the products are flexible, deformation would indicate overstressing due to excessive loading or loss of embedment support, most likely caused by scouring around the outside of the liner and would need to be addressed.

Cracked barrel / Joint broken or separated

- When overstressed due to excessive loading the pipe will develop cracks or joint separation.

Abrasion in sectional area

- While PVC and Polyethylene are more abrasion resistant than steel or concrete, the liners/pipes should be inspected for any evidence of abrasion, particularly in floor.

Fire / Ultra Violet Radiation damage

- The products could be subject to fire/UVR damage however, they will withstand intense heat/fire.

11.3 Inspection

- The materials will not rot or decay and they are resilient to any attack by termites or fungus.

- A close visual inspection is to be made of all exposed surfaces.
- No boring for inspection purpose shall be undertaken as it will not reveal any internal defects.
- No chemical etching or hard tapping with any object shall be undertaken.

11.4 Inspection Methods

The principal inspection methods are:

Visual

Visual inspection will detect most defects in liners or pipes. The inspector is to look for signs of:

- Deformation.
- Settlement / Changed alignment.
- Cracking/Disjointing.
- Abrasion.
- Fire / UVR damages within elements or at joints.

Deformation and/or cracking in pipes are indicators of weakness. These defects must be examined for size and movement under load, and details recorded. All cracks need be noted carefully.

Length, width, and location of cracks are to be measured. A short line scribed across the midpoint of a crack will give easy indication of further movement. Reference points scribed at each end of the line can be measured to indicate changes in crack width.

Hammer Test

Hammer testing, where surfaces are tapped lightly with an examination hammer, can indicate “drumminess” and potential loss of backfill material or undermining of foundation.

11.5 Locations

Deformation

As the products are flexible, deformation would indicate overstressing due to excessive loading or loss of embedment support, most likely caused by scouring around the outside of the pipe and would need to be addressed.

Cracked barrel / Joint broken or separated

When overstressed due to excessive loading the pipe will develop cracks or joint separation.

Abrasion in sectional area

While PVC and Polyethylene are more abrasion resistant than steel or concrete, the liners/pipes should be inspected for any evidence of abrasion, particularly in floor.

Fire / Ultra Violet Radiation damage

The products could be subject to fire/UVR damage however, they will withstand intense heat/fire.

Foundation

Examine for differential settlement and undermining of the foundation and around inlet/outlet of pipe.

Deformation

Check for deformation in highly stressed zones at 10 and 2 0'clock and at any other locations along full length of the pipe.

Tension Zones

Check for cracks in the tension zones, which could result in the disjointing along seams. All cracks must be measured and recorded.

Deflection

Deflection in elements is normally small. Any clear movement in roof under normal traffic load is to be measured and reported.

12 Appendix F – Inspection of Masonry Structural Elements

12.1 Overview

This section describes typical defects that occur in masonry structures.

12.2 Defects Caused by Structural Distress

Excessive Loading

a. Excessive loading, particularly when applied as a point loading, may cause localised crushing of masonry or even displacement of individual masonry units.

b. An increase in lateral pressure of earth behind abutments, wing walls and retaining walls may cause forward movement or tilting leading to distortion of the shape of an arch structure and may cause transverse cracking of the arch barrel. Recent cracks would indicate that movement is occurring.

c. An increase in lateral forces or pressures in the fill material may destabilize spandrel walls on arch structures.

Arch Shape Deformation

Flattening of the arch may be a sign of outward movement of the abutments. Movements may be more easily identified by evidence of dips in the courses of the spandrel walls or the parapets above the arch.

Structural Cracking

Cracks in masonry construction may only affect the appearance but can also be indicative of a more serious underlying defect. The inspector should observe many aspects of the cracking, including length, width, variation of width along its length, location, distribution, and, in some cases, depth. The displacements forwards, backwards and sideways of the masonry on each side of a crack should also be recorded. The current extent of the displacement should, if possible, be marked and dated on the surface of the structure to assist future inspections.

The most serious form of cracking is that caused by structural inadequacy or overloading. The four types of cracking associated with this are described as follows:

- *Longitudinal cracks (in direction of span)* – Differential settlement or movement across the width of an abutment or pier will produce longitudinal cracks in the arch barrel, as the structure splits apart, dividing the barrel into independent sections. If accessible, the depth of the cracks should be probed to reveal whether or not the whole thickness of the arch barrel has been cracked.
- *Transverse (lateral) cracks* – These may be accompanied by permanent deformations of the arch shape and are caused by partial load failure of the arch or by movement at the supports.
- *Diagonal cracks* – These normally start near the sides of the arch at the springs and spread up towards the centre of the barrel at the crown. They are generally due to subsidence at the sides of the abutment or pier and are caused by the resultant twisting of the arch.
- *Longitudinal cracks near the spandrel walls* – Longitudinal cracks near the edge of the arch barrel may be a sign that the spandrel wall has been forced outward and, instead of the

spandrel wall sliding on the extrados (i.e. the exterior curve) of the arch, the arch ring itself has cracked.

12.3 Defects arising due to the nature of the material

Arch Ring Separation

The load capacity can be significantly reduced if ring separation has occurred. Separation within the barrel of an arch may be detected by hammer tapping to detect “drumminess” as opposed to a solid “ring” if fully bonded.

Defective Mortar and Pointing

The load carrying capacity of a masonry arch is dependent upon the thickness of the arch ring. If the mortar is missing, loose, or friable, then that depth of the ring affected is unable to transmit load and contribute to the strength of the arch.

Displaced or Missing Stones or Bricks

Deterioration of mortar, localised loading or large structure movements may result in masonry units becoming loose or displaced. The displacement of individual masonry units should be noted; particular emphasis should be made to those at the crown of arches with shallow depths of cover over the crown.

12.4 Defects instigated by external agents

Deterioration under these conditions may occur due to one or a combination of two or more of the following reasons:

- Erosion by water and wind and water borne particles, by frost attack and by vegetation root growth.
- Chemical/biological attack due to acids, sulphates and chemicals either water-borne or released by water, or from air-borne pollution.
- Efflorescence staining.
- Moisture and thermal movement of bricks and blocks.

13 Appendix G – Inspection of Tunnels

Serious deterioration in the stability of a tunnel is evidenced by bulging, distortion, cracking or changing geometry in the tunnel.

Inspection requires a working platform and good lighting so that close examination of the periphery can be made.

Tunnel Inspection should highlight the following indicators:

- The general condition of the rock face in unlined tunnels, or of the lining in others.
- The condition of joints in concrete, brickwork and stonework.
- Cracks, spalling, hollows or bulges in tunnel linings.
- Ineffective drainage, especially through weep holes and track drains.
- Signs of water seepage remote from constructed drainage outlets.
- Condition of attachments to tunnel lining.
- Track heave, subsidence, or alignment change.
- Condition of tunnel refuges and lighting.
- Condition of Portals and movement of portal away from tunnel stem.

Cracks, bulges, and spalled areas are to be measured for length, position and displacement. Cracks or displacement greater than 10mm should have measurement reference pins.

All extensively cracked areas or individual critical cracks should be adequately mapped and photographed for easy reference during the next inspection.

14 Appendix H – Inspection of Substructure Elements

14.1 Introduction

The substructure is the component of a bridge that includes all elements supporting the superstructure. Its purpose is to transfer the loads from the superstructure to the foundation soil or rock. The primary structural elements of the bridge substructure are the abutments (including wingwalls) and the piers (or trestles).

14.2 Inspection procedures

Inspection procedures for substructure elements are the principally the same as superstructure elements of similar material type, particularly when it involves material deterioration. However, because stability is a paramount concern, checking for various forms of movement is required.

Vertical Movement

Vertical movement can occur in the form of uniform settlement or differential settlement. A uniform settlement of all bridge substructure units often will have little effect on the structure, although it will affect the vertical alignment of the railway track(s) and road onto and off the structure.

Differential settlement can produce serious distress in a structure. Differential settlement may occur between different substructure units, causing damage of varying magnitude depending on span length and structure type. It may also occur under a single substructure unit causing an opening of the expansion joint between the abutment and wingwall, or it may cause cracking or tipping of the abutment, pier, or wall.

The most common causes of vertical movement are soil bearing failure, consolidation of soil, scour, and deterioration of the abutment foundation material.

Inspection for vertical movement, or settlement, should include:

- Investigate existing and new cracks for signs of settlement.
- Examine the superstructure alignment for evidence of settlement (particularly the bridge deck kerbs or railing).
- Check for scour around abutment and pier footings or foundations.
- Inspect the joint that separates the wingwall and abutment for proper alignment.
- Check for any new or unusual cracking.

Lateral Movement

Earth retaining structures, such as abutments and retaining walls, are susceptible to lateral movements, or sliding. Lateral movement occurs when the horizontal earth pressure acting on the wall exceeds the friction forces that hold the structure in place.

The most common causes of lateral movement are slope failure, water seepage, changes in soil characteristics, and time consolidation of the original soil.

