ARCADIS Design & Consultancy for natural and built assets

Moorebank Precinct East - Stage 1 Project

Best Practice Review (SSD 14-6766)

SIMTA

SYDNEY INTERMODAL TERMINAL ALLIANCE

September 2017

CONTACT

WESTLEY OWERS
Principal Environmental Planner

T 02 8907 9096
M 0451 105 610
E westley.owers@arcadis.com

Arcadis
Level 5
141 Walker Street, North Sydney |
NSW 2060 | Australia

SIMTA
MPE STAGE 1 (SSD 14-6766)

Best Practice Review

Author	Ketan Patel, Westley Owers	
Checker	Westley Owers	
Approver	Todd Brookes	

Report No 013

Date 20/09/2017

Revision Final

REVISIONS

Revision	Date	Description	Prepared by	Approved by
001	08/03/17	First Draft for review	KP	WO
002	29/03/17	Second Draft (work in progress)	WO	WO
003	5/04/2017	Final Draft	WO	WO
004	7/04/17	Final (for discussion)	WO	BS
005	11/04/17	Final (for discussion)	WO	BS
005	17/05/17	Legal review	WO	BS
006	31/05/17	Final (EPA comments update)	WO	WO
007	01/06/17	FINAL Arcadis Internal Review	WO	TB

Revision	Date	Description	Prepared by	Approved by
008	02/06/17	FINAL Comments from Legal Review	KP	TB
009	22/06/2017	FINAL updated after additional EPA comments and client review	KP	TB
010	26/07/2017	FINAL updated after additional EPA and TfNSW comments	WO	KP
011	24/08/2017	FINAL updated post additional discussions with Qube	WO	KP
012	07/09/2017	FINAL updated post additional EPA comments	WO	KP
013	19/09/2017	FINAL- DP&E Approved with EPA/TfNSW comments	WO	KP

ACRONYMS AND DEFINITIONS

Term	Explanation
AC	Alternating Current
AESS	Automatic engine shutdown/start-up systems
APU	Auxiliary Power Units
ARTC	Australian Rail Track Corporation
AS	Australian Standard
CAR	Corrective Action Request
CCTV	Closed Circuit Television
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CoA	Conditions of Approval
CoP	Code of practice
CNG	Compressed Natural Gas
dB	Decibels
DC	Direct Current
DPE	Department of Planning and Environment
DPF	Diesel Particulate Filters
ECP	Electronically Controlled Pneumatic Brakes
EGR	Exhaust Gas Recirculation
EIS	Environmental Impact Statement
EMD	Electromotive Diesel
EMS	Environmental Management Systems
EPA	Environment Protection Authority
EPL	Environmental Protection License

Term	Explanation
EU	European Union
FORG	Freight on Rail Group
GPS	Global Positioning System
HC	Hydrocarbons
IMEX	Import-Export Terminal Facility • Truck processing, holding and loading areas - entrance and exit from Moorebank Avenue • Rail loading and container storage areas – installation of four rail sidings with adjacent container storage area serviced by manual handling equipment initially and overhead gantry cranes progressively Administration facility and associated car parking- light vehicle access from Moorebank Avenue.
IMT	MPE Stage 1 Site including the construction of the following key components together comprising the intermodal terminal (IMT): • Truck processing and loading areas. • Rail loading and container storage areas. • Administration facility and associated car parking • Rail Link.
INP	Industrial Noise Policy
ISO	International Organisation for Standardisation
LNG	Liquefied Natural Gas
MPE	Moorebank Precinct East
MPW	Moorebank Precinct West
NOx	Nitrogen oxide
OEMP	Operational Environmental Management Plan
Package 1	The Rail Link includes a connection to the IMEX, and traverses across Moorebank Avenue, Anzac Creek and Georges River prior to connecting to the Southern Sydney Freight Line.
Package 2	Construction of the IMEX

Term	Explanation
PPM	Parts per million
POEO Act	*Protection of Environment Operations Act 1997*
PM	Particulate Matter
RING	Rail Infrastructure Noise Guideline
RISSB	Rail Industry Safety and Standards Board
RNP	Road Noise Policy
RtS	Response to Submissions
SCR	Selective Catalytic Reduction
SEPP	State Environment Protection Policy
SSD	State significant development
SIMTA	Sydney Intermodal Terminal Alliance
SO_2	Sulphur Dioxide
SSFL	Southern Sydney Freight Line
TEU	Twenty-foot equivalent units
TfNSW	Transport for New South Wales
ULESL	Ultra-low-emitting switch locomotives
US EPA	United States Environmental Protection Authority

CONTENTS

ACRONYMS AND DEFINITIONS ..... **III**

LIST OF TABLES **9**

1 INTRODUCTION **1**
1.1 Background **1**
1.2 Purpose and structure **1**
1.3 Consultation **2**
1.3.1 TfNSW 3
1.3.2 EPA 4
1.3.3 RISSB 9

2 AVAILABLE TECHNOLOGY AND CURRENT INDUSTRY BENCHMARK **10**
2.1 Air emissions **10**
2.1.1 Emission control technology for upgrade / repower options in Australia 11
2.1.2 Summary of available best practice 12
2.2.1 Engine rebuild and upgrades 14
2.2.2 Emissions after treatment 14
2.2.3 Fuel efficiencies 14
2.2.4 Summary of available best practice 15

3 PROJECT COMMITMENT TO ACHIEVE AVAILABLE BEST PRACTICE **16**
3.1 Justification of the technology proposed **16**
3.2 Implementation of available best practice **17**
3.2.1 Air emissions 17
3.2.2 Noise emissions 19
3.2.3 Fleet review 19

4 IMPLEMENTATION **21**
4.1 Industry understanding **21**
4.1.1 Consultation and working group involvement 21
4.2 Site-based **21**
4.2.1 Operational Environmental Management Plan 21
4.2.2 Roles and responsibilities 21
4.2.3 Progress review 21

5 CONCLUSION **22**

REFERENCES **24**

APPENDIX A: TFNSW CONSULTATION **25**

APPENDIX B: EPA CONSULTATION **28**

APPENDIX C: FORG AND RISSB PUBLICATIONS **42**

LIST OF TABLES

Table 1-1 Consultation summary with TfNSW 3
Table 1-2 Consultation summary with the EPA 4
Table 1-3 Summary of Correspondence with the RISSB 9
Table 2-1 US-EPA Tiered Standards for line haul locomotives 10
Table 2-2 Overview of existing Australian fleet emissions perspective 11
Table 2-3 EPA locomotive noise limits (EPL 3142 (ARTC) and EPL 12208 (Sydney Trains) and EPL 13421 (John Holland Rail)) 13

1 INTRODUCTION

This Best Practice Review (the report) has been prepared by Arcadis on behalf of SIMTA and includes technical specialist's information provided by Wilkinson Murray (Noise) and Ramboll Environ (Air Quality). Tactical Group and Aspect Environmental have also undertaken a review of this document.

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) received approval for the construction and operation of Stage 1 of the Moorebank Precinct East (MPE) Project, comprising an Intermodal (IMT) Facility including a rail link (Package 1) and Import Export (IMEX) Terminal (Package 2) on 12 December 2016 (SSD 6766).

The MPE Project involves the development of an intermodal facility including warehouse and distribution facilities, rail link, freight village (ancillary site and operational services), stormwater, landscaping, servicing and associated works on the eastern side of Moorebank Avenue, Moorebank.

Stage 1 of the MPE Project comprises, and will be constructed across, two packages:

- Package 1 - the Rail Link includes a connection to the IMEX facility, and traverses across Moorebank Avenue, Anzac Creek and Georges River prior to connecting to the Southern Sydney Freight Line (SSFL)
- Package 2 - the IMEX Terminal includes the following key components:
  - Truck processing, holding and loading areas - entrance and exit from Moorebank Avenue
  - Rail loading and container storage areas – installation of four rail sidings with adjacent container storage area serviced by manual handling equipment initially and overhead gantry cranes progressively
  - Administration facility and associated car parking- light vehicle access from Moorebank Avenue

Although these packages are to be delivered separately this report relates to both packages.

1.2 Purpose and structure

This report has been prepared to satisfy Condition No. G6(a) of the MPE Stage 1 Project to facilitate for the commencement of construction of both packages of work. Condition No. G6 (a) of the MPE Stage 1 Approval (SSD 14-6766) states the following:

G6. Port shuttle operations must use:

a) Locomotives that incorporate available best practice noise and emission technologies. Prior to the construction of the rail link connecting to the site, the Applicant must submit a report to the Secretary for consideration and approval that has been prepared in consultation with TfNSW and the EPA that justifies the technology proposed and how it meets the objective of best practice noise and emission technologies.

SIMTA notes that the Environmental Impact Statement (EIS) (prepared by Arcadis dated May 2015) for the MPE Stage 1 Project included a detailed assessment of best practice relating to noise and air (refer to Section 10 of the EIS) and outcomes of this best practice assessment were identified in the mitigation measures for both noise and air which committed to the implementation of best practice measures during operation of the MPE Stage 1 Project.

Following consultation with the EPA, 'available best practice technology', in the context of Condition No G6(a), is understood to be Reasonable Emission Control Technology (RECT) applicable to upgrade / repower options which can be implemented on the existing fleet, to achieve the best achievable emissions performance at the next overhaul (refer to Section 1.3.2 of this report). The focus on the existing fleet is based on the fact that very few, if any, new locomotives will operate for the Project in initial years.

Upgrade / repower options have previously been described in the Best Practice Report prepared for the EIS. The purpose of this report is to clearly outline how the Project will implement available best practice technologies, as they relate to these available upgrade / repower options. This report complements other components of best practice management for the Project as outlined in the EIS.

To address the requirements of Condition No. G6 (a), this report seeks to:

- Identify consultation undertaken (refer to Section 1.3 and Appendix A)
- Summarise available best practice noise and emission technologies (refer to Section 2)
- Establish an industry benchmark for noise and emission technologies (refer to Section 2)
- Provide justification of the technology proposed for the Project (refer to Section 3)
- Outline how the Project uses locomotives that incorporate best practice noise and emissions technology (refer to Section 3).

This report has been prepared to address Condition No. G6(a) as this is required to be undertaken prior to construction of the MPE Stage 1 Project. Condition No. G6(b) which relates to the application of the best practice for wagons will be addressed prior to operation as identified within the MPE Stage 1 conditions of approval.

1.3 Consultation

Condition of approval No. G6(a) notes that this report must be submitted to the Secretary, however, needs to be prepared in consultation with both Transport for NSW (TfNSW) and the Environment Protection Authority (EPA). Both of these agencies have been consulted on a number of occasions throughout the preparation of the EIS and RtS (refer to Section 6 of the EIS (Hyder Consulting, May 2015) and Section 2 of the RtS (Hyder Consulting, September 2015)). Both EPA and TfNSW have also been consulted in the preparation of this report in April 2017.

Of further note is that, although not required, SIMTA has undertaken consultation with Australian Rail and Track Corporation (ARTC) to inform them on the approach to be undertaken for the implementation of available best practice as part of the MPE Stage 1 Project.

A summary of the additional discussions and specific consultation which has been undertaken with TfNSW and the EPA for the preparation of this report is provided below.