Inspection for lateral movement, or sliding, should include:

- Inspect the general alignment of abutments, wingwalls, piers and exposed footings.
- Check the bearings for evidence of lateral displacement.

- Examine the opening in the construction joint between the wingwall and the abutment.
- Investigate the joint opening between the primary elements.
- Settlement of fill behind the abutment and wingwalls.
- Check the expansion gap at the ends of spans.
- Examine for clogged drains and/or water seepage.
- Inspect for erosion or scour of the embankment material in front of abutments or pier footings.

Rotational Movement

Rotational movement, or tilting, of substructure units is generally the result of unsymmetrical settlements. Abutments and walls are typically subject to this type of movement.

The most common causes of rotational movement are scour, erosion, saturation of backfill, soil bearing failure, erosion of backfill along the sides of the abutment, and poor design.

Inspection for rotational movement, or tilting, should include:

- Check the vertical plumbness of the substructure.
- Examine the clearance between individual spans.
- Inspect for clogged drains or weep holes and/or water seepage.
- Investigate for cracks, and record the crack width, length, and direction.

15 Appendix I – Inspection of Underwater Structural Elements

15.1 Introduction

Where structural elements are continuously submerged, underwater inspections must be undertaken to establish their condition. Underwater structural elements must be inspected to the extent necessary to determine with certainty that their condition has not compromised the structural integrity of the bridge.

In general, the term "underwater inspection" is taken to mean a hands-on inspection that may require underwater breathing apparatus and related diving equipment.

15.2 Frequency

All structures, except for timber bridges, should receive routine underwater inspections at the time of the Engineering Inspection, but special inspections may be implemented more frequently where appropriate for the individual bridge. The underwater inspection of timber bridges should be carried out at least every 4years.

Structures representative can determine underwater examination frequency greater than 6 years for structures other than timber piles and shallow footed piers.

The decision must at least be based on the following factors:

- Last inspection date.
- Structure type.
- Water flow characteristics.
- Risk of scouring.
- Risk of deterioration of elements.
- Local environment.

The underwater examination for rail bridges, other than timber bridges, must not lapse more than 12years.

15.3 Methods of Underwater Inspection

There are three general methods used to perform underwater inspections:

- Wading inspection.
- Self-contained diving (SCUBA).
- Surface-supplied diving.
- Sonar.
- Naked eye.

Wading Inspection

Wading inspection is the basic method of underwater inspection used on structures with shallow streams. The substructure condition should be evaluated using a probing rod, sounding rod or line, waders, and possibly a boat.

Self-contained Diving (SCUBA)

In this mode, the diver operates independently from the surface, carrying his/her own supply of compressed breathing gas (typically air). This dive mode is best used at sites where environmental and waterway conditions are favorable, and where the duration of the dive is relatively short.

Extreme care should be exercised when using SCUBA equipment at bridge sites where the waterway exhibits low visibility and/or high current, and where drift and debris may be present at any height in the water column.

Surface-Supplied Diving

Surface-supplied diving uses a breathing gas supply that originates above the water surface providing the diver with a nearly unlimited supply of breathing gas and also, provides a safety tether line and hard-wire communications system connecting the diver and above water personnel. Using surface-supplied equipment, work may be safely completed under adverse conditions.

Sonar

Sonar survey of the deep-water bed around submerged structures is undertaken by trained sonar operators, typically from a suitable boat. Divers may still be required for the inspection of structures.

Naked Eye

Naked eye inspection of underwater inspection is used on structures with shallow streams, clear water and without any debris to obstruct proper inspection.

Method Selection Criteria

In determining whether a bridge can be inspected by wading or whether it requires the use of diving equipment, water depth should not be the sole criteria. Many factors combine to influence the proper underwater inspection method including:

- Water depth.
- Water visibility.
- Current velocity.
- Streambed conditions (softness, mud, "quick" conditions, and slippery rocks).
- Debris.
- Substructure configuration.

15.4 Diving Inspection Intensity Levels

Three diving inspection intensity levels have evolved as follows:

- Level I: Visual, tactile inspection.
- Level II: Detailed inspection with partial cleaning.
- Level III: Highly detailed inspection with nondestructive testing.

Level I

Level I inspection consists of a "swim-by" overview at arm's length with minimal cleaning to remove marine growth. Although the Level I inspection is referred to as a "swim-by" inspection, it must be detailed enough to detect obvious major damage or deterioration. A Level I inspection is normally conducted over the total (100%) exterior surface of each underwater element, involving a visual and tactile inspection with limited probing of the substructure and adjacent streambed.

The results of the Level I inspection provide a general overview of the substructure condition and verification of the as-built drawings. The Level I inspection can also indicate the need for Level II or Level III inspections and aid in determining the extent and selecting the location of more detailed inspections.

Level II

Level II inspection is a detailed inspection that requires that portions of the structure be cleaned of marine growth. It is intended to detect and identify damaged and deteriorated areas that may be hidden by surface growth.

A Level II inspection is typically performed on at least 10% of all underwater elements. The thoroughness of cleaning should be governed by what is necessary to determine the condition of the underlying material. Generally, the critical areas are near the low waterline, near the mud line, and midway between the low waterline and the mud line.

On submerged piles, horizontal bands, approximately 150 to 300mm in height, should be cleaned at designated locations. On large elements, such as piers and caissons, areas approximately 300mm square should be cleaned at three or more levels on each face of the element (or at quarter points for circular elements). Deficient areas should be measured, and the extent and severity of the damage recorded.

Level III

A Level III inspection is a highly detailed inspection of a critical structure or structural element, or an element where extensive repair or possible replacement is contemplated. The purpose of this type of inspection is to detect hidden or interior damage and loss in cross-sectional area. This level of inspection includes extensive cleaning, detailed measurements, and selected nondestructive and partially destructive testing techniques.

Level III inspections are not included in the scope of Engineering Inspections and will be undertaken as part of a specific investigation.

15.5 Types of Inspection

Routine Inspections

A routine inspection is typically undertaken as part of an Engineering Inspection. It is an intermediate level inspection consisting of sufficient observations and measurements:

- To determine the physical and functional condition of the bridge.
- To identify any change from "inventory" or previously recorded conditions.
- To ensure that the structure continues to satisfy present service requirements.

The scope of work for a routine inspection should include:

- A Level I inspection of all the submerged elements.
- A Level II inspection on at least 10% of submerged elements.

The dive team should also conduct a scour evaluation at the bridge site, including inspecting the channel bottom and sides for scour and, in particular, checking for local scour in the vicinity of submerged elements.

Damage Inspections

Certain conditions and events affecting a bridge may require more frequent, or unscheduled, inspections to assess structural damage resulting from environmental or accident related causes.

A Level III inspection may be necessary to determine the need for emergency load restrictions or closure of the bridge to traffic and to assess the level of effort necessary to repair the damage. The amount of effort expended on this type of inspection will vary significantly depending upon the extent of the damage. If major damage has occurred, the inspector must evaluate section loss, make measurements for misalignment of elements, and check for any loss of foundation support.

Situations that may warrant a Level I inspections include:

- Floods - bridge elements located in streams, rivers, and other waterways with known or suspected scour potential should be inspected after every major runoff event to the extent necessary to ensure bridge foundation integrity.

Situations that may warrant Level III inspections include:

- Vessel impact - elements should be inspected underwater if there is visible damage.
- Buildup of debris at piers or abutments - the buildup effectively lessens the waterway opening and may cause scouring currents or increase the depth of scour.
- Evidence of deterioration or movement.
- Following significant earthquakes.

15.6 Qualifications of Diver-Inspectors

All divers shall have a commercial diving license and have all appropriate insurances to undertake the work.

The underwater inspector must have knowledge and experience in bridge inspection. When necessary, the structures inspector shall be present at site to direct the divers during the underwater inspection in order to determine the extent of any damage.

16 Appendix J – Inspection of Miscellaneous Structures

Generally, the elements that comprise Miscellaneous Structures should be inspected in accordance with the recommendations given in Appendices A to F of this Procedure.

Where blockage is occurring in a waterway, the inspector is required to make an assessment if the material causing the blockage will be flushed away during a storm event. Only where the inspector makes an assessment that the blockage will not be self-flushing s/he should allocate a defect category in accordance with the Standard, ETE–09-01.

It should be noted the above descriptions cannot cover every situation and the inspector is expected to exercise judgement based on local knowledge and experience to identify the criticality of identified defects and deficiencies during an inspection.

17 Appendix K – Inspection of Redundant Structures

Generally, the elements that comprise Redundant Structures should be inspected in accordance with the recommendations given in Appendices A to F of this Procedure.

Redundant structures could be located in close proximity to operational tracks or anywhere within the railway corridor.

All redundant structures must be inspected to ensure they do not incur any safety risk to the public at large and/or normal train operations.

Some typical things to look for during inspections are as follows:

- Structural integrity – ensuring that it will not fail or collapse under its own dead load, due to wind load, vibration, etc.
- Dangerous sites are properly fenced off.
- All ladders attached to structures are at least 3m above ground level to prevent children from climbing up the structures.
- All water tanks and their openings are properly secured to prevent entry of children into tanks.
- All water tanks are empty.
- Track side access roads at bridge abutments or at other dangerous locations are adequately protected by road traffic barriers, earth mounts or other suitable barricades to prevent vehicles being driven off the high embankments.
- Appropriate signage is displayed at all concerned structures, track side access roads, etc. Some typical signages are as follows:
  - “Access for Authorised Persons Only”.
  - “Danger – Falling Objects”.
  - “Danger – No Pedestrian Access”.
  - “Danger – Do Not Climb”.
  - “Road Closed”.

It should be noted the above descriptions cannot cover every situation and the inspector is expected to exercise judgement based on local knowledge and experience to identify the criticality of identified defects and deficiencies during an inspection.

18 Appendix L – Load Rating of Bridges

18.1 Introduction

In addition to the requirements provided in ARTC Code of Practice Section 9 and ETE-09-01 the following is provided. Details of load rating of underbridges is defined in ETE-09-05

18.2 Load Rating Results

The definition of Rating Factor is provided in AS 5100.7 as:

$$RF = \frac{\text{Available bridge capacity for live load effects}}{\text{Live load effects from the nominated rating vehicle}}$$

Where the nominated rating vehicle is 300LA railway design load the structural capacity of a railway bridge or culvert shall be expressed in terms of the equivalent LA loading (i.e. RF x 300LA).

The live load rating of a road bridge is expressed in terms of single, tandem and tri-axle loading of nominated road traffic.

Where the structure has been rated for specific train consist the results shall be expressed in terms of:

- The Rating Factor (RF) for that vehicle under full DLA.
- The minimum equivalent LA loading.
- Where the value of RF is less than unity (1.0), for each structural element the following should be reported:
  - The reduced speed necessary to raise the value of RF to unity (1.0) i.e. reducing DLA with respect to lower speed.

Calculated load factor (λ_L) for live load with full DLA.

18.3 Train Load Effects

The load effects from the following train consists must be considered as a minimum unless otherwise specified in Scope of Work:

- For all lines – 300LA design loading with 1.6 live load factor.
- RAS 270 locomotives hauling RAS 270 wagons.
- RAS 210 locomotives hauling RAS 210 – 100T general freight or RAS 210 – 92T steel wagons with 1.6 live load factor.
- For heavy coal lines – Heavy Haulage Coal trains.
- For all main lines – Main Line Freight Trains with 25t and 23t axles.

All the above train consists with their load effects on all elements and components under consideration must be recorded on the proforma provided.

18.4 Speed Restriction

Railway bridges in Australia have historically been designed and load rated in accordance with American and British practices and to Australia New Zealand Railway Corporation (ANZRC) bridge design manual.

In 2004, Australian Standard 5100: Bridge Design was introduced, covering both road and rail bridges.

AS ISO 13822 Basis for Design of Structures – Assessment of Existing Structures (which applies to structures generally, not just bridges) aims to provide guidelines for extending the life of structures, while limiting construction intervention. The guidelines include procedures for assessment based on past performance.

The application of AS 13822 can allow the existing train operating conditions to prevail across steel bridges without reducing the operational track speed or undertaking any upgrading work to conform to AS 5100 requirements.

Application of AS 13822 -2005

Load carrying capacity of structures can be derived using AS 13822 provided the original physical and structural integrity of element under consideration have not been significantly altered and similar traffic conditions prevail.

Traffic Conditions for main lines

- Train configurations with load effects not exceeding more than the load effects of current traffic.
- Performance based on at least past 20years of operation for current traffic.

Element Conditions

- Original physical characteristics and structural integrity of element is not altered by either strengthening or replacing it
- Element has not suffered more than 10% loss in capacity when load rated using dynamic load allowance factor (impact) from ANZRC Manual 1974. The impact load for open deck steel bridges is determined by taking a percentage of live load:

$$I = \frac{31}{Y} + 40 - \frac{3L^3}{150}$$

Where Y = girder spacing and L = element length up to 25m

For ballasted deck steel bridges use 90% of impact for open deck.

Application of AS 5100

Where the above traffic and element conditions for the application of AS 13822 cannot be attained then the load carrying capacity of that element shall be carried out using dynamic load allowance from AS 5100.

18.5 Fatigue Rating

The theoretical remaining fatigue life of only steel elements of railway bridges are required under engineering inspection.

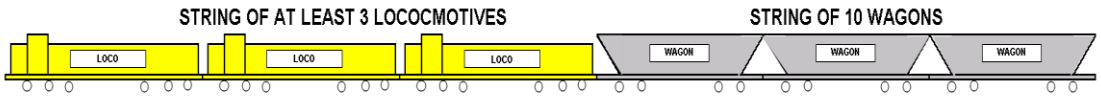
18.6 Wind & Sway Bracing

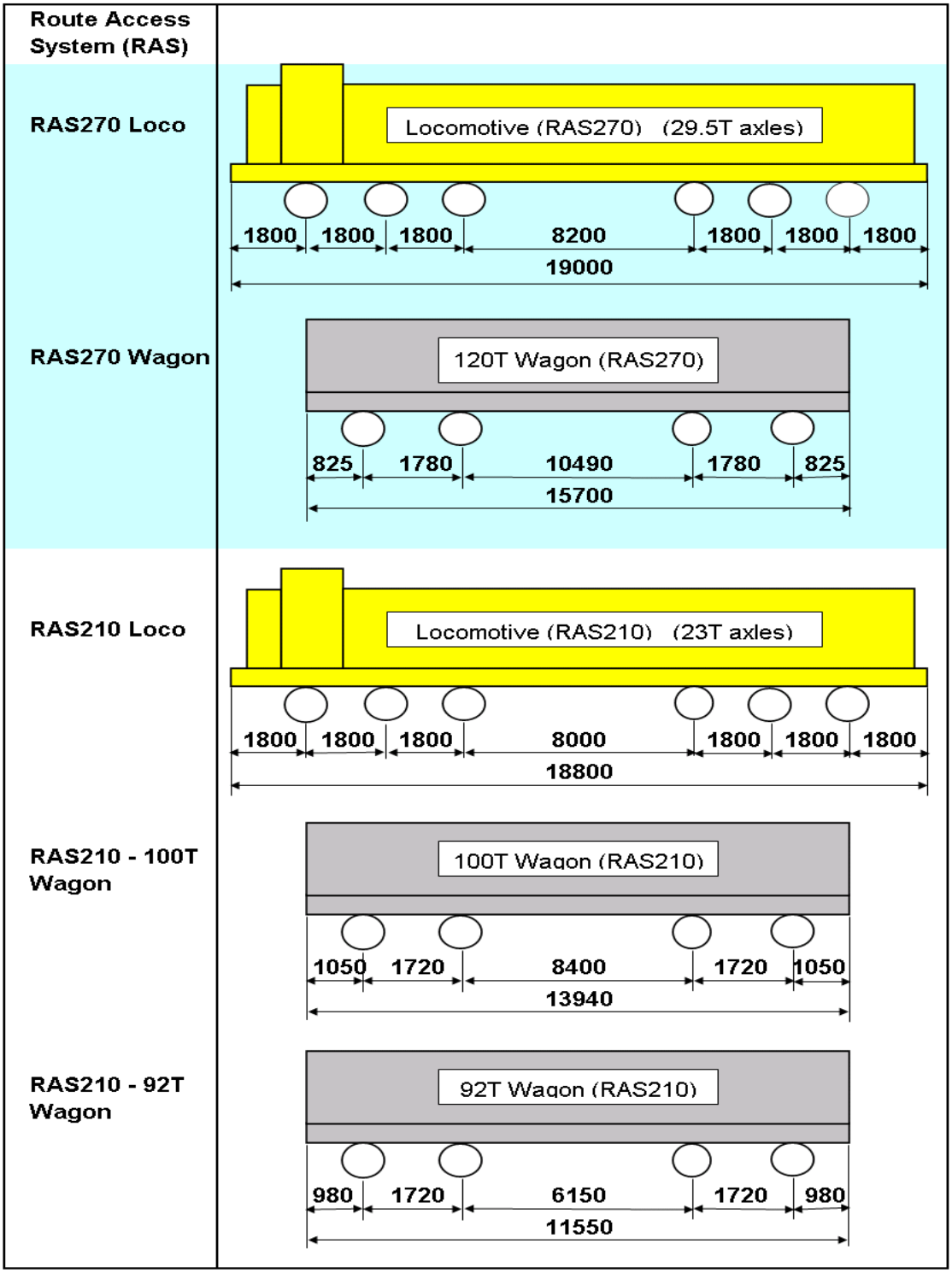
The wind bracing (secondary elements) of the old steel bridges are fabricated mostly from flat bars and as such they do not have adequate theoretical capacity for the current railway traffic in accordance with the AS 5100. The old sway bracing angles and riveted connections also do not have adequate theoretical capacity.