1.3.1 TfNSW

A summary of the consultation undertaken with TfNSW to satisfy condition of approval No. G6(a) is provided in Table 1-1. Full comments and responses to these comments received are provided in *Appendix A* of this report.

Table 1-1 Consultation summary with TfNSW

Date	Person Contacted	Comment	Location addressed
February - March 2017	Tony Gausden (General Manager Network Efficiency & Regulation)	Several telephone conversations were undertaken to discuss the MPE Stage 1 Project and gain an understanding of TfNSW's expectations for best practice.	Section 3 of this report.
13 March 2017	Tony Gausden (General Manager Network Efficiency & Regulation)	A memorandum was issued explaining the approach to be undertaken to address Condition G6(a) of the MPE Stage 1 Approval. This memorandum provided an introduction to the 'road map' for best practice and the structure of this report. No specific comments were provided by TfNSW at the time.	Section 3 of this report.
12 April 2017	Tony Gausden (General Manager Network Efficiency & Regulation)	Draft version of this report (Best Practice Review, Arcadis, April 2017) was provided for comment to TfNSW.	N/A
Early June 2017	Tim Dewey (Senior Planner, Land Use Planning and Development) per Mark Ozinga (Principal Manager, Land Use Planning and Development)	Updated version of this report (Best Practice Review, Arcadis, v008, dated 2 June 2017) was provided for comment to TfNSW.	N/A
27 June 2017	Tim Dewey (Senior Planner, Land Use Planning and Development) per Mark Ozinga (Principal Manager, Land Use Planning and Development)	Raised the following comments: • A national standard on air emissions including implementation timeframes would apply to all locomotives immediately that a national standard is published. • If a national standard is not achieved within seven years, then the proposed standards on air emissions outlined by the proponent in version 8 at page 23 and elsewhere in the document relating to emissions are applicable. • The proponent should undertake a review of the locomotives most likely to have poorer emissions performance within two years of the commencement of operations. The proponent should then develop a program of reducing the emissions on	Appendix A

Date	Person Contacted	Comment	Location addressed
		these worst performing vehicles first. Both parts should be subject of TfNSW and/or EPA review. Full submission provided in *Appendix B* of this report.	

1.3.2 EPA

A summary of the discussions and consultation undertaken with the EPA to satisfy condition of approval No. G6(a) is provided in Table 1-2. Full comments and responses to these comments received are provided in *Appendix B* of this report.

Table 1-2 Consultation summary with the EPA

Date	Person Contacted	Comment	Location addressed
February - March 2017	Rashad Danoun (Operation Officer)	Several telephone conversations were undertaken to discuss the MPE Stage 1 Project and gain an understanding of EPA's expectations for best practice.	Section 3 of this report.
13 March 2017	Rashad Danoun (Operation Officer)	A memorandum was issued explaining the approach to be undertaken to address Condition G6(a) of the MPE Stage 1 Approval. This memorandum provided an introduction to the 'road map' for best practice and the structure of this report. No specific comments were provided by EPA at the time.	Section 3 of this report.
21 March 2017	Jacinta Hanemann (Unit Head Metropolitan Infrastructure), Rashad Danoun (Operation Officer), Gareth Jones (Principal Air Policy Officer), Roger Bluett (Manager Air Policy), Alexandra Young (Senior Air Policy and Program Officer), Duncan McGregor (Senior Noise Officer).	A teleconference was undertaken with the EPA, SIMTA and Tactical to discuss, amongst other aspects of the Moorebank Precinct, the approach to best practice. The key points identified in this meeting include: • The EPA considers, as a minimum, US Tier 0+ emission standard for particles to be best practice for existing locomotives. Tier 0+ locomotive upgrade kits are available and have been certified for many locomotive engines commonly used in Australia. The kits have been tested on locomotives operating in NSW. • Locomotives operating on the SSFL are to be tested, as part of	Section 3 of this report. Appendix B

Date	Person Contacted	Comment	Location addressed
		separate exercise, in accordance with the EPL (No. 3142), currently only 70% of the fleet are operating in accordance with this requirement.	
12 April 2017	Jacinta Hanemann (Unit Head Metropolitan Infrastructure), Rashad Danoun (Operation Officer)	Draft version of this report (Best Practice Review, Arcadis, v005, dated April 2017) was provided for comment to the EPA.	N/A
2 May 2017	Jacinta Hanemann (Unit Head Metropolitan Infrastructure), Rashad Danoun (Operation Officer)	Comments provided by the EPA in summary include: **Noise** • Minimum performance standard is considered compliance with EPLs 3142 (ARTC), 12208 (Sydney Trains),13421 (John Holland Rail). 70% of current locomotives comply with these EPLs. • On commencement of operations IMEX should only accept trains that comply with the minimum standard, however it is suggested to go beyond this and only accept trains with the lowest practicable noise level **Air Quality** • Best practice considered consistent with the US EPA Tier 0+ locomotive emission standards for existing locomotives • 'Available best practice emission technology' to be Reasonable Emission Control Technology (RECT) available in Australia for diesel locomotives. • EPA considers the US EPA Tier 2 locomotive emission standard the current minimum best practice emission technology for new locomotives, with Tier 3 conformant locomotive emerging as best practice standard in the coming years. Full submission provided in *Appendix B* of this report.	Throughout this report. Appendix B
Early June 2017	Sarah Thomson	Updated version of this report (Best Practice Review, Arcadis, v008,	N/A

Date	Person Contacted	Comment	Location addressed
	(Unit Head Metropolitan Infrastructure)	dated 2 June 2017) was provided for comment to the EPA.	
16 June 2017	Sarah Thomson (Unit Head Metropolitan Infrastructure)	Comments provided by the EPA in summary include: **Air Quality** • QUBE's commitment to the implementation of available best practice emission technology (i.e. Reasonable Emission Control Technology) for diesel locomotives is unclear. The EPA interprets it to be as presented in Chapter 3.2.1 (p.19) of the final report, where QUBE commits to restricting the access to IMEX terminal for locomotives that exceed stated minimum particle emission standards, with a sunset date of 7 years. • The EPA expects the available best practice technology minimum emission standard for existing locomotives to be **PM below 0.3 g/kWhr**. • The EPA expects the available best practice technology minimum emission standard for new diesel locomotives to be **full harmonisation with US Tier 2 standard**, i.e. include minimum NOx emission limits (in addition to proposed PM below 0.27 g/kWhr). • Proposed implementation of minimum available best practice technology (emission standard) and commitment to periodic review and progressive improvement in locomotive emission performance is unclear. • There are technical errors in the final report, for example with regards to the US emission standards. **Noise and Vibration** The EPA previously advised to the Sydney Intermodal Terminal Alliance: • At the start of operation, we expect site access will only be allowed to locomotives which have been approved by the EPA to operate on the NSW rail	Throughout document Appendix B

Date	Person Contacted	Comment	Location addressed
		network, under condition L2 of environment protection licences number 3142, 12208 and 13421, or in accordance with the former Noise Control Act 1975. This is the minimum standard the EPA will accept. • To meet best practice for noise from locomotives, the alliance needs to only allow locomotives with the lowest practicable noise levels to access the site. The lowest practicable noise levels will need to be re-assessed over time to maintain best practice over the life of the project. The EPA is concerned that the updated Best Practice Review Report does not present best practice for locomotive noise, or adequately address our previous comments. Full submission provided in *Appendix B* of this report.	
11 July 2017	Sarah Thomson (Unit Head Metropolitan Infrastructure)	EPA Table of Responses provided to EPA, no report submitted, table only.	N/A
21 July 2017	Sarah Thomson (Unit Head Metropolitan Infrastructure)	Comments provided by the EPA in summary include: **Air Quality** • Agreement on the identified sunset clause for the establishment of standards for in service locomotives • Requested an additional commitment be included in relation to when overhauled locomotives would need to meet the established standard. • Agreement on the identified sunset clause for the establishment of standards for new locomotives • Requested an additional commitment be included in relation to ordering of new locomotives to need to meet the established and future standard. **Noise and Vibration** • No comment. **General**	Sections 3.2.1 and 4.2.3 Appendix B

Date	Person Contacted	Comment	Location addressed
		• Requested periodic review of best practice annually. Full submission provided in *Appendix B* of this report.	
7 September 2017	Sarah Thomson (Unit Head Metropolitan Infrastructure)	Comments provided by the EPA in summary include: Pointing out an error on p.19 of the report (last paragraph) that states "These tests also showed an increase in overall fuel consumption and increase in CO2 emissions" (and the next sentence) as incorrect. This sentence has been removed from the report.	Section 2.1.1.
13 September 2017	EPA (contact unspecified)	Comments provided by the EPA in a letter prepared by DP&E which indicated approval of this document subject to update of USA EPA Tier 4 emissions standards.	Section 2.1.1

1.3.3 RISSB

A summary of the discussions undertaken with RISSB is provided in Table 1-3.

Table 1-3 Summary of Correspondence with the RISSB

Date	Person Contacted	Summary of Discussion
1 June 2017	General Enquiry (Canberra Office)	Arcadis called RISSB with regard to the DRAFT Australian Standard AS7512 and DRAFT Code of Practice. We were informed that these documents would be published by the end of 2017.
19 June 2017	Alex Howie Code of Practice Project Manager (Brisbane Office)	A summary of the conversation with RISSB is as follows: • The Australian Standard (AS) has been in development for many years, primarily due to being unable to reach a resolution on best practice due to conflicting interests from many stakeholders, namely operators and regulators across different states. • RISSB are in the process of amalgamating the draft AS and the draft code of practice into a new code of practice • The new draft code of practice is due to be published at the end of the financial year 2018 • The NSW EPA will be consulted with as part of the review process • The document will have PM_{10} emissions limits as per what has been included in the current draft documentation (DRAFT Australian Standard AS7512 and DRAFT Code of Practice) • There is unlikely to be NOx, HC or CO emissions targets. However, the focus will be on improved engine efficiency which RISSB argue will result in a reduction of emissions • Noise limits will not be included within the document • RISSB were unable to confirm why there was a difference between what is proposed in Australia for best practice (i.e. what is to be included within the Code of Practice) and the US EPA tiered system.

2 AVAILABLE TECHNOLOGY AND CURRENT INDUSTRY BENCHMARK

A summary of the available best practice technology and best practice benchmarks which have been considered, through consultation with the EPA, to be industry best practice are discussed below.

2.1 Air emissions

There are currently no air emission limits for locomotives in Australia. The most commonly referenced international emissions standard is the US EPA's tiered emissions standards for new locomotives and re-manufactured locomotives. Table 2-1 shows the US-EPA emission standards for key pollutants, expressed in grams per kilowatt hour (g/kW-hr). The US EPA standards were adopted in two regulatory actions. Tier 0-2 standards were adopted in 1997, effective from 2000, and applied to locomotives manufactured from 1973, any time they were manufactured or re-manufactured. The 2008 regulation strengthens Tier 0-2 standards to Tier plus standards and introduces Tier 3-4 standards. Further information on emissions standards is provided in the EIS.

Table 2-1 US-EPA Tiered Standards for line haul locomotives

Tier Classification	PM_{10}	HC	NO_x	CO
Line Haul Emission Standards (g/kW-hr)				
Tier 0	0.80	1.3	13	6.7
Tier 0+	0.30	-	11	-
Tier 1	0.60	0.7	9.9	3.0
Tier 1+	0.30	-	9.9	-
Tier 2	0.27	0.4	7.4	2.0
Tier 2 + and Tier 3	0.13	0.4	7.4	2.0
Tier 4	0.04	0.19	1.7	2.0

ENVIRON (2013) outlined the emission performance of the existing Australian fleet (as of 2012), as shown in Table 2-2, however, did not provide a state by state breakdown, or details of emissions performance by rail operator. A review of the existing fleet shows that as of 2012, US EPA Tier 2 was the best performing emissions standard in Australia and only for a very small proportion of the fleet (0.3%).

Table 2-2 Overview of existing Australian fleet emissions perspective

Current emission performance					
	Pre-Tier 0	**Tier 0**	**Tier 1**	**Tier 2**	**Total**
No. of Locomotives	1497	52	299	6	1854
% of Locomotives	80.7	2.8	16.1	0.3	100%

Modified after ENVIRON (2013)

It is understood that locomotives configured to meet U.S. EPA Tier 3 were due to arrive in Australia mid-2016 (model GT46C-ACe Gen II)[1] and a Euro IIIA compliant new generation locomotive has been introduced by KiwiRail (ENVIRON, 2013).

Also, feedback received from the EPA confirmed that CSR SDA1 locomotives are currently operational and available in Australia (EU Stage IIIA - equivalent of US Tier 2), as are Motive Power MP27 and MP33 locomotives (Tier 3 compliant). The Cummins QSK60 engine available in MP27 locomotives is also available as Tier 4 compliant while the QSK95 locomotive is also available and Tier 4 compliant.

2.1.1 Emission control technology for upgrade / repower options in Australia

Options to improve air emissions from in-service locomotives include fleet upgrades, repowering, fuel efficiency improvements and retrofitting of after-treatment systems, which have been previously described in the EIS.

However, since publication of the EIS, the EPA commissioned a pilot program to investigate the emission reductions achievable through the installation of Tier 0+ emission kits on 90 class and 81 class locomotives with Electomotive Diesel (EMD) 645 and 710 series engines. The emission upgrade kit was developed by EMD and consists of new power assemblies, cylinder heads, oil separator, aftercooler, and injectors (ABMARC, 2015). Following the installation of the Tier 0+ emission kits, significant emission reductions were demonstrated, including an approximate 60% reduction in PM emissions and an approximate 30% to 40% reduction in NOx emissions. Fuel consumption was found to increase, resulting in higher CO_2 emissions. All regulated emissions were below Tier 0+ and in the case of particulate matter (PM), the emission kits achieved better than Tier 2 for one and Tier 3 for the other.

A follow-on study (ABMARC, 2016) tested two GE powered locomotives, a NR class and 93 class, both powered by 7FDL-16 engines and claimed by GE to meet Tier 0+ PM limits without the installation of an upgrade kit. It is noted that the NR class locomotive had recently gone through a major maintenance and upgrade program. The testing showed that both locomotives achieved Tier 3 emission standards for PM but did not meet Tier 0+ for NOx.

These NSW EPA projects demonstrate that both emissions upgrade kits and / or maintenance and upgrade programs can achieve Tier 0+ emissions standards for in-service locomotives and in the case of PM, can achieve Tier 2 to Tier 3 emission standards. In-service locomotives are generally overhauled every 10 years or so and

[1] http://www.epa.nsw.gov.au/resources/air/diesel-locomotive-emissions-technology.pdf

therefore depending on the age of the locomotive and time since last overhaul, engine overhauls can have limited applicability for the commencement of the Project, unless part of an accelerated upgrade program.

2.1.2 Summary of available best practice

Available best practice emission technology for air emissions for in-service locomotives has been identified by the NSW EPA, through consultation and recent testing programs, to be as follows:

- Existing locomotives – US EPA Tier 0+ emissions standards
- New locomotives – US EPA Tier 2 emissions standards[2].

Notwithstanding this, the Freight on Rail Group (FORG), has also identified an industry best practice that is to be implemented for locomotives throughout Australia (refer to Section 4.1 of this report for more information on FORG). FORG has prepared, and issued to the Rail Industry Safety and Standards Board (RISSB), a draft code of practice (CoP) which includes commitments for environmental performance in both existing and new locomotives. The standard is based on diesel particulate matter rather than prescribing certain tiered standards and includes the following:

- Existing locomotives – operate with diesel particulate emissions less than or equal to 0.30 grams per kilowatt hour
- New locomotives – operated with diesel particulate emissions less than or equal to 0.27 grams per kilowatt hour.

A summary of this draft standard, as included within the FORG's submission on Clean Air for NSW Consultation Paper (27 January 2017), is provided in *Appendix B*. This draft standard identifies further details on the classification of existing and new locomotives in consideration of applying emissions standards. As this code of practice has been progressed by a key rail industry group, and is anticipated to be in force in the near future through regulation, it is considered to be a benchmark for best practice, soon to be established.

2.2 Noise emissions

The current best practice in NSW relating to noise from rail locomotives is to select units that comply with noise limits set out in NSW EPA EPL 3142 issued to ARTC, EPL 12208 issued to Sydney Trains and EPL 13421 issued to John Holland Rail. These EPLs establish noise limits on locomotives, when measured at set distances from the noise source, which are presented in Table 2-3.

[2] The EPA notes that US EPA Tier 3 emissions standards are anticipated to be an emerging best practice standard in the coming years.

Table 2-3 EPA locomotive noise limits (EPL 3142 (ARTC) and EPL 12208 (Sydney Trains) and EPL 13421 (John Holland Rail))

Operating Condition	Speed and Location of Measurement	Noise Limit – Microphone height: 1.5 m
Idle with compressor radiator fans and air conditioning operating at maximum load during idle	Stationary 15 m contour	70 dBA Max
All other throttle settings under self-load with compressor radiator fans and air conditioning operating	Stationary 15 m contour	87 dBA Max 95 dBLin Max
All service conditions[3]	As per Australian Standard AS2377-2002 (Acoustics – Methods for the measurement of railbound vehicle noise) except as otherwise approved by the EPA	87 dBA Max 95 dBLin Max

In addition to the requirements above, all of these EPLs include the following limits on tonality and low frequency noise from locomotives:

"All external noise <1000 Hz must be non-tonal. For the purpose of this condition, external noise is non-tonal if the Leq 30s sound pressure in each Z-weighted one-third octave band does not exceed the level of the adjacent band on both sides by:

- *5 dB if the centre frequency of the band containing the tone is above 400 Hz; and,*
- *8 dB if the centre frequency of the band containing the tone is between 160 and 400 Hz, inclusively; and,*
- *15 dB if the centre frequency of the band containing the tone is below 160 Hz."*

It is understood that compliance with these EPL noise limits for locomotives presents a significant challenge, as evidenced by the fact that not all locomotives operating in NSW have been approved through that process. On this basis, the EPL noise limits are regarded as being superior to a "minimum performance standard" and, with regard to the current locomotive technology available in Australia, are considered best practice.

It is noted that these EPLs allow all existing locomotives on the Sydney Trains, ARTC and Country Regional networks to continue operating under licences 3142, 12208 and 13421, but not all have gone through the testing and approval process described by condition L2 of the licences. For clarity, best practice is considered to be locomotives that comply with the noise limits set out in the EPLs and does not include the operation of the clauses which allow existing locomotives not meeting these limits to continue to operate.

[3] Included within 3142 (ARTC), 12208 (Sydney Trains) but not within 13421 (John Holland Rail).

2.2.1 Engine rebuild and upgrades

The NSW EPA commissioned a pilot program to investigate emissions reductions from retrofitting existing locomotives with Tier 0+ emissions kits, outlined in Section 2.1.2, and also investigated the effects of these emissions kits on locomotive noise levels. The study found that the Tier 0+ emissions kit significantly reduced noise levels from a Class 81 locomotive at notch settings[4] 1-8. The study found that the emissions kit had no significant effects on noise levels from a Class 90 locomotive at notch settings 1-8, or on noise levels from either a Class 81 or Class 90 locomotive at idle. Noise levels from different locomotives of the same class can vary, and the noise levels from either locomotive in the study, compared to other locomotives of the same class, are unknown.

The Tier 0+ emissions kits involved replacing the power assemblies, cylinder heads, oil separators, aftercoolers, and injectors in the locomotives. The study identified no significant feasibility issues with the installation of the emissions kits, and therefore, this technology is understood to be feasible, however, the results do not currently identify considerable benefits for the reduction of noise emissions.

The availability of these technologies within the industry would be determined as part of the review recommended in Section 2.1.

2.2.2 Emissions after treatment

On some locomotives within the industry fleet, it is possible to modify the exhaust system to reduce noise levels, particularly low frequency noise on older locomotives. The feasibility and effectiveness of such measures is different for each locomotive class, and is a function of the size, design and tuning of the existing exhaust system, and the available space in which to fit a modified exhaust system.

The availability of these technologies within the industry would be determined as part of the review recommended in Section 3.

2.2.3 Fuel efficiencies

Shutting down stationary locomotives would reduce overall noise levels, compared to leaving locomotives idling for extended periods of time. However, such a measure would be unlikely to reduce typical worst-case operational noise levels, as these occur when the locomotives are in transit. Any locomotive idle reduction measures would require careful consideration of safety and technical constraints of the locomotives and other rolling stock.

In addition to the above, encouraging drivers to operate locomotives at the lowest possible engine notch settings, subject to other operating constraints, would reduce noise emissions compared to operating locomotives at significantly higher notch settings.

The availability of these technologies within the industry and the ability to conduct driver education programs would be determined as part of the review recommended in Section 3.

[4] Settings which allow the locomotive driver to change the power delivered by the engine.

2.2.4 Summary of available best practice

The EPA, during consultation, indicated that the minimum standard for noise controls for in-service locomotives in NSW is based on compliance with EPLs No. 3142 (ARTC), 12208 (Sydney Trains), 13421 (John Holland Rail). Notwithstanding this, it is evident that only approximately 70% of locomotives substantially (not completely) comply with this standard. It is understood that compliance with these EPLs presented a significant challenge, as evidenced by the fact that not all locomotives operating in NSW have been approved through that process. On this basis, the EPL noise limits are regarded as being superior to a “minimum performance standard” and, with regard to the current locomotive technology available in Australia, are considered best practice.

In conclusion, the current best practice for noise is considered to be consistent with Table 2-3 (above) and other relevant noise controls within these EPLs.

3 PROJECT COMMITMENT TO ACHIEVE AVAILABLE BEST PRACTICE

SIMTA has considered the implementation of best practice for a number of years through both the MPE Concept Plan Approval (MP 10_0193) and, more recently the MPE Stage 1 Approval (SSD 14-6766).

SIMTA understands that best practice is an on-going process and will progressively consider the opportunity for the implementation of certain aspects of best practice based on their benefits in achieving noise and air emissions standards.

This section provides an outline of SIMTA's commitment to best practice for port shuttle locomotives for the MPE Stage 1 Project.

3.1 Justification of the technology proposed

Condition No. G6 (a) requires justification of the technology proposed for port shuttle locomotives intended to use the MPE Stage 1 Project.