However, experience to date has shown that in reality there is no evidence of distress to suggest that they are being overloaded. Where the existing braces are rated between 0.8 and 0.99 for the current traffic then the structures inspector should give firm recommendations on inspection frequency, intervention levels and responses necessary to maintain safety. Where rating is below 0.8 then consideration should be given for monthly inspections and replacement within a reasonable timeframe.

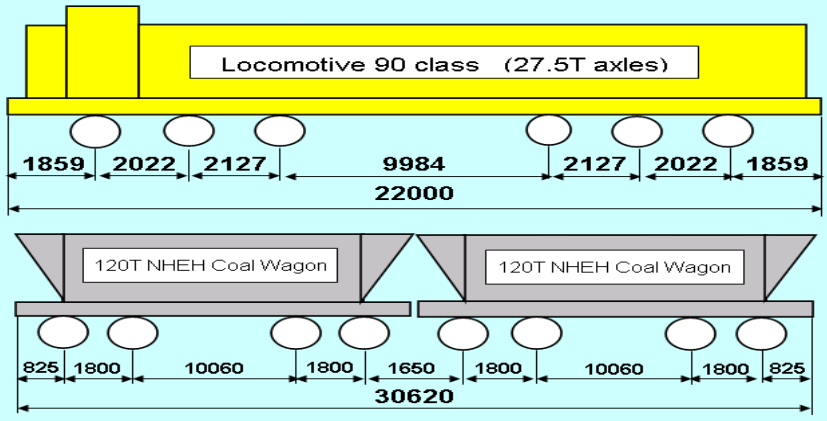
18.7 Train Consists

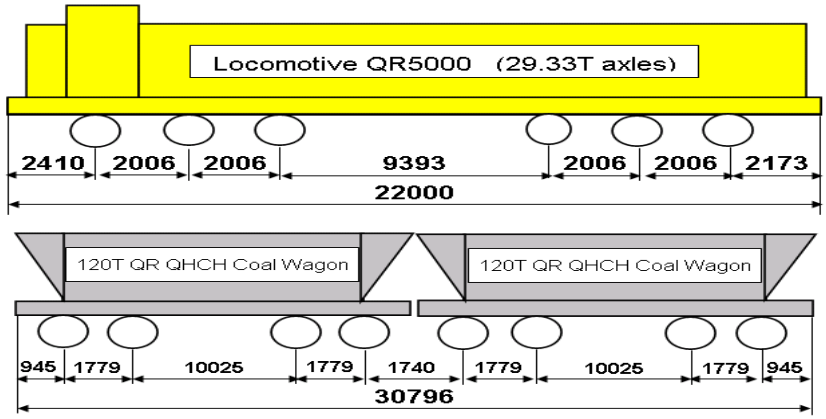
Some typical train consists are shown below:



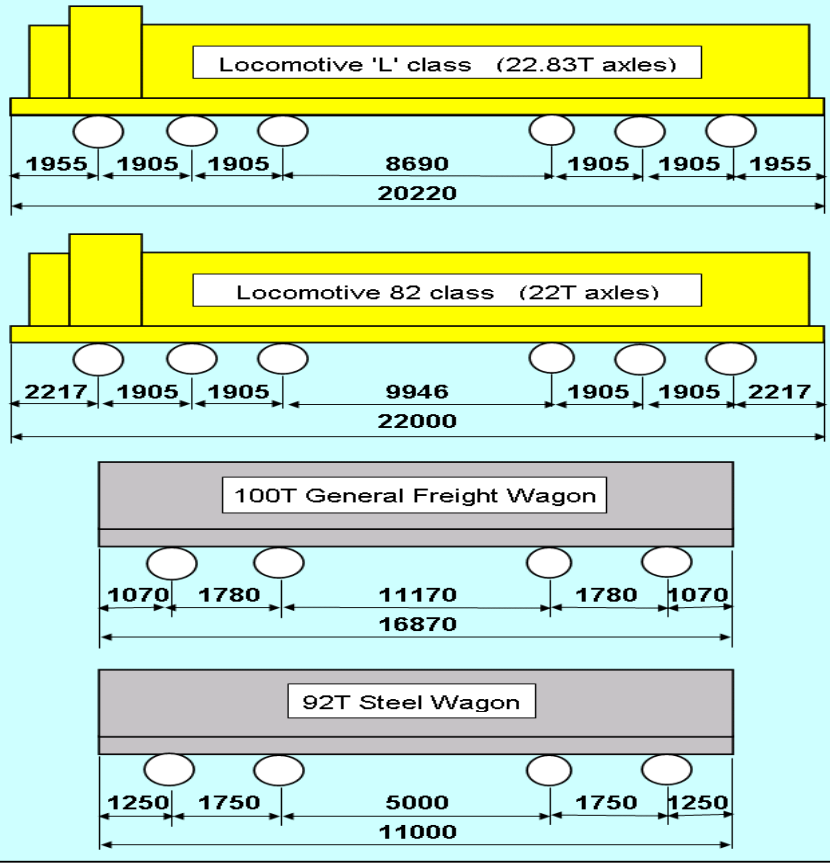


Heavy Haulage Coal Train



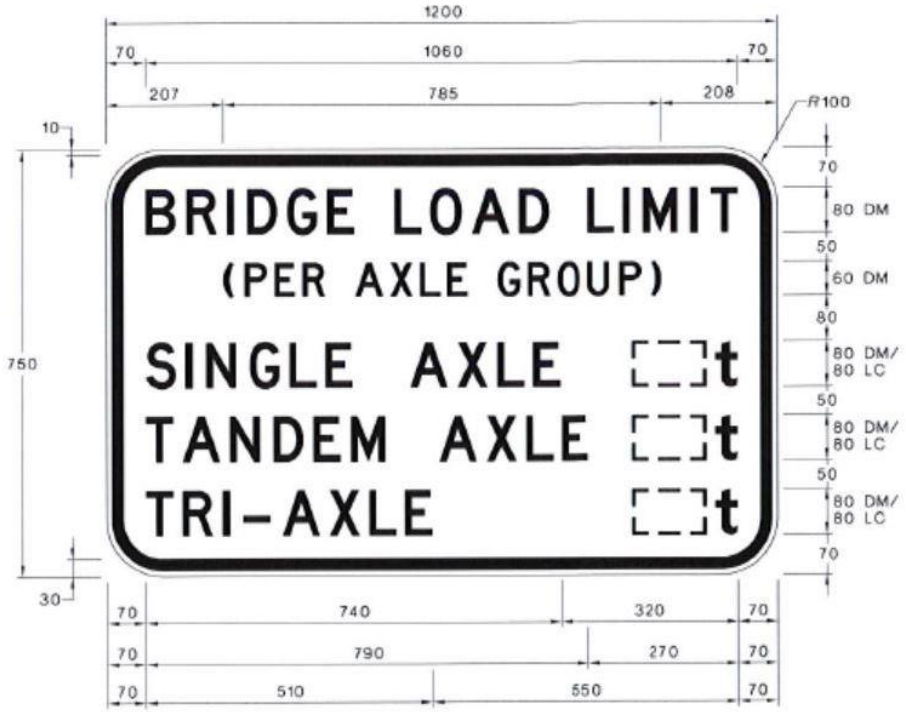


Main Line Freight Train Consists



Road Bridge – Load Limit Sign

R6-17



Appendix E – NSW EPL 3142

Environment Protection Licence

Licence - 3142

Licence Details	
Number:	3142
Anniversary Date:	05-September

Licensee

AUSTRALIAN RAIL TRACK CORPORATION LIMITED

LOCKED BAG 1

BROADMEADOW NSW 2292

Premises

AUSTRALIAN RAIL TRACK CORPORATION (ARTC) NETWORK

SYDNEY NSW 2001

Scheduled Activity

Railway activities - railway infrastructure operations

Fee Based Activity	Scale
Railway infrastructure operations	Any annual capacity

Region

Metropolitan North - Sydney

4 Parramatta Square, 12 Darcy Street
PARRAMATTA NSW 2150

Phone: (02) 9995 5000

Fax: (02) 9995 6901

Locked Bag 5022

PARRAMATTA NSW 2124

Environment Protection Licence

Licence - 3142

Environment Protection Licence

Licence - 3142

Environment Protection Licence

Licence - 3142

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

Licence - 3142

The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

AUSTRALIAN RAIL TRACK CORPORATION LIMITED
LOCKED BAG 1
BROADMEADOW NSW 2292

subject to the conditions which follow.

Environment Protection Licence

Licence - 3142

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Railway activities - railway infrastructure operations	Railway infrastructure operations	Any annual capacity

Objectives of this licence

A1.2 It is an objective of this licence to control and progressively reduce noise and air quality impacts from the operation of rolling stock and management of rail infrastructure.