The IMT Facility to be developed for the MPE Stage 1 Project is to be operated by SIMTA. SIMTA has national experience in logistics delivery, property management, and a strong commitment to stakeholder engagement.

SIMTA is required and committed to operate the MPE Stage 1 Project as a non-discriminatory open access terminal. That means the IMEX terminal could be accessed by any rail operator within the existing fleet of port shuttle locomotives used by the industry. Therefore, while SIMTA cannot directly influence the technology used by the existing fleet, they can impose reasonable and feasible performance benchmarks for noise and air emissions for port shuttle locomotives that enter the IMEX terminal. It is SIMTA's intention to continuously improve, through benchmarking, the environmental performance of port shuttle locomotives which use the IMEX terminal. This continuous improvement will be based on industry benchmarking to ensure that both a non-discriminatory access arrangement and best practice can be achieved. The benchmarking process will provide reasonable time for the rail operator to ensure that their fleet intended to use the IMEX terminal meet the imposed standard that will be set by SIMTA as the minimum benchmark, from a published date.

As discussed above, a number of technologies are currently in use for both retrofitting existing locomotives and new locomotives and to improve their emissions performance, i.e. reduce emissions. This technology is coupled with management practices such as anti-idle policies which further contribute to minimising both noise and air emissions. The existing technology used in port shuttle locomotives is of importance, however, it is the final emissions standard that is achieved which ultimately provides the benefit and therefore is considered the industry benchmark for best practice.

In the preparation of the EIS for the MPE Stage 1 Project, SIMTA considered a number of best practice measures for port shuttle locomotives using the IMEX terminal. The implementation of these best practice measures was considered on the basis of the definition of best practice, namely:

- Environmental risk – the impacts posed by the MPE Stage 1 Project and level of compliance with relevant noise and air criteria
- Reasonable and feasible based on industry fleet – consideration of the best practice technologies which have been installed throughout Australia, the nature of the development, to provide a non-discriminatory access terminal.

Based on the environmental impacts posed by the MPE Stage 1 Project and also the benchmark set by industry standard, no specific mitigation measures were considered required for port shuttle locomotives based on the anticipated environmental impact of the operations. Notwithstanding this, SIMTA is committed to implement a best practice process to continue to lift the minimum standard of port shuttle locomotives using the IMEX terminal. The process however cannot be too rapid or too onerous to prevent the modal shift from road freight to rail, and will need to commence at a reasonable level taking into consideration the existing anticipated locomotive fleet that may use the IMEX terminal for port shuttle operations. The monitoring of this fleet will establish suitable benchmarks (from a noise and air perspective) for available best practice to drive the continued improvement of the minimum level of port shuttle locomotives using the facility. The establishment of a reasonable initial benchmark is critical to not act as a disincentive to modal shift, but also ensure that the best practice outcomes can be achieved. As outlined in the recent Clean Energy Finance Corporation announcement (14 July 2017) the Moorebank Precinct (MPE and MPW Projects) include a modal shift from road tto rail and will result in a number of significant benefits, including:

- Reduction in congestion and deliver net annual carbon emissions savings equivalent to removing 11,000 vehicles from the road for a full year or burning 25,000 tonnes of coal
- A positive impact on regional air quality, including a net reduction in emissions for NOx and PM, and annual greenhouse gas saving of 73,000 tCO_2e.
- Reduction in truck vehicle kilometres travelled of approximately 90 million kilometres per annum

The adoption of emissions standards that are too stringent, or implemented over a short time period could act as a disincentive to this modal shift and not achieve the significant benefits to regional air quality, noise emissions and traffic improvement that would otherwise occur.

Overall, on the basis of providing a non-discriminatory access terminal SIMTA will commit to a minimum benchmark, which is considered current industry best standard. This benchmark will be implemented based on a specified timeframe which is consistent with industry standard. A review of the existing operational fleet will also be undertaken to further understand the level of compliance with these benchmarks and also to set goals for the on-going review of best practice for the MPE Stage 1 Proposal, IMT.

3.2 Implementation of available best practice

Based on both consultation with the EPA and a review of industry based information, available best practice for in-service locomotives has been identified in Section 2.1.2 (air) and Section 2.2.4 (noise) of this report. SIMTA understands that best practice is an evolving process however is committed to imposing reasonable and feasible performance benchmarks for noise and air emissions for port shuttle locomotives that enter the MPE Stage 1, IMEX terminal. A summary of these are provide below.

3.2.1 Air emissions

Industry best standard is anticipated to be established by the FORG, through the draft code of practice. It is understood through consultation undertaken with Rail Industry Safety and Standards Boards (RISSB) (telephone conversation on 1 June 2017 and 19 June 2017) that this code of practice is likely to be published in late 2017. This code, once published, will establish a nation-wide best practice for locomotive operations. This code, albeit not specified as yet, will identify timeframes requirements for the upgrade of existing locomotives and purchasing of new locomotives to meet or

exceed the standard. SIMTA considers this code of practice appropriate in that this is to be a regulated best practice measure that is to be implemented throughout Australia, thereby ensuring that all rail operators on all operational rail lines meet these standards. This draft code of practice and the standard committed to by SIMTA also meets the objective of ensuring that the IMEX terminal remains a non-discriminatory open access terminal. The draft code of practice and the standard committed to by SIMTA is consistent with the particulate matter emissions standards of US EPA Tier 0+ for existing locomotives and Tier 2 for new locomotives.

This code of practice has yet to be published and therefore there is a risk that this may not become regulation. As a result SIMTA has committed to a timeframe, should this code of practice not be published promptly, for compliance with the anticipated requirements of the code of practice. SIMTA, at the request of EPA has also committed to periodic improvements of the locomotive fleet throughout operation of the IMEX terminal.

In summary, SIMTA commits to restricting port shuttle locomotives, that do not meet the following air emissions standards from entering the MPE Stage 1, IMEX terminal:

Locomotive type	***Standard***	***Periodic improvements***	***Ultimate outcome***
Existing locomotives	*operate with diesel particulate emissions less than 0.30 grams per kilowatt hour*	*Any overhauls of existing locomotives after the commencement of operations of the IMEX terminal (anticipated to be 1 January 2019) would need to comply*	*All existing locomotives to comply with 7 years of operation of the IMEX terminal*
New locomotives	*operated with diesel particulate emissions less than 0.27 and NOx emissions of less than 7.37 grams per kilowatt hour.*	*Any new locomotives ordered after the commencement of operations of the IMEX terminal (anticipated to be 1 January 2019) would need to comply*	*N/A*
	operated with diesel particulate emissions less than 0.13 and NOx emissions of less than 7.37 grams per kilowatt hour.	*Any new locomotives ordered after 5 years of the commencement of operations of the IMEX terminal (anticipated to be 1 January 2024) would need to comply*	*N/A*

The above measures would be adopted until such time as an industry standard or guideline (endorsed by NSW regulators) has been established, at which time the relevant standard or guideline including associated timeframes would apply.

3.2.2 Noise emissions

It is understood that an EPL, under the *Protection of the Environment Operations Act 1997* (POEO Act) will be required for the operation of the Rail link as part of the MPE Stage 1 Proposal. Schedule 1, clause 33 of the POEO Act indicates that 'rail systems activities', which includes the Rail link, require an EPL for operations. It is noted that the IMT (IMEX terminal) component of the MPE Stage 1 does not trigger the requirement of an EPL, however as serviced by the Rail link could only accept locomotives that comply with the EPL.

It is anticipated, as is the case for other operational rail lines throughout NSW, that any EPL for the Rail link will be consistent with the requirements of the EPLs for ARTC (EPL 3142), Sydney Trains (EPL 12208) and John Holland Rail (EPL 13421). As identified through the investigations within this report, best practice noise controls for in-service locomotives is compliance with these EPLs. As a result, SIMTA proposes to restrict locomotives that do not meet the noise limit requirements of EPLs 3142 and 12208, from entering the MPE Stage 1, IMEX terminal. As the EPL 13421 does not include noise limits for 'all service conditions' this is not considered as suitable.

In summary, SIMTA commits to restricting port shuttle locomotives, that do not meet the noise limit requirements of EPLs 3142 and 12208, from entering the MPE Stage 1, IMEX terminal.

The timeframe for the implementation of this restriction will be from day one of operation of the MPE Stage 1, IMEX terminal.

3.2.3 Fleet review

It was not possible to complete a detailed review of the fleet for the timing of this report as the specific locomotive and operators intending to use the IMEX terminal for port shuttle operations have not yet been identified. In addition to the above-mentioned air and noise emissions standards, SIMTA commits to a detailed review of the existing fleet seeking initial access to the terminal prior to operations. This review will develop a matrix for the fleet that intend to use the IMEX terminal, and compare this fleet to the wider locomotive fleet to identify the implementation of best practice performance and a road map for ongoing review and improvement, in addition to the commitments identified above.

This information will be gathered based on discussions with rail providers, including the Freight on Rail Group and the Freight Rail Operators Environmental Policy Group.

It is anticipated that the review will document the following details for port shuttle locomotives:

- Locomotive Class
- Year manufactured
- Year predicted to retire
- Year of next scheduled overhaul
- Manufacturer
- Model
- Engine
- Traction supplier
- Current emissions performance

- Requirement/demonstration of compliance with NSW Locomotive Noise Limits (ARTC/Sydney Trains EPL).

SIMTA will work with the rail operators using, and intending to use, the IMEX terminal to achieve available best practice technology.

4 IMPLEMENTATION

In accordance with condition of approval no. G6(a), the port shuttle operations must use locomotives that incorporate available best practice technologies during operation of the MPE Stage 1 Project (SSD 14-6766). The timing for this implementation will be based on those established for the operation of port shuttle locomotives for the MPE Stage 1 Project as identified in Section 3 above. This section provides a summary of the key methods of implementation that are considered for achieving noise and air benchmarks identified in Section 3.

4.1 Industry understanding

4.1.1 Consultation and working group involvement

SIMTA will continue to consult with the EPA, TfNSW and ARTC regarding existing and anticipated best practice technologies. This consultation will provide a forum for SIMTA and agencies to discuss the suitability of, and timeframes for the implementation of available best practice measures.

SIMTA will also research the opportunity to participate in a larger working group comprised of agencies and industry leaders. The type of group that considered, as suggested by the EPA, is further involvement in the FORG (https://www.artc.com.au/projects/freight-on-rail-group/) and the Freight Rail Operators Environmental Policy Group.

4.2 Site-based

4.2.1 Operational Environmental Management Plan

It is envisaged that the implementation of available best practice will be included within the Operational Environmental Management Plan (OEMP) for the Rail link to be developed and submitted to the Secretary for approval a minimum of one month prior to the commencement of operation in accordance with condition of approval No. F4 of the MPE Stage 1 Approval. The benchmarks for available best practice will be reiterated in the OEMP (as identified in Section 3.2 of this report). Timeframes for review of these best practice benchmarks will also be identified within the OEMP.

4.2.2 Roles and responsibilities

Operational control of the entrance to the MPE Stage 1 site will reside with SIMTA. As discussed above, SIMTA will enforce the restrictions on in service port shuttle locomotives, entering the MPE Stage 1 IMT.

4.2.3 Progress review

SIMTA will review progress against the objectives and targets of available best practice on an annual basis (for a notional period of up to 7 years from operation) to ensure that available best practice benchmarks are current, relevant and achievable. New best practice benchmarks will be considered during this review to ensure that the latest available technology is considered for implementation on the MPE Stage 1 Project.

5 CONCLUSION

This report has been prepared to address condition of approval No. G6(a) for the MPE Stage 1 Project (SSD 14-6766). This report has been prepared based on consultation with TfNSW, EPA and ARTC.

SIMTA is required to operate the MPE Stage 1 Project as a non-discriminatory access terminal. This means the IMEX terminal can be accessed by any rail operator within the existing fleet of port shuttle locomotives used by the industry. On this basis, while SIMTA cannot directly control the technology used by the existing fleet, they can influence it through imposition of minimum performance expectations for noise and air emissions for port shuttle locomotives that enter the IMEX terminal.

This report summarises the international and Australian emission standards and best practice technology available to reduce noise and air emissions from locomotives. In particular, the following available technologies were investigated:

- New locomotives
- Engine re-build or upgrades
- Emissions after treatment
- Fuel efficiencies.

As a result of consultation with the EPA and an understanding of industry best practice SIMTA has established benchmarks which will be implemented for the MPE Stage 1 Project. The best practice benchmarks to be achieved are as follows:

Air emissions

In summary, SIMTA would restrict port shuttle locomotives, that do not meet the following air emissions standards from entering the MPE Stage 1, IMEX terminal:

Locomotive type	Standard	Periodic improvements	Ultimate outcome
Existing locomotives	operate with diesel particulate emissions less than 0.30 grams per kilowatt hour	Any overhauls of existing locomotives after the commencement of operations of the IMEX terminal (anticipated to be 1 January 2019) would need to comply	All existing locomotives to comply with 7 years of operation of the IMEX terminal
New locomotives	operated with diesel particulate emissions less than 0.27 and NOx emissions of less than 7.37 grams per kilowatt hour.	Any new locomotives ordered after the commencement of operations of the IMEX terminal (anticipated to be 1 January 2019) would need to comply	N/A
	operated with diesel particulate emissions	Any new locomotives ordered after 5 years of the commencement of operations of the	N/A

Locomotive type	Standard	Periodic improvements	Ultimate outcome
	less than 0.13 and NOx emissions of less than 7.37 grams per kilowatt hour.	IMEX terminal (anticipated to be 1 January 2024) would need to comply	

The above measures would be adopted until such time as an industry standard or guideline has been established, at which time the relevant standard or guideline including associated timeframes would apply.

Noise emissions:

SIMTA would restricting port shuttle locomotives, that do not meet the noise requirements of EPLs 3142 and 12208, from entering the MPE Stage 1, IMEX terminal.

The timeframe for implementation will be from day one of operation of the MPE Stage 1, IMEX terminal.

SIMTA also proposes to further investigate available best practice technologies to ensure that available best practice benchmarks are current, relevant and achievable. This review will be undertaken in the first year of operations of the MPE Stage 1, IMEX terminal. Train driver education will also be undertaken from first year of operation of the MPE Stage 1, IMEX terminal.

This report outlines the available best practice technologies and justifies the consideration of these technologies in the context of the operation of the MPE Stage 1 Project in establishing a suitable minimum standard to enable best practice technology for port shuttle operations within this standard preventing the ability for the rail industry to compete with road freight to achieve modal shift.

REFERENCES

Arcadis, 2016, *Environmental Impact Statement MPW Stage 2*

Arcadis, 2015, *Environmental Impact Statement MPE Stage 1*

Arcadis, 2015, *Response to Submissions MPE Stage 1*

Bektas, T. and Crainic, T.G. (2007). A Brief Overview of Intermodal Transportation. Interuniversity Research Centre on Enterprise Network, Logistics and Transportation.

CARB (2009). Technical Options to Achieve Additional Emissions and Risk Reductions from California Locomotives and Railyards, California ARB, 2009.

Corry, P. and Kozan, E. (2006). A decision support system for Intermodal Train Planning. Operations Research Group Queensland university of Technology. Proceedings of the Second International Logistics System Conference.

ENVIRON (2013). Locomotive Emissions Project: Potential Measures to Reduce Emissions from New and In-service Locomotives in NSW and Australia, prepared for NSW EPA by ENVIRON Australian Pty Ltd, March 2013.

EPA Victoria (2013) Demonstrating Best Practice, Publication number 1517, February 2013

EU (2004). Directive 2004/26/EC of the European Parliament and of the Council – Official Journal of the European Union, April 2004.

Fuel Standard (Automotive Diesel) Determination 2001, incorporating the Fuel Standard (Automotive Diesel) Amendment Determination 2009 (No. 1)

Submission in response to: Clean Air for NSW Consultation Paper (27 January 2017) prepared by the Freight on Rail Group

Morais, P. Lord, E. (2006) Terminal Appointment System Study, prepared for Transport Canada Transport Development Centre

Non-Road Diesel Machinery Directive

NSW EPA (2014a). Diesel emissions and their management in NSW. Background paper for EPA diesel emissions workshop 13 June 2014.

Protection of the Environment Operations (POEO) *Act 1997*.

US EPA (2009). Guidance for quantifying and using long duration switchyard locomotive idling emission reductions in state implementation plans. US Environmental Protection Agency. EPA-420-B-09-037.

Victoria State Environment Protection Policy (SEPP) (Air Quality Management)

APPENDIX A: TFNSW CONSULTATION

Consultation Log – TfNSW

TfNSW Comments Response Table

SSD 6766 Condition G6(a)

Approval holder: Sydney Intermodal Terminal Alliance comprising: Qube Holdings Limited and Aurizon Holdings Limited

TfNSW Comments Dated: 27 June 2017

Name of document under review: Best Practice Review Revision 008, Moorebank Precinct East Stage 1

Review Comments:

TfNSW Comment	SIMTA Response	Section in Document Amended
A national standard on air emissions including implementation timeframes would apply to all locomotives immediately that a national standard is published.	It is agreed that once a standard or code of practice has been published, that this would apply to locomotives utilising the IMEX terminal including timelines for implementation. It is assumed that a timeline for implementation will be included in the standard /code of practice or the guidance that may accompany it. In the absence of this standard being available, SIMTA has established its own timelines for the implementation of best practice.	No amendment considered necessary. Section 3.2.1.
If a national standard is not achieved within seven years, then the proposed standards on air emissions outlined by the proponent in version 8 at page 23 and elsewhere in the document relating to emissions are applicable	Accepted as consistent with the position put forward within this report.	No amendment considered necessary. Section 3.2.1.
The proponent should undertake a review of the locomotives most likely to have poorer emissions performance within two years of the commencement of operations. The proponent should then develop a program of reducing the emissions on these worst performing vehicles first. Both parts should be subject of TfNSW and/or EPA review.	Section 3.2.3 of the BPR outlines SIMTAs commitment to undertake a fleet review prior to the commencement of operations. This review will develop a matrix for the fleet that intend to use the IMEX terminal, and compare this fleet to the wider locomotive fleet to identify the implementation of best practice performance and a road map for ongoing review and improvement, in addition to the commitments identified above. Port shuttle locomotives with poor emissions performance will be identified within this review. The program of reducing the emissions from poorly performing port shuttle locomotives would be consistent with the	No amendment considered necessary. Sections 3.2.1 and 4.2.3.

TfNSW Comment	SIMTA Response	Section in Document Amended
	commitments to upgrade the existing fleet as detailed within this report. Best practice will also be reviewed annually with additional measures implemented as necessary based on industry standard.	

APPENDIX B: EPA CONSULTATION

Consultation Log – EPA

EPA Comments Response Table

SSD 6766 Condition G6(a)

Approval holder: Sydney Intermodal Terminal Alliance comprising: Qube Holdings Limited and Aurizon Holdings Limited

EPA Comments Dated: 21 July 2017

Name of document under review: EPA Table of Responses dated 11 July 2017 – no report provided

Review Comments:

EPA Comment	SIMTA Response	Section in Document Amended
In-service locomotives requirements:		
• The EPA is satisfied with the proposed best available technology emission requirements for in-service locomotives accessing the MPE terminal to be 0.3 g/kWh for PM (equivalent of US Tier 0+ standard for PM), with a sunset date of 7 years (see section 3.2.1 of the report).	Noted and agreed.	No amendment considered necessary
• The EPA is not satisfied with the MPE requirements for existing locomotives to be linked with the national locomotive emission standard (RISSB) currently proposed by the industry because this standard is only in draft form and the implementation dates and mechanisms have not been determined or agreed. Since SIMTA commits to implement the best available technology emission requirements irrelevant of RISSB standard (see section 3.2.1), the implementation mechanism should be clearly stated in the SIMTA report. The EPA advises that SIMTA should implements a system in which *any locomotive entering the MPE, that has been overhauled after e.g. 1 January 2018, is required to meet a PM limits of 0.3 g/kWh (or below) in order to continue to be granted access to the MPE terminal and rail link.*	Agreed and report updated accordingly.	Section 3.2.1
New locomotive requirements:		
• The EPA is not satisfied and is unclear why, in its response, SIMTA claims "no role	This standard is generally agreed and report has been updated accordingly.	Section 3.2.1

EPA Comment	SIMTA Response	Section in Document Amended
or authority to enforce standards for new locomotives" while it has the authority and proposes to enforce requirements for in-service locomotives. The EPA has previously advised that, to meet the best available technology practice emission requirements, SIMTA should require that new locomotives must meet PM and NOx emission limits that are equivalent of the US Tier 2 emission standards for diesel locomotives. This means that SIMTA should implement a system (similar to in-service locomotives) where *any new locomotive entering the MPE, that has been ordered after e.g. 1 July 2018 or delivered to rail operator from e.g. 1 July 2019, is required to meet a PM limits of 0.27 g/kWh (or below) and NOx limits of 7.37 g/kWh (or below) in order to be granted access to the MPE terminal and rail link*		
• The EPA also advises that SIMTA requirements for new locomotives should be reviewed annually and become more stringent to require that *any new locomotive that has been delivered to rail operator from e.g. 1 Jan 2022 should be required to meet emission limits for PM and NOx that are equivalent of the US Tier 3 emission standard for diesel locomotives.*	This standard is generally agreed and report has been updated accordingly.	Section 3.2.1
Review of requirements:		
• The EPA has not identified any reference in the report that the best available technology practice requirements will be reviewed annually as suggested in the SIMTA's response table. Section 3.1 of the report suggests only that the *benchmarks will be established within the first year of the terminal operation and there will be an on-going review*.	The report has previously included a statement to this effect.	Section 4.2.3

EPA Comments Dated: 16 June 2017

Name of document under review: Best Practice Review Revision 008, Moorebank Precinct East Stage 1

Review Comments:

Reference	EPA Comment	SIMTA Response	Section in Document Amended
	QUBE's commitment to the implementation of available best practice emission technology (i.e. Reasonable Emission Control Technology) for diesel locomotives is unclear. The EPA interprets it to be as presented in Chapter 3.2.1 (p.19) of the final report, where QUBE commits to restricting the access to IMEX terminal for locomotives that exceed stated minimum particle emission standards, with a sunset date of 7 years.	Section 3.2.1 of the report has been updated accordingly.	Section 3.2.1 and Section 5
	The EPA expects the available best practice technology minimum emission standard for existing locomotives to be **PM below 0.3 g/kWhr**.	The commitment by SIMTA in relation to existing locomotives has been amended to be PM_{10} less than 0.3g/kWhr.	Section 3.2.1 and Section 5
	The EPA expects the available best practice technology minimum emission standard for new diesel locomotives to be full harmonisation with **US Tier 2 standard**, i.e. include minimum NOx emission limits (in addition to proposed PM below 0.27 g/kWhr).	Section 3.2.1 of the report has been updated accordingly.	Section 3.2.1 and Section 5
	Proposed implementation of minimum available best practice technology (emission standard) and commitment to periodic review and progressive improvement in locomotive emission performance is unclear	Section 3.2.3 states that *"SIMTA commits to a detailed review of the existing fleet seeking initial access to the terminal prior to operations."* Further, in section 4.2.3 (progress review), SIMTA provide a clear commitment to periodic reviews of best practice and consideration / implementation of best practice at that point in time. This is every year for a period of seven years from operation.	No amendment considered necessary
	There are technical errors in the final report, for example with regards to the US emission standards	The USEPA emission standards presented in Table 2-1 of the Best Practice Review are consistent with the emission	Table 2-1 has been amended

Reference	EPA Comment	SIMTA Response	Section in Document Amended
		standard factors for Line Haul Locomotives listed in *Technical Highlights: Emission Factors for Locomotives* (US-EPA 2009) required to meet the 2008 USEPA emission standards. These standards rates listed in USEPA 2009 standards differ from the *2008 USEPA standards memo* for locos and *NSW EPA Diesel Locomotives Upgrade Project* (2016) report. The Table 2-1 has been updated accordingly.	
	At the start of operation, we expect site access will only be allowed to locomotives which have been approved by the EPA to operate on the NSW rail network, under condition L2 of environment protection licences number 3142, 12208 and 13421, or in accordance with the former Noise Control Act 1975. This is the minimum standard the EPA will accept. To meet best practice for noise from locomotives, the alliance needs to only allow locomotives with the lowest practicable noise levels to access the site. The lowest practicable noise levels will need to be re-assessed over time to maintain best practice over the life of the project. All existing locomotives on the Sydney Trains, ARTC and Country Regional networks are allowed to continue operating under licences 3142, 12208 and 13421, but not all have gone through the testing and approval process described by condition L2 of the licences. These locomotives allowed to operate untested on the NSW networks include known problem locomotives and locomotives with unknown noise performance, because they were in use when noise testing of locomotives began, and the requirements did not apply retrospectively. Compliance with licences 3142, 12208 and 13421 does not mean best practice for	The intent of the commitment made by SIMTA for noise emissions is consistent with the EPAs comment regarding the noise levels in the existing EPLs. This has been clarified in the document.	Section 2.2

Reference	EPA Comment	SIMTA Response	Section in Document Amended
	locomotive noise, because the licences allow locomotives with unknown, possibly poor, noise performance to be used if they operated in NSW before noise testing was required. The EPA wishes to reiterate that terminal access should only be given to locomotives that have been approved following the testing in condition L2 of the licences.		

EPA Comments Dated: 02 May 2017

Name of document under review: Complimentary Best Practice Review Revision 005 dated 11/04/17, Moorebank Precinct East Stage 1

Review Comments:

Document Reference	EPA Comment	SIMTA Response	Section in Document Amended
Noise			
General	The EPA's former advice to the Department of Planning and Environment (DPE) on the environmental impact statement for the project included recommendations that the project be required to use locomotives with the lowest practicable noise levels on trains to and from Port Botany. The EPA summarised the expectations for noise as follows: • Best practice means using locomotives with the lowest practicable noise levels; • The minimum performance standard is locomotives to be approved for use in NSW through the process in Condition L2 of environment protection licenses numbers 3142, 12208 and 13421. • The EPA notes that approximately 70% of the locomotive fleet has been approved through that process.	It is understood that compliance with the locomotive noise limits stipulated in Condition L2 of environment protection licences (EPL) numbers 3142, 12208 and 13421 presented a significant challenge, as evidenced by the fact that not all locomotives operating in NSW have been approved through that process. On this basis, the EPL noise limits are regarded as being superior to a "minimum performance standard" and, with regard to the current locomotive technology available in Australia, are considered best practice. Notwithstanding this, Section 3.2.2 of this report has been updated accordingly to meet the noise limit requirements of the ARTC and Sydney Trains EPLs.	Sections 2.2 and 3.2.
General	Operation Commencement	Best practice benchmarks have	Section 3.2

Document Reference	EPA Comment	SIMTA Response	Section in Document Amended
	The EPA expects that on commencement of operation on the site, site access will only be granted to locomotives which meet the minimum standard of having been approved by the EPA to operate on the NSW rail network.	been established and committed to for the Project. Port shuttle locomotives that do not meet the noise limit requirements of EPLs 3142 and 12208, will be restricted from entering the MPE Stage 1, IMEX terminal from day 1 of operation.	
General	Noise Best Practice In order to meet best practice for noise from locomotives, the EPA recommends Sydney Intermodal Terminal Alliance go beyond this and only allow locomotives with the lowest practicable noise levels to access the site. The lowest practicable noise levels will need to be reassessed over time to maintain best practice over the life of the project.	As outlined above, compliance with the EPL noise limits for locomotives is considered best practice. It is noted that, over time, locomotive engine technology will potentially provide reduced noise emissions from locomotives, and this will be reviewed in the future, particularly where locomotives are planned to be replaced and/or refurbished.	Section 3.2
General	Locomotive Retrofits The report identified that exhaust treatments can reduce locomotive noise levels, but also that exhaust retrofits were not feasible or reasonable for the “existing fleet". The feasibility and reasonableness of exhaust upgrades and other retrofits to reduce noise level will change depending on the locomotive being considered, and should be assessed for each model type of locomotive which may access the site.	When the fleet of locomotives to be used for the proposal has been identified, they will be reviewed on a “class-by-class” basis to identify any feasible retrofits that will deliver reduced noise emissions set by this report.	Section 3.2

Document Reference	EPA Comment	SIMTA Response	Section in Document Amended
Air Assessment			
Background			
General	In consultation with QUBE on 21/03/2017, the EPA advised that it considers the available best practice emission technology for existing diesel locomotives to be, as a minimum achieving particulate emissions consistent with the US EPA Tier 0+ locomotive emission standards	Noted, consultation section of this report has been updated to reflect this comment. Air emissions commitments have also been updated accordingly.	Section 1.3.2 and Section 3.2.
General	The EPA understands “available best practice emission technology” to be a Reasonable Emission Control Technology (RECT) available in Australia for diesel locomotives. It is assumed that RECT will be used along other components of the Locomotive Best Practice management as proposed in SIMTA Intermodal Terminal Facility – Stage 1 EIS in May 2015.	Noted, report updated to reflect this information.	Sections 1.2 and 2.1.1
General	The available best practice emission technology for in-service diesel locomotive emissions has been identified in the course of evidence based studies conducted by the EPA jointly with the rail industry over the last two years (http://www.epa.nsw.gov.au/esdsmoky/redlocoemis.htm)	Noted, report updated to reflect this information.	Section 2
General	Independently, the rail industry has been progressing work on establishing the industry benchmark and available best practice emission technology for diesel locomotive emissions since 2015 through the Freight on Rail Group (FORG) (QUBE is a member) and the Freight Rail Operators Environmental Policy Group [that includes all key locomotive operators and that is endorsed and supported by Australasian Railway Association (ARA) and Rail Industry Safety and Standards Boards (RISSB)]. This work is well advanced.	Noted, report updated to reflect this information.	Section 3.2 and 4.1.1
General	The available best practice emission technology for new locomotives in the context of Moorebank Precinct East (MPE) has not been suggested in the consultations because very few new locomotives are expected to be purchased by locomotive operators in the next few years. However, the EPA considers the US EPA Tier 2 locomotive emission standard the current minimum best practice emission technology for new locomotives, with Tier 3 conformant locomotive emerging as best practice standard in the coming years.	Noted, report updated to reflect this information. Air emissions commitments have also been updated accordingly.	Section 2.1

Document Reference	EPA Comment	SIMTA Response	Section in Document Amended
General	The additional rail freight operations generated by the Moorebank intermodal terminal will occur along a rail corridor directly through the built Sydney urban environment (the Sydney Metropolitan Freight Network and the Southern Sydney Freight Line), and hence lead to direct population exposure to the additional resultant emissions. The EPA considers that best practice should be prevention of exposure and hence best available technology should be implemented from the start of operations.	The MPE Stage 1 Project seeks approval only for the construction and operation of the Rail link. The use of the SSFL is subject to separate approvals and therefore cannot be regulated as part of the MPE Stage 1 Approval. The MPE Stage 1 Approval only has the ability to regulate the IMT and Rail link operations, as is the approach undertaken for this Best Practice Review. Notwithstanding this, other considerations relating to management of air emissions have been integrated into this report, as identified above.	Sections 2 and 3
EPA Report Response. The report:			
General	misrepresents the EPA's position in relation to what the EPA considers the available best practice emission technology for existing diesel locomotives to be, as a minimum	Noted, report updated to reflect this information.	Section 1.3 and Section 2
General	does not identify the available best practice emission technology for diesel locomotives in NSW	Noted, report updated to reflect available best practice.	Section 2
General	does not propose or justify the emission technology requirements for the MPE that would meet the available best practice emission technology, as required in the Condition G6(a)	Noted, report updated to reflect this information.	Section 3

Document Reference	EPA Comment	SIMTA Response	Section in Document Amended
General	does not provide any certainty of implementation of any minimum emission performance standard;	Noted, report updated to reflect this information.	Section 3.2
General	outlines only the roadmap that would allow to establish the industry benchmark and available best practice for locomotive emissions during the first year of the MPE operations. The EPA considers it insufficient to meet the objectives of condition of G6(a) and to minimise exposure and pollution impacts from the facility and the port shuttle operation on adjacent communities. (This also does not propose much above what was already proposed in the EIS report dated May 2015).	Noted, report updated to reflect this information.	Section 3.2
General	To meet its objectives, this report should identify the best practice technology for locomotive emissions and propose a roadmap for in-service (and possibly new) locomotives, which will use the MPE and operate the port shuttle, to meet the minimum best practice for locomotive emissions.	Noted, report updated to reflect this information.	Section 3.2
Table 1-2	These discussions were part of communication with the EPA but not sure if they, as such, could be considered 'consultations.'	Section 1.3 of the report has been updated to state that both 'discussions and consultation' has been undertaken with the EPA, to reflect this comment. Note this table has also been updated to identify further consultation comments provided within this table.	Section 1.3 and Table 1-2.
Table 1-2 21 March 2017	This effectively was the only consultation with the EPA on available best practice emission technology for locomotives.	Refer to comment above.	Section 1.3 and Table 1-2.
Page 10	Delete following text: EPA currently uses US Standards as a form of benchmarking with US EPA Tier 0+ being emerging best practice which is currently being tested on other locomotives fleets.	Noted, report updated to reflect this information.	Section 1.3 and Table 1-2.
Page 10	The EPA considers, as a minimum, US Tier 0+ emission standard for particles to be best practice for existing locomotives. Tier 0+ locomotive upgrade kits are available and have been certified for many locomotive	Noted, report updated to reflect this information.	Sections 1.3, 2 and Table 1-2.