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
AUSTRALIAN RAIL TRACK CORPORATION (ARTC) NETWORK
SYDNEY
NSW 2001
THE PREMISES TO WHICH THIS LICENCE APPLIES COMPRISES THE ARTC NETWORK WHICH IS DEFINED BY: **(A) THE FOLLOWING RAIL NETWORK DIAGRAMS:** **• HUNTER VALLEY CORRIDOR** **• TELARAH-ACACIA RIDGE CORRIDOR** **• SYDNEY-IVANHOE & ALBURY CORRIDOR** **• MELBOURNE-SERVICETON & ALBURY CORRIDOR** **• KALGOORLIE-SERVICETON & IVANHOE CORRIDOR; AND** **(B) THE LAND AND INFRASTRUCTURE REFERRED TO IN THE ARTC NETWORK DEEDS, INCLUDED AT CONDITION E2 OF THIS LICENCE.** **NOTE: THE RAIL NETWORK DIAGRAMS ARE CONTAINED IN EPA FILE LIC07/1555 AND EF13/2579 AND ARE AT THE WEBLINK: HTTPS://WWW.ARTC.COM.AU/CUSTOMERS/MAPS/SYSTEM**

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

3 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 The premises must be operated and managed to minimise the generation of dust.

O4 Ongoing track maintenance

O4.1 The premises must be maintained to minimise noise impacts on noise sensitive receivers where safe and practicable to do so.

O5 Idling and horn use

O5.1 The licensee must minimise noise and air emissions and impacts on sensitive receivers, from locomotive idling on the premises.

O5.2 The licensee must minimise noise impacts on noise sensitive receivers from locomotive horn usage on the premises.

O6 Braking, bunching and stretching

O6.1 The licensee must minimise noise impacts on noise sensitive receivers from braking, bunching and stretching of rolling stock on the premises.

O7 Environmental awareness

O7.1 All staff, including contractors and subcontractors, involved in the carrying out of the activities authorised by this licence must be aware of their environmental responsibilities relating to the activities regulated by this licence.

O8 Waste management

O8.1 The licensee must assess, classify and manage any waste generated at the premises in accordance with the Waste Classification Guidelines Part 1: Classifying Waste, November 2014 prior to transporting the waste off the premises.

O8.2 The licensee must not cause, permit or allow any waste generated:
a) outside the licensed premises to be received at the licensed premises, except as expressly permitted by a condition of this licence or a resource recovery order and resource recovery exemption under the POEO Act.
b) at the premises to be disposed of at the premises, except as expressly permitted by another condition of this licence.

O8.3 Waste that is generated at the premises (including excavated material) may be:
a) Lawfully re-used or recovered within the premises; or
b) Transported from one part of the premises to another part by road in accordance with Condition O8.4.

O8.4 The licensee must ensure that:
a) the body of any vehicle or trailer, used to transport waste or excavated material from the premises, is covered before leaving the premises to minimise any spill or escape of any dust, waste, or spoil from the vehicle or trailer; and
b) mud, splatter, dust and other material likely to fall from or be cast off the wheels, underside or body of any vehicle, trailer or motorised plant leaving the premises, is removed to the greatest extent practicable

before the vehicle, trailer or motorised plant leaves the premises; and
c) the surfaces of access roads connecting the premises to public roads are effectively cleaned of any tracked material.

O9 Other operating conditions

Railway maintenance and construction activities

Note: The objectives of these conditions are to minimise noise impacts from railway maintenance and construction activities, recognising that operational safety and other factors constrain when these activities can be carried out on the premises. These factors include avoiding disruptions during peak periods for passenger services and ensuring that programmed track closures facilitate the efficient completion of maintenance and construction activities. Night-time and weekend work will be required for some activities.

Railway maintenance activities

Standard railway maintenance hours

O9.1 Maintenance activities must be undertaken:
a) between the hours of 7:00am and 6:00pm Mondays to Friday
b) between the hours of 8:00am and 1:00pm Saturday; and
c) not on Sundays or public holidays,
unless an exception in Condition O9.2 or Condition O9.3 applies.

Exception to standard railway maintenance hours

O9.2 The licensee may undertake maintenance activities outside of the hours specified in Condition O9.1:
a) to provide safe and reliable services or a safe working environment; or
b) for emergency works; or
c) for the delivery of oversized plant or structures that require special arrangements or authorisation to be lawfully transported along public roads.

Exception to standard railway maintenance hours for low noise impact generating works

O9.3 (a) The licensee may undertake maintenance activities outside of the hours specified in Condition O9.1, if the activities do not exceed:
(i) 5dBA (LAeq, 15min) above the relevant rating background levels at day, evening and night, as determined at the nearest noise sensitive receiver as assessed by acoustic investigation, and
(ii) 15dBA (LA1, 1min or LAmax) above the relevant rating background level at night, as determined at the nearest noise sensitive receiver as assessed by acoustic investigation.
(b) The results of any acoustic investigation undertaken in relation to Conditions O9.3(a)(i) and O9.3(a)(ii) must be provided by the licensee when requested by an authorised officer of the EPA.
(c) An acoustic investigation referred to in Conditions O9.3(a)(i) and O9.3(a)(ii) is not required if there are no noise sensitive receivers impacted by the activities.

Management of noise impacts from railway maintenance

O9.4 Where maintenance activities are undertaken, including outside of the hours specified in Condition O9.1, noise impacts must be managed in accordance with the recommendations of the Interim Construction Noise Guideline (DECCW, 2009), as updated from time to time. Consistent with those recommendations, under this condition the licensee is required to:
a) identify noise sensitive receivers that may be affected;
b) identify hours of work for the proposed activities;
c) identify noise impacts at noise sensitive receivers;
d) select and apply reasonable and feasible work practices to minimise noise impacts; and
e) notify the identified noise sensitive receivers at least 5 days prior to the commencement of maintenance activities undertaken outside of the hours specified in Condition O9.1, except where the licensee first becomes aware of the need to undertake those maintenance activities less than 5 days prior to the proposed commencement date, in which case the notification must be provided as soon as practicable after becoming aware of the need to undertake the maintenance activities.

O9.5 When requested by an authorised officer of the EPA, the licensee must provide the following information regarding any proposed maintenance activities on the premises:
a) dates and times of the proposed maintenance activity;
b) location of the proposed maintenance activity;
c) type(s) of work to be performed in conducting the proposed maintenance activity;
d) plant and equipment to be used; and
e) contact name and telephone number of a person who will be on site during the activity and who is authorised by the licensee to take action, including the cessation of the activity or any part of it, if so directed by the EPA. A contact person must be contactable 24 hours a day via the supplied telephone number(s) during the whole of the period that the activity takes place outside the hours specified in Condition O9.1.

O9.6 When requested by an authorised officer of the EPA, the licensee must provide written reasons that demonstrate that maintenance activities undertaken outside of the hours specified in Condition O9.1 comply with the licence.

Railway construction activities

Standard railway construction hours

O9.7 Construction activities must be undertaken:
a) between the hours of 7:00am and 6:00pm Mondays to Friday
b) between the hours of 8:00am and 1:00pm Saturday; and
c) not on Sundays or public holidays,
unless an exception in condition O9.8, O9.9 or O9.10 applies.

Exception to standard railway construction hours

O9.8 a) The licensee may undertake construction activities outside of the hours specified in Condition O9.7:
i) to provide safe and reliable services or a safe working environment; or
ii) for emergency works; or
ii) for the delivery of oversized plant or structures that require special arrangements or authorisation to be

lawfully transported along public roads.

b) If emergency works outside of the hours specified in Condition O9.7 are to be undertaken in proximity to noise sensitive receivers the licensee must, on becoming aware of the need to undertake the emergency works, notify the EPA's Environment Line as soon as practicable and submit a report to the EPA by 2pm on the next business day after the emergency works commenced that describes:
i) the cause, time and duration of the emergency;
ii) action taken by or on behalf of the licensee in relation to the emergency; and
iii) details of any measures taken or proposed to be taken by the licensee to prevent or mitigate against a recurrence of the emergency.

c) Condition O9.8b) does not apply where, for an existing construction project, an approval within the meaning of Division 5.1 of the Environmental Planning and Assessment Act 1979 (the EP&A Act) has been granted in relation to an activity the subject of environmental assessment under Division 5.1 of the EP&A Act prior to the date of issue of this licence;

d) For emergency works undertaken under this condition, the licensee is not required to comply with Condition O9.13.

Exception to standard railway construction hours for low noise impact generating works

O9.9 (a) The licensee may undertake construction activities outside of the hours specified in Condition O9.7, if the activities do not exceed:
i) 5dBA (LAeq, 15min) above the day, evening and night relevant rating background levels, as determined at the nearest noise sensitive receiver as assessed by acoustic investigation, and
ii) 15dBA (LA1, 1min or LAmax) above the relevant rating background level at night, as determined at the nearest noise sensitive receiver as assessed by acoustic investigation;
(b) The results of any acoustic investigation undertaken in relation to Conditions O9.9(a)(i) and O9.9(a)(ii) must be provided by the licensee when requested by an authorised officer of the EPA.
(c) An acoustic investigation referred to in Conditions O9.9(a)(i) and O9.9 (a)(ii) is not required if there are no noise sensitive receivers impacted by the activities.