Document Reference	EPA Comment	SIMTA Response	Section in Document Amended
	engines commonly used in Australia. The kits have been tested on locomotives operating in NSW.		
Section 2.1	Please see comments on 'available best practice emission technology' provided in the 'general comments.' In short, the EPA understands that 'best practice management for locomotive emissions locomotive' have been provided in SIMTA ITF - Stage 1: EIA. The current report concerns the available best practice technology that corresponds to 'upgrade/repowering existing fleet to best achievable Tier at next overhaul' in the EIS.	Noted, report updated to reflect this information.	Refer to comments in 'General' above.
Section 2.2.2.1	Delete text: in two regulatory actions – Tier 0-2 for remanufactured locomotives and Tier 3-4 for new locomotives.	Noted, report updated to reflect this information.	Section 2.1.
Section 2.2.2.1	Tier 0-2 standards were adopted in 1997, effective from 2000, and applied to locomotives manufactured from 1973, any time they were manufactured or re-manufactured The 2008 regulation strengthens Tier 0-2 standards to Tier plus standards and introduces Tier 3-4 standards.	Noted, report updated to reflect this information.	Section 2.1.
Table 2-2	Delete first row as not-relevant in Australian context.	Noted, report updated to reflect this information.	Section 2.1 and Table 2-1.
Section 2.2.2.2	- should mention CSR SDA1 locomotives operational and available in Australia (EU Stage IIIA - equivalent of US Tier 2) - should also include Motive Power MP27 (Tier 3 compliant) and MP33 locomotives operational and available in Australia. The Cummins QSK60 engine available in MP27 is also available as Tier 4, also QSK95 is available as Tier 4.	Noted, report updated to reflect this information.	Section 2.1.
Section 2.2.2.2 Second paragraph first sentence	Incorrect, both EMD and GE have achieved Tier 4 without after treatment.	Noted, report updated to reflect this information.	Section 2.1.
Section 2.2.2.3	The technology is available and cost-effective.	Noted, report updated to reflect this. Section removed.	N/A

Document Reference	EPA Comment	SIMTA Response	Section in Document Amended
Section 2.2.2.4	Should include diesel oxidation catalysts (DOC). Some locomotive manufacturers (e.g. EMD) supply DOCs for their engines that claim to reduce PM significantly and are relatively low cost.	Note, section on after-treatment devices removed as covered by the EIS BPR and available best practice has been identified as Tier 0+ upgrade kits.	N/A
Section 3	See general comments provided in the e-mail. It is unclear.	Noted, report updated to reflect this information.	Refer to comments in 'General' above.
Section 3.2	Should include info from 2.2.2.3	Noted, report updated to reflect this information.	Section 3
Section 4.2	See general comments provided in the email.	Noted, report updated to reflect this information.	Refer to comments in 'General' above.
Section 4.3	See general comments provided in the e-mail. This is a road map to establish the available best practice emissions technology proposed to be completed in the first year of operation. As such it does not meet the requirements of the condition G6(a).	SIMTA has provided a commitment to industry best practice within this report.	Section 3.2
Section 4.3	It is reasonable and completely feasible to review all rail operators locomotive fleets in NSW. In fact, most loco operators have this information readily available due to work undertaken in the past two years.	Noted, report updated to reflect this information.	Section 3.2
Section 4.3	If it is intended that non-long haul locomotives will be operating the port shuttle (smaller locomotives), it is important that they are included in the inventory because they generally are older and have poorer emissions performance.	Port shuttle locomotives only are to be the subject of the review.	Section 3.2
First paragraph page 21	This sentence is unclear. What best practice standards is this referring to?	Noted, report updated to reflect this information.	Section 3.
Second paragraph page 21	Available best practice technology is not defined in the report so it is unclear what is the goal post that requires a decade to be implemented. This implementation option is defined as more feasible and reasonable but it does not define what is the alternative option that is being compared to.	Available best practice commitments are defined and committed to by SIMTA in this report.	Sections 2 and 3.2

Document Reference	EPA Comment	SIMTA Response	Section in Document Amended
Section 5.2.2	The EPA regards 'considering' of the progressive restrictions as lack of QUBE commitment to improvement of locomotive impacts and community exposure to locomotive emissions.	Available best practice commitments are defined and committed to by SIMTA in this report.	Sections 2 and 3.2
Section 6, para 2, sentence 2	This contradicts statement in 5.2.2 that SIMTA has operational control over what locomotives enter the intermodal terminal.	These sections are considered consistent in that they both identify that SIMTA has the opportunity to restrict entrance to port shuttle locomotives entering the site. No change has been made to this section report.	Section 5
Section 6 (first sentence after bullets)	The EPA does not consider the existing fleet and industry benchmarks to be the available best practice technology.	An alternative approach, based on industry best practice, has been identified within this report.	Sections 2, 3.2 and 5
Section 6 concluding para	See general EPA comments provided via e-mail. This report does not outline available best practice emission technologies and does not justify consideration of these technologies in the context of the operation of the MPE Stage 1 project.	An alternative approach, based on industry best practice, has been identified within this report.	Sections 2, 3.2 and 5

APPENDIX C: FORG AND RISSB PUBLICATIONS

FREIGHT ON RAIL GROUP

Submission in response to:

Clean Air for NSW Consultation Paper

27 January 2017

This document has been prepared by the Freight on Rail Group (the Group). The Group is a rail freight focussed industry group established to engage with Government and key stakeholders on major public policy issues. It consists of the seven major rail freight businesses in Australia:

Aurizon
Aurizon has rail and road-based freight and infrastructure operations across Australia. Aurizon operates above-rail freight services from Cairns through to Perth, and manages the Central Queensland Coal Network made up of approximately 2,670km of heavy haul rail infrastructure.

Australian Rail Track Corporation (ARTC)
ARTC has responsibility for the management of over 8,500 route kilometres of standard gauge interstate track across Australia. ARTC also manages the Hunter Valley coal rail network, and other regional rail links.

Brookfield Rail
Brookfield Rail manages and operates a 5,500 kilometre open access, multi-user rail freight network extending throughout the southern half of Western Australia, providing access for intermodal, iron ore, grain, alumina and various other bulk commodities.

Genesee & Wyoming
G&W is a global vertically integrated rail freight company with a large Australian presence in SA, NT, Victoria and NSW. G&W owns nearly 5,000 kilometres of track in SA and NT, including the 2,200-km Tarcoola-to-Darwin railway.

Pacific National
Pacific National is one of the largest providers of rail freight services in Australia, providing intermodal, coal and bulk rail haulage services throughout Australia.

Qube
Qube is Australia's largest integrated provider of import and export logistics services. It offers a broad range of logistics services with a national footprint and a primary focus on markets involved in international trade in both the bulk and container markets.

SCT Logistics
SCT is a national, multi-modal transport and logistics company. It operates its own intermodal rail services from the eastern States to Perth, while also providing bulk rail haulage services. It has facilities in Brisbane, Sydney, Parkes, Melbourne, Adelaide and Perth.

Key contacts for this document:

Aurizon:	Patrick Coleman, Principal Policy Adviser 07 3019 7747, Patrick.Coleman@aurizon.com.au
ARTC:	Adrian Teaha, Manager Industry Policy & Strategy 08 8217 4397, ATeaha@ARTC.com.au
Pacific National:	Stuart Ronan, Manager Access and Regulation 02 8484 8056, stuart_ronan@pacificnational.com.au

Executive Summary

The Freight on Rail Group (FORG) supports the objective of the New South Wales (NSW) Government to improve air quality in the state.

FORG also recognises the benefits of developing a clean air plan, including the potential to provide greater certainty for industry with regard to operational planning and investment considerations.

FORG believes that the preparation of a long term plan is an important and positive development for the management of air quality in NSW, but we propose that the identification of priority areas and potential actions needs to be the result of a solid evidence-based process.

FORG therefore endorses the approach presented in the Clean Air for NSW Consultation Paper (the Paper) to determine priority areas, namely "that they:

- Target emission sources for which there is clear evidence that those sources have large impacts on air quality and human health; and

- Have the potential to provide the most cost-effective responses to identified pollution and health issues and deliver the best net gains for the community, based on the findings from economic studies"[1].

Consistent with this approach, FORG has included in this submission a set of suggested principles to guide the identification of priority areas for action.

In relation to diesel locomotive emissions, analysis of the NSW Environment Protection Agency (EPA) data shows that:

- Diesel locomotive emissions are not in the top 10 human made sources of emissions in NSW for particulate matter.

- Locomotives contribute just 0.2% of total PM10 emissions in the NSW GMR and 0.6% of PM2.5 emissions, as shown in the figures provided on page 8 of this submission.

Based on this evidence that particulate emissions from diesel locomotives represent a negligible component of overall particulate emissions, FORG does not support the position proposed in the Paper that emissions from diesel locomotives should be a priority area for action by the Government[2].

Although NSW EPA data clearly demonstrates that emissions from diesel locomotives are not a major contributor to particulate emissions, FORG acknowledges the community concerns in this area.

Reducing fuel usage and emissions have been a key focus for the members of FORG over recent years, with significant investments being made to reduce locomotive diesel consumption, thereby reducing associated emissions at the point of production.

Furthermore, FORG notes that rail freight operators have worked over the last 12 months to develop a national industry standard and associated code of practice for diesel emissions from existing and new locomotives. The standard has been submitted to the Rail Industry Safety and Standards Board (RISSB) and is to be published as Australian Standard AS 7512.

The development of this standard and the accompanying code of practice represents an industry-led approach to managing emissions from diesel locomotives over the next ten years and beyond.

[1] NSW Environment Protection Agency and Office of Environment and Heritage, *Consultation Paper: Clean Air for NSW*, October 2016, p. 27

[2] Ibid, p. 27.

The standard and code of practice demonstrates the commitment of rail freight operators to managing environmental impacts and to improved practices and reductions in locomotive emissions.

In relation to coal dust on the Hunter Valley rail corridor, studies undertaken by the NSW Chief Scientist and Engineer and others have concluded that long term average air quality (the focus of Clean Air for NSW) is no different to other parts of the region. In the absence of clear evidence suggesting there is an air quality issue around the rail corridor, the listing of this planned work as an individual priority appears not supported by FORG, especially when tested against the criteria presented in the Paper[3].

Based on the evidence available relating to diesel locomotives and coal dust respectively, FORG submits that the Government should determine:

- That emissions from diesel locomotives should not be classified as a priority area or source of emissions for improving air quality in NSW.
- That it should specifically note as part of its Clean Air for NSW process the proactive development by the rail freight industry of a national diesel emissions standard, and that this demonstrates that no regulatory actions are required by Government and/or the NSW EPA.
- That coal dust should not be identified as a priority for regulatory action in NSW.
- That in relation to coal dust and the Hunter Valley rail corridor, further monitoring and studies are needed, consistent with the conclusion of the NSW Chief Scientist and Engineer.
- That a Government-industry working group be formed to contribute to and inform the ongoing monitoring and further studies of coal dust on the Hunter Valley corridor.

We suggest that the broader benefits of using rail freight compared to transporting freight by road should be fully considered as part of the Clean Air for NSW consultation process.

Increasing the use of rail freight would promote the objective of improving air quality. The Clean Air for NSW consultation paper recognises this environmental benefits of rail freight due to the fact that "each freight train is equivalent to approximately 150 semi-trailers, and transporting freight by rail generates only one third of the greenhouse gases produced by road transport"[4].

In addition, we believe the Government should take further policy actions to increase the utilisation of rail freight recognising the substantial environmental, safety, economic and community benefits the increased use of rail offers, and consistent with the Government's transport policy priority to shift more freight onto rail. We recognise that important initiatives have already been introduced to support this objective in NSW and that significant progress has already been made on key transport corridors.

FORG has appreciated the opportunity to respond to the Paper. If it would be helpful to the further consideration of the issues raised in this submission, FORG would be pleased to participate in the planned 2017 Clean Air Summit and the subsequent process whereby the Government will set priority areas and longer term directions for air quality management in New South Wales through to 2027.

[3] NSW Environment Protection Agency, Consultation Paper: Clean Air for NSW, October 2016, p. 27

[4] Ibid, p. 45

The environmental, economic and community benefits of the rail freight industry

Rail freight operations provide major environmental, safety and community benefits compared to the use of road freight. These benefits include:

- The Energy Efficiency Exchange reports that "rail freight transport emits 75 per cent less greenhouse gas emissions per tonne of freight moved compared to the road freight transport sector"[5].

- Road accidents involving trucks result in costs that are 10 times higher than the costs of rail freight accidents, due to rail being a far safer mode[6].

- Rail freight reduces traffic congestion with one freight train having the capacity to remove 100 trucks from the corresponding road corridors.

FORG submits that it would be important for the Government in determining priority areas for proposed actions to improve air quality to take into account other areas of Government policy.

This is particularly the case regarding the Government's policy to increase the proportion of freight carried by rail, which is positive in terms of environmental impacts, social amenity (i.e., congestion) and community safety.

FORG notes in this context that the Paper states:

"……..Putting freight on trains is recognised as being good for our economy, good for our environment and good for road users. Each freight train is equivalent to approximately 150 semi-trailers, and transporting freight by rail generates only one third of the greenhouse gases produced by road transport. Enhancing the capacity of the rail freight network through the NSFC Program (i.e., the Northern Sydney Freight Corridor) will allow rail to be more competitive with road transport for certain types of freight and cut more than 20,000 heavy vehicle road trips per year within 15 years. It will reduce diesel use by almost 40 million litres and greenhouse gas emissions by more than 100.000 tonnes each year"[7].

Increasing the overall proportion of freight carried by rail compared to road would be consistent with an important transport priority for the NSW Government, as stated in the 2013 *NSW Freight and Ports Strategy*:

"Opportunities exist to shift more freight onto rail and this remains an important priority for the NSW Government[8]."

This policy includes a target to double the proportion of freight carried by rail to and from Port Botany between 2013 and 2020[9]. The rail corridors used to transport containers to and from Port Botany include regional rail infrastructure. The NSW Government has already introduced initiatives that are contributing to meeting this transport policy objective. Aligning environmental and transport policy settings towards this objective would make a vital contribution to achieving this target and realising significant environmental, safety and congestion benefits in both urban and regional parts of NSW.

General Principles to guide policy and regulation relating to air quality

FORG proposes that the Government adopt a set of clear principles designed to best achieve its air quality goals, focusing on improved community outcomes.

---

[5] The Energy Efficiency Exchange website: http://eex.gov.au/sectors/transport/rail-freight-transport

[6] Deloitte Access Economics for The Australasian Railway Association, *The True Value of Rail*, 2011

[7] NSW Environment Protection Agency and Office of Environment and Heritage, *Consultation Paper: Clean Air for NSW*, October 2016, p. 45

[8] New South Wales Freight and Ports Strategy, November 2013, p. 19.

[9] Ibid, p. 24.

Drawing on the 2007 COAG agreement on Best Practice Regulation, as well as the Government's "Guide to Better Regulation" and its "Seven principles of better regulation", FORG proposes that the Government endorse the following principles as part of its "Clean Air for NSW" consultation process and more generally:

1. Proposed actions in support of objectives should focus on rigorously determined priority areas that will deliver the maximum immediate benefits to the community at the lowest possible cost to industry.

2. Government and industry should seek to work together to develop appropriate solutions (including potential voluntary industry codes) for addressing air quality issues.

3. Regulatory action should only be adopted where it is demonstrably required.

4. If regulation is required, it should be:

    a. Founded on a rigorous, transparent and evidence-based decision making process, with transparent dispute settlement arrangements.
    b. Proportionate to the demonstrated risks.
    c. Deliver cost effective outcomes for the impacted industries and the overall community.
    d. Have regard to the impact on other relevant areas of Government policy, as well as potential economic and social impacts.

In relation to dispute resolution arrangements, these arrangements should allow an organisation or industry to have access to a readily available mechanism to review proposed regulatory requirements.

In addition, FORG believes it is important to ensure that all significant environmental, economic and social impacts of proposed environmental actions are fully assessed, and take into account the relevant industry context and potential implications for other policy settings.

FORG notes in this context that the governance of regulatory arrangements is currently under review by the Independent Review of the NSW Regulatory Policy Framework.

FORG suggests that the review, in taking account of important areas of regulation, consider the current environmental governance arrangements and structures.

We further propose that this include the prospect of the introduction of a whole-of-government assessment and decision making process for environmental regulation.

A whole of government approach should involve rigorous consideration of the full details of proposals to introduce new environmental measures, and such as approach should ensure that the potential impact of such proposals on other relevant areas of Government policy are fully considered.

It is also important to consider the principle of proportionality in relation to the impact of the rail freight industry in the context of overall emissions, as well as the determination of priority areas for initiatives to improve air quality in NSW.

The use of rail to carry freight involves substantially less emissions compared to carrying the same freight by road. Rail freight also provides substantial safety improvements compared to road freight.

Therefore, using the example of rail freight transport, imposing additional costs on this industry would also result in additional costs to the community.

FORG therefore submits that the cost of potential actions in this area would not be proportionate to the potential environmental gains.

Improving air quality: Identification of priority areas

FORG endorses the position in the Paper that:

"*Actions that will be prioritised under Clean Air for NSW will reflect our understanding that the greatest health benefits will come from actions that achieve sustained reductions in long-term exposure of large populations to air pollution such as fine particles*"[10].

FORG also endorses the approach presented in the Paper for determining priority areas, noting that:

"*the emission and exposure reduction actions identified in this Clean Air for NSW Consultation Paper have been prioritised for further investigation, generally on the basis that they:*

- *Target emission sources that have large impacts on air quality and human health, based on the evidence, and*

- *Have the potential to provide the most cost-effective responses to identified pollution and health issues and deliver the best net gains for the community, based on the findings from economic studies*"[11].

In relation to rail freight transport, consistent with the approach outlined in the Paper, we support having a focus on what the evidence shows.

An analysis of EPA data on page 8 of this submission shows that:

- Diesel locomotive emissions are not in the top 10 human made sources of emissions in NSW for particulate matter (PM10 & PM2.5) as shown in figures 1 and 2 on page 8 of this submission;

- Locomotives contribute just 0.2% of total PM10 emissions in the NSW GMR and 0.6% of PM2.5 emissions as also shown in figures 1 and 2 on page 8;

In addition, major studies undertaken for the Department of Environment and the EPA & Health Department do not list locomotives as a priority area. These studies are:

- *Air Pollution Economics: Health Costs of Air Pollution in the Greater Sydney Metropolitan Region* prepared for the (then) Department of Environment and Conservation, 2005.

- Woolcock Institute of Medical Research, Centre for Air Quality and Health Research and Evaluation (CAR), *Review of the health impacts of emission sources, types and levels of particulate matter air pollution in ambient air in NSW*, produced for the NSW EPA and the NSW Ministry of Health, Environmental Health Branch, December 2015.

In the case of oxides of nitrogen, total emissions from diesel locomotives are considerably less than total emissions from diesel road vehicles.

FORG therefore proposes that, based on the evidence summarised above and on page 8 of this submission, emissions from diesel locomotives should not be included as a priority area or source of emissions by the NSW Government and the NSW EPA.

[10] NSW Environment Protection Agency and Office of Environment and Heritage, *Consultation Paper: Clean Air for NSW*, October 2016, p. 10
[11] Ibid, p. 27.

Figure 1: Sources of PM2.5 in the NSW Greater Metropolitan Region (GMR) 2008[12]

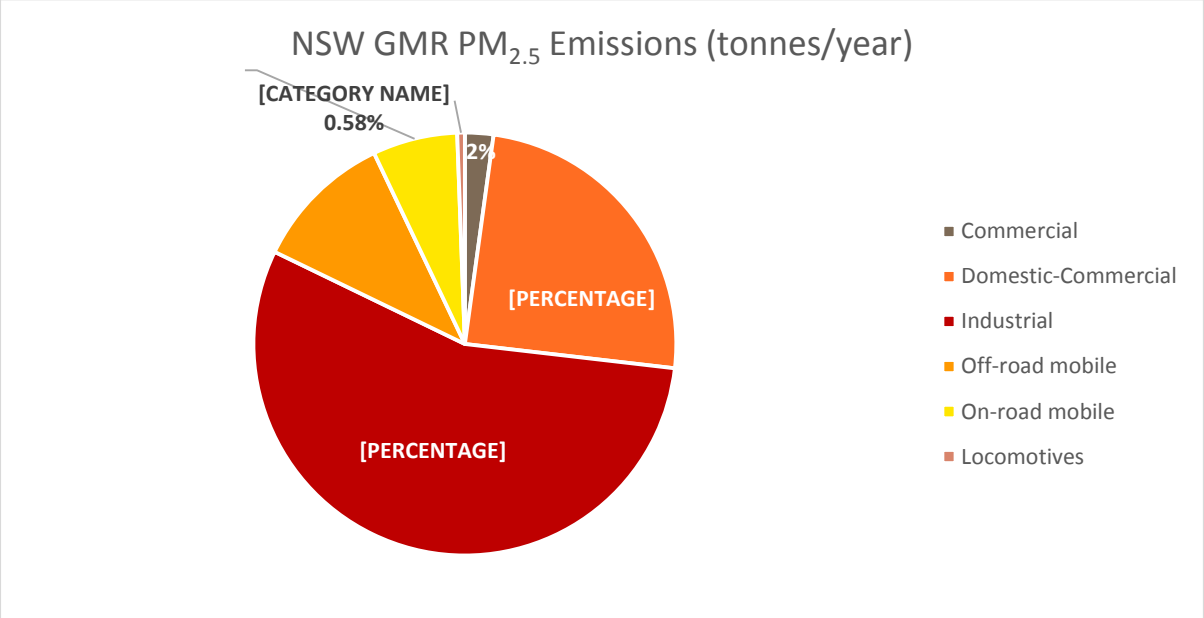