Other exceptions to standard railway construction hours

O9.10 The licensee may undertake construction activities outside of the hours specified in Condition O9.7 if agreement between the licensee and potentially affected noise sensitive receivers, termed the 'local community', has been reached. Any agreement(s) between the licensee and the local community must be recorded in writing and a copy of the agreement(s) kept at the premises by the licensee for the duration of the works and provided to the EPA at any time during or following the works, on request.

Hours for high noise impact generating works

O9.11 With regard to construction activities, any high noise impact generating works must only be undertaken:
a) Between 08:00am – 06:00pm Monday to Friday;
b) Between 08:00am – 01:00pm Saturday; and
c) in continuous blocks of no more than 3 hours, with at least a 1 hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same noise sensitive receivers. For the purposes of this condition, 'continuous' includes any period during which there is less

than a 1 hour respite between ceasing and recommencing any of the work that is the subject of this condition, or
d) at any other time where there are no noise sensitive receivers identified under Condition O9.12(a) or agreement has been reached with the local community in accordance with Condition O9.10.
e) Conditions O9.11a) and b) do not apply where, for an existing construction project, an approval within the meaning of Division 5.1 of the EP&A Act has been granted in relation to an activity the subject of environmental assessment under Division 5.1 of the EP&A Act prior to the date of issue of this licence.

Note: Condition E3 provides the hours for high noise impact generating works for existing construction projects referred to in Condition O9.11e).

Management of noise impacts from railway construction

O9.12 Where railway construction activities are undertaken, including outside of the hours specified in Condition O9.7, noise impacts must be managed in accordance with the recommendations of the Interim Construction Noise Guideline (DECCW, 2009), as updated from time to time. Consistent with those recommendations, the licensee is required to:
a) identify noise sensitive receivers that may be affected;
b) identify hours of work for the proposed activities;
c) identify noise impacts at noise sensitive receivers;
d) select and apply reasonable and feasible work practices to minimise noise impacts; and
e) notify the noise sensitive receivers in accordance with Condition O9.13.

O9.13 Where noise sensitive receivers are required to be notified under Condition O9.12(e), and except in relation to emergency works undertaken under Condition O9.8, the notification must be made not less than 5 days and not more than 14 days before those works and activities are to be undertaken, unless agreement has been reached with the local community in accordance with Condition O9.10.
a) The notification must be:
i) by letterbox drop or other targeted and equivalent method; and
ii) published on the project website where one exists,
b) The notification must:
i) clearly outline the reason that the work is required to be undertaken outside the hours specified in Condition O9.7;
ii) include a diagram that clearly identifies the location of the proposed works in relation to nearby cross streets and local landmarks;
iii) include details of relevant time restrictions that apply to the proposed works;
iv) clearly outline in plain English the location, nature, scope and duration of the proposed works;
v) detail the expected noise impact of the works on noise sensitive receivers;
vi) detail any mitigation measures to be implemented to minimise noise and/or vibration impacts;
vii) clearly state how complaints may be made and additional information obtained; and
viii) include the number of the telephone complaints line required by this licence, an afterhours contact phone number specific to the works and activities, and the project website address where applicable.

O9.14 When requested by an authorised officer of the EPA, the licensee must provide the following information regarding any proposed construction activities on the premises:
a) dates and times of the proposed construction activity;
b) location of the proposed construction activity;
c) type(s) of work to be performed in conducting the proposed construction activity;
d) plant and equipment to be used; and

e) contact name and telephone number of a person who will be on site during the activity and who is authorised by the licensee to take action, including the cessation of the activity or any part of it, if so directed by the EPA. A contact person must be contactable 24 hours a day via the supplied telephone number(s) during the whole of the period that the activity takes place outside the hours specified in Condition O9.7.

O9.15 When requested by an authorised officer of the EPA, the licensee must provide written reasons that demonstrate that construction activities undertaken outside of the hours specified in Condition O9.7 comply with the licence.

Blasting

O9.16 All blasting activities are prohibited unless permitted under another condition of this licence.

Erosion and sediment control

O9.17 The licensee must, before and during maintenance activities and/or construction activities, implement all feasible and reasonable erosion and sediment controls to minimise sediment leaving the premises.

O9.18 Erosion and sediment controls must be designed, constructed, operated and maintained in accordance with “Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition” (Landcom, 2004) to be read and used in conjunction with the relevant DECC Managing Urban Stormwater – Soils and Construction volume.

4 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Recording of pollution complaints

M2.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent

of the licensee in relation to pollution arising from any activity to which this licence applies.

M2.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M2.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M2.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M3 Telephone complaints line

M3.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M3.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M3.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

M4 Other avenues for complaints

M4.1 The licensee must have an avenue for complaints, such as an email address, accessible from its website, for the purpose of receiving any complaints from members of the public in relation to activities carried out under this licence.

5 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,

4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee notification that the Annual Return is due.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in

accordance with the requirements of Part 5.7 of the Act.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Other reporting conditions

Identification of rolling stock on the premises in response to complaints

R4.1 a) At the request of an EPA authorised officer, the licensee must make all reasonable inquiries to identify the Rolling Stock Operator which is the subject of a complaint reported to the EPA and to supply those details to the EPA within such time as may be specified in the request.
b) Where the licensee receives a pollution complaint, including noise and vibration complaints, through the telephone complaints line (Condition M3) or other avenues (Condition M4), which relates to rolling stock operating on the premises, the licensee must make all reasonable inquiries to identify the Rolling Stock Operator which is the subject of the complaint (except where the complaint arises because of the

actions or instructions of the licensee) where it will assist in resolving the complaint. The details of the complaint must then be provided to the relevant Rolling Stock Operator as soon as is reasonably practicable.

Complaints register reporting

R4.2 a) Within 10 business days of the end of each calendar month, the licensee must submit a report to the EPA, in a form nominated by the EPA, that provides details of all pollution complaints, including noise and vibration complaints, received on the telephone complaints line (Condition M3) or through other avenues (Condition M4) or otherwise referred to the licensee in regards to the activities authorised and controlled by this licence. The report must include:
i) a unique identifier number for each complaint;
ii) the details required by condition M2.2;
iii) the Rolling Stock Operator which is the subject of the complaint, where relevant; and
iv) the date and time that the complaint was reported to any identified Rolling Stock Operator which is the subject of the complaint.
b) The licensee is not required to submit a report for any calendar month during which no complaints were received by or referred to the licensee.
c) The preceding conditions do not apply until 3 months from 5 of August 2020.

Notification of railway construction projects

R4.3 Within 10 days of the end of each calendar month, the licensee must provide a monthly report to the EPA listing all construction activities being undertaken on the premises or scheduled to be undertaken on the premises prior to the next monthly reporting period. The report must include:
a) the dates and times of the construction activities;
b) the location(s) of the construction activities;
c) a description of the works to be undertaken, including the type of plant and equipment used;
d) details of any mitigation or management measures implemented at the construction location to meet the conditions of this licence and the requirements of the Act; and
e) The licensee is not required to submit a report for any calendar month during which there were no construction activities undertaken or scheduled to be undertaken by the licensee.

6 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

G1.4 For the purpose of Condition G1.1 the premises is defined as the principal office of the licensee.

G1.5 For the purpose of G1.3 "available for inspection" includes inspection via electronic means.

G2 Contact number for incidents and responsible employees

G2.1 The licensee must provide the EPA with up to date contact details to enable the EPA:
a) to contact either the licensee or a representative of the licensee who can respond at all times to incidents relating to the premises, and
b) to contact the licensee's senior employees or agents authorised at all times to:
i) speak on behalf of the licensee, and
ii) provide any information or document required under the licence.

G2.2 The contact details required by Condition G2.1 above must include:
a) the full name and title of the authorised representatives and the scope of their respective authorisations; and
b) the direct telephone number, mobile number, email address and postal address for contacting each authorised representative.

7 Pollution Studies and Reduction Programs

U1 Pollution Study - Operation Report – Idling

U1.1 The licensee must prepare a report which:
(a) describes the actions and practices undertaken by the licensee to prevent or minimise noise and air emissions, and impacts on sensitive receivers, from locomotives idling on the premises; and
(b) examines matters related to network operation and control affecting rolling stock operating on the premises.

Note: This report may be used to develop a Pollution Reduction Program to further investigate potential improvements to current actions and practices and develop a management plan to minimise the impacts of idling where appropriate and as requested by the EPA.

U1.2 In the report, the licensee must:
a) include relevant information regarding idling, including but not limited to:
i) a review of the complaints it has received regarding idling;
ii) categorisation of the complaints by cause and location and identification of the number of complaints for each category; and
iii) details of all actions and practices that were identified and/or implemented by the licensee to address the complaints; and
b) details of any actions, practices or possible improvements that the licensee could undertake to minimise impacts on sensitive receivers from locomotives idling on the premises.

U1.3 The licensee must provide the EPA with the report by 5 August 2021.

U2 Pollution Study - Operation Report – Horn use

U2.1 The licensee must prepare a report which:

(a) describes the actions and practices undertaken by the licensee to prevent or minimise noise impacts on noise sensitive receivers from locomotive horn use on the premises; and
(b) examines matters related to network operation and control affecting rolling stock operating on the premises.

Note: This report may be used to develop a Pollution Reduction Program to further investigate potential improvements to current actions and practices and develop a management plan to minimise impacts of locomotive horn use where appropriate and as requested by the EPA.

U2.2 In the report, the licensee must:
a) include relevant information regarding horn use, including but not limited to:
i) a review of the complaints it has received regarding horn use;
ii) categorisation of the complaints by cause and location and identification of the number of complaints for each category; and
iii) details of all actions and practices that were identified and/or implemented by the licensee to address the complaints; and
b) details of any actions, practices or possible improvements that the licensee could undertake to minimise impacts on noise sensitive receivers from locomotive horn use on the premises.

U2.3 The licensee must provide the EPA with the report by 5 August 2021.

U3 Pollution Study - Operation Report – Braking, bunching and stretching

U3.1 The licensee must prepare a report which:
(a) describes the actions and practices undertaken by the licensee to prevent or minimise noise impacts on noise sensitive receivers from braking, bunching and stretching of freight wagons on the premises; and
(b) examines matters related to network operation and control affecting rolling stock operating on the premises.

Note: This report may be used to develop a Pollution Reduction Program to further investigate potential improvements to current actions and practices and develop a management plan to minimise impacts from braking, bunching and stretching where appropriate and as requested by the EPA.

U3.2 In the report, the licensee must:
a) include relevant information regarding bunching, braking and stretching of freight wagons, including but not limited to:
i) a review of the complaints it has received regarding noise impacts associated with braking, bunching and stretching of freight wagons;
ii) categorisation of the complaints by cause and location and identification of the number of complaints for each category; and
iii) details of all actions and practices that were identified and/or implemented by the licensee to address the complaints; and
b) details of any actions, practices or possible improvements that the licensee could undertake to minimise noise impacts on noise sensitive receivers from braking, bunching and stretching of freight wagons on the premises.

U3.3 The licensee must provide the EPA with the report by 5 August 2021.

Environment Protection Licence

Licence - 3142

8 Special Conditions

E1 Special Dictionary

Railway Infrastructure Operations Licence Dictionary

E1.1 In this licence, unless the contrary is indicated, the terms below have the following meanings:

Term	Definition
construction activities	means construction of railway infrastructure carried out at a scale below the threshold for the scheduled activity of "railway activities—railway infrastructure construction" in clause 33(2) of Schedule 1 to the Protection of the Environment Operations Act 1997. 'Railway infrastructure' has the same meaning as in clause 33(4) of Schedule 1 to the Act.
day	the period from 0700 to 1800 h (Monday to Saturday) and 0800 to 1800 h (Sundays and Public Holidays).
emergency works	means unforeseen works: (a) to avoid harm to persons (loss of life and personal injury) or damage to property or to prevent environmental harm; or (b) To restore safe and reliable railway passenger and freight services or to prevent imminent interruptions to those services.
evening	the period from 1800 to 2200 h.
feasible and reasonable	has the same meaning as defined in the Rail Infrastructure Noise Guideline (EPA, 2013) for operational rail activities and has the same meaning as defined in the Interim Construction Noise Guideline (DECC, 2009) for construction / maintenance activities.
freight wagon	a railway vehicle that is used or intended to be used to transport freight for reward, but does not include a locomotive.
high noise impact generating works	means: (a) rail regulating and tamping, jack hammering, grinding, line drilling, pile driving, vibratory rolling, rock hammering, rock breaking, saw cutting, sheet piling; or (b) any other activities where those activities in (a) above generate offensive noise (as defined in the Dictionary to the Protection of the Operations Act 1997) at noise sensitive receivers, because of their impulsive, intermittent, low frequency or tonal characteristics.
LAFMax	means A-weighted maximum noise level, fast weighting.
locomotive	a vehicle powered by an internal combustion engine that is primarily intended for hauling freight and/or passenger rolling stock.

LZFMax	means Z-weighted maximum noise level, fast weighting.
maintenance activities	means repair, upgrading or alteration of 'railway infrastructure' as defined in clause 33(4) of Schedule 1 to the Act.
night	the period from 2200 to 0700 h (Monday to Saturday) and 2200 to 0800 h (Sundays and Public Holidays)
noise sensitive receivers	receiver types and land-uses identified in Table 1, 2 and 3 of the Rail Infrastructure Noise Guideline (EPA, 2013).
railway infrastructure operations	means the scheduled activity in clause 33A of Schedule 1 to the Act.
railway infrastructure operator	means a person authorised by an environment protection licence to carry out the scheduled activity of Railway Infrastructure Operations under clause 33A of Schedule 1 to the Act.
rating background level (RBL)	is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). Determination of the rating background level is by the method described in the NSW Noise Policy for Industry (EPA, 2017)
rolling stock	has the same meaning as in clause 33B of Schedule 1 to the Act.
rolling stock operations	means the scheduled activity in Clause 33B of Schedule 1 to the Act.
rolling stock operator	means a person authorised by an environment protection licence to carry out the scheduled activity of Rolling Stock Operations under Clause 33B of Schedule 1 to the Act.
sensitive receiver	a location where people are likely to work or reside; this includes residential dwellings, schools, hospitals, offices or public recreational areas.

E2 ARTC Network Deeds

A full description of the licensed premises is as follows and is known as the ARTC Network Deeds

E2.1 The land and infrastructure defined, from time to time, as "Land", "Additional Land", "Infrastructure" and "ARTC Infrastructure" respectively in the Deed of Lease between ARTC, the State Rail Authority of New South Wales ("SRA") and the Rail Infrastructure Corporation ("RIC"), executed on 4 June 2004, as that document is amended or varied from time to time ("Lease"), to the extent that such land and infrastructure is owned, leased or licensed by, or otherwise vested in SRA or RIC and is the subject of a lease or licence to ARTC by virtue of the Lease, or is otherwise owned by or vested in ARTC, and is under the management or control of ARTC.

E2.2 The land, and the infrastructure comprising the "Infrastructure" and the "ARTC Infrastructure", in the "Freight Corridor" and in the "MFN Side" of the "Shared Corridor", as those terms are defined respectively from time to time in the Metropolitan Freight Network Deed of Lease and Licence ("MFN Lease") between Rail Corporation New South Wales ("RailCorp") and Australian Rail Track Corporation Ltd ("ARTC") (including the land marked "Additional Land" in the plan titled, "Revised Plan- Enfield South" dated 29

July 2013), as well as the land and infrastructure comprising "Licensed Area" and "Rail Infrastructure" as those terms are defined respectively from time to time in the Deed of Licence between Sydney Ports Corporation and ARTC ("Sydney Ports Licence") as those documents are amended or varied from time to time, to the extent that all such land and infrastructure is owned, leased or licensed by or otherwise vested in RailCorp or Sydney Ports Corporation and is the subject of a lease or licence to ARTC by virtue of the MFN Lease or the Sydney Ports Licence, or is otherwise owned by or vested in ARTC, and is under the management or control of ARTC.

Note: The "Revised Plan- Enfield South", dated 29th July 2013, is held on EPA file EF13/2579, sub folder SF13/3504.

E2.3 After 12:01 AM on 23 December 2012 - the land, and the infrastructure comprising the "Infrastructure" and the "ARTC Infrastructure", in "Leightonfield Yard" and in the "SSFL Side" of the "Shared Corridor", as those terms are defined respectively from time to time in the Southern Sydney Freight Line Deed of Lease and Licence ("SSFL Lease") between Rail Corporation New South Wales ("RailCorp") and Australian Rail Track Corporation Ltd ("ARTC"), as amended or varied from time to time, to the extent that all such land and infrastructure is owned, leased or licensed by or otherwise vested in RailCorp and is the subject of a lease or licence to ARTC by virtue of the SSFL Lease or is otherwise owned by or vested in ARTC, and is under the management or control of ARTC.

E2.4 The land and infrastructure comprising "Licensed Area" (including the areas marked "ARTC exclusive licence" and "ARTC non-exclusive licence" on the map referenced below) and "Rail Infrastructure" in the Sydney Ports Licence is referenced in the map named 'SPC Deed of Licence Plan - Port Botany' dated March 2013 and numbered 'BNPP222D'.

E2.5 The land defined as "Property Acquisition / Lease Area" in Figures 1 to 9 dated 24 June 2009 submitted with the licence variation application received by the EPA on 29 June 2009 for the construction of the Minimbah Bank Rail Project as described in Project Approval 08_0060 issued by the Minister for Planning on 22 May 2009.

E2.6 The land denoted "Variation Boundary" and defined by a red dotted line on the map named "Kiacatoo Licence Variation" Document no. AET900.205-C-GIS-001 prepared by Kellogg, Brown & Root P/L dated 8 February 2010 (held on EPA File LIC07/1555-08).

E2.7 Land owned by ARTC comprising the whole of the land described in the Certificates of Titles Auto Consol 11132-54 dated 20 April 1999 and auto Consol 12074-195 dated 20 April 1999.

E2.8 On and from 30 April 2013 the land owned by ARTC, comprising the whole of the land described in the Certificates of Title (Folio Identifiers) 15/1097330 and 16/1097330.

E3 Hours for high noise impact generating works for existing projects

E3.1 Where, for an existing construction project, an approval within the meaning of Division 5.1 of the EP&A Act has been granted in relation to an activity the subject of environmental assessment under Division 5.1 of the EP&A Act prior to the date of issue of this Licence, any high noise impact generating works must only be undertaken:
a) Between 08:00am – 10:00pm Monday to Friday;
b) Between 08:00am – 06:00pm Saturdays and Sundays; and
c) in continuous blocks of no more than 3 hours, with at least a 1 hour respite between each block of work

generating high noise impact, where the location of the work is likely to impact the same noise sensitive receivers. For the purposes of this condition, 'continuous' includes any period during which there is less than a 1 hour respite between ceasing and recommencing any of the work that is the subject of this condition, or
d) at any other time where there are no noise sensitive receivers identified or agreement has been reached with the local community.

E4 Completed pollution studies and reduction programs

E4.1 The following pollution studies and reduction programs have been completed by the licensee.

PRP/Pollution Study Title	Description	Completion date
1. PRP U1.2 Noise Management for existing activities and infrastructure: Infrastructure Management and Maintenance PRP	Identify and assess infrastructure management and maintenance measures that can be implemented by the licensee to reduce operational rail noise	7 March 2005
2. PRP U1.3 Noise Management for existing activities and infrastructure: Whole of Licensee's Network PRP	Identify and assess a range of management and maintenance measures that can be implemented by the licensee to reduce operational rail noise, including measures that can be applied by rail operators that are using the licensee's network	5 Sept 2005
3. PRP 3 Audit of the noise performance of locomotives on ARTC's network	Help manage locomotive noise from the NSW rail network by monitoring the noise performance of locomotives on its rail network and providing noise monitoring data to locomotive operators and the EPA	16 July 2010
4. PRP 5 Review of safety related procedures that cause a noise nuisance	Help manage associated with safety related practices, including detonators as a standard warning device during trackwork	29 June 2010
5. PRP4 Reduction of coal dust emissions from locomotive loads (Note: This PRP was replaced by PRP No.6 below)	Develop and implement a workplan of how appropriate technology can be adopted to significantly reduce coal dust emissions from locomotive coal loads on the NSW ARTC rail network	Not applicable
6. PRP 4 Particulate Emissions from Coal Trains (Note: This PRP replaced PRP No.5 above)	Actions 4A-C Implement a pilot monitoring program to determine whether coal trains and rail freight transport contribute or increase ambient particulate levels in the lower Hunter Valley	3 August 2012
	Actions 4D A final report on the pilot monitoring program to be published on the licensee's website	28 September 2012

Environment Protection Licence

Licence - 3142

	Actions 4.2A-D Continuation of the monitoring program commenced as the pilot program in PRP no.6 above) and final report on the monitoring program to be published on the licensee's website	30 May 2013
7. PRP 3.1 Audit of the noise performance of locomotives on ARTC's network	Implement and maintain a 12- month wayside noise monitoring program (consistent with the previous ARTC wayside noise pilot monitoring program – see PRP No. 3 above) and reporting to locomotive operators and the EPA of noise monitoring results and measures taken by locomotive operators with the aim of reducing noise levels from locomotives identified with top 5% noise levels	28 Jan 2014
8. PRP5 Investigation of coal loss from rail wagons on the ARTC network	An investigation to identify the loss of coal from rail wagons on the ARTC network during the transportation of coal on the rail network and to assess the effectiveness of removing coal deposition from the ballast through vacuuming	1 March 2016

Environment Protection Licence

Licence - 3142

Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 3142

flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

Environment Protection Licence

Licence - 3142

TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste

Ms Penny Finlay

Environment Protection Authority

(By Delegation)

Date of this edition: 20-December-2000

Environment Protection Licence

Licence - 3142

End Notes

1	Licence varied by notice 1007100, issued on 17-Jul-2001, which came into effect on 11-Aug-2001.
2	Licence varied by notice 1010600, issued on 15-Aug-2001, which came into effect on 09-Sep-2001.
3	Licence varied by notice 1011934, issued on 05-Oct-2001, which came into effect on 05-Oct-2001.
4	Licence varied by notice 1012143, issued on 29-Nov-2001, which came into effect on 24-Dec-2001.
5	Licence varied by notice 1015602, issued on 01-May-2002, which came into effect on 26-May-2002.
6	Licence varied by notice 1018132, issued on 12-Jun-2002, which came into effect on 13-Jun-2002.
7	Licence varied by notice 1023724, issued on 19-Dec-2002, which came into effect on 23-Dec-2002.
8	Licence varied by notice 1028108, issued on 01-Jul-2003, which came into effect on 16-Jul-2003.
9	Licence varied by notice 1029702, issued on 01-Aug-2003, which came into effect on 01-Aug-2003.
10	Licence varied by notice 1030573, issued on 31-Oct-2003, which came into effect on 06-Nov-2003.
11	Licence varied by notice 1032289, issued on 09-Dec-2003, which came into effect on 30-Dec-2003.
12	Licence varied by notice 1033638, issued on 31-Dec-2003, which came into effect on 25-Jan-2004.
13	Licence fee period changed by notice 1040177 on 25-Aug-2004.
14	Licence transferred through application 142914, approved on 06-Sep-2004, which came into effect on 05-Sep-2004.
15	Licence varied by notice 1040462, issued on 06-Sep-2004, which came into effect on 06-Sep-2004.
16	Licence varied by change to record due to LGA amalgamation, issued on 03-Nov-2004, which came into effect on 03-Nov-2004.
17	Licence varied by notice 1052119, issued on 22-Sep-2005, which came into effect on 17-Oct-2005.
18	Licence varied by notice 1092348, issued on 30-Sep-2008, which came into effect on 30-Sep-2008.

Environment Protection Licence

Licence - 3142

19	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
20	Licence varied by notice 1093829, issued on 14-Nov-2008, which came into effect on 14-Nov-2008.
21	Licence varied by notice 1103541, issued on 08-Jul-2009, which came into effect on 08-Jul-2009.
22	Licence varied by notice 1105912, issued on 04-Sep-2009, which came into effect on 04-Sep-2009.
23	Licence varied by notice 1108138, issued on 28-Oct-2009, which came into effect on 28-Oct-2009.
24	Licence varied by notice 1110207, issued on 23-Dec-2009, which came into effect on 23-Dec-2009.
25	Licence varied by notice 1112635, issued on 18-May-2010, which came into effect on 18-May-2010.
26	Licence varied by notice 1121864, issued on 05-Jan-2011, which came into effect on 05-Jan-2011.
27	Licence varied by notice 1123526, issued on 07-Jan-2011, which came into effect on 07-Jan-2011.
28	Licence varied by notice 1123725, issued on 14-Jan-2011, which came into effect on 14-Jan-2011.
29	Licence varied by notice 1123791, issued on 18-Jan-2011, which came into effect on <date to be advised>.
30	Licence varied by notice 1123791, issued on 19-Jan-2011, which came into effect on 19-Jan-2011.
31	Licence varied by notice 1123916, issued on 01-Apr-2011, which came into effect on 01-Apr-2011.
32	Licence varied by notice 1130376, issued on 11-Jul-2011, which came into effect on 11-Jul-2011.
33	Licence varied by notice 1501777 issued on 28-Sep-2011
34	Licence varied by notice 1503705 issued on 13-Jan-2012
35	Licence varied by notice 1506907 issued on 20-Jun-2012
36	Licence varied by notice 1507804 issued on 03-Aug-2012
37	Licence varied by notice 1508511 issued on 30-Aug-2012
38	Licence varied by notice 1509294 issued on 09-Oct-2012
39	Licence varied by notice 1509718 issued on 25-Oct-2012

Environment Protection Licence

Licence - 3142

40	Licence varied by notice 1510875 issued on 18-Dec-2012
41	Licence varied by notice 1512282 issued on 04-Apr-2013
42	Licence varied by notice 1513859 issued on 10-May-2013
43	Licence varied by notice 1514367 issued on 28-May-2013
44	Licence varied by notice 1516856 issued on 09-Dec-2013
45	Licence varied by notice 1519381 issued on 20-Jan-2014
46	Licence format updated on 26-Feb-2014
47	Licence varied by notice 1526184 issued on 11-Feb-2015
48	Licence varied by notice 1531018 issued on 11-Jun-2015
49	Licence varied by notice 1534754 issued on 02-Nov-2015
50	Licence varied by notice 1539866 issued on 15-Apr-2016
51	Licence varied by notice 1540874 issued on 03-Aug-2016
52	Licence varied by notice 1553083 issued on 22-Jun-2017
53	Licence varied by notice 1557516 issued on 04-Dec-2017
54	Licence varied by notice 1559512 issued on 08-Dec-2017
55	Licence varied by notice 1571526 issued on 20-Sep-2019
56	Licence varied by notice 1589782 issued on 05-Aug-2020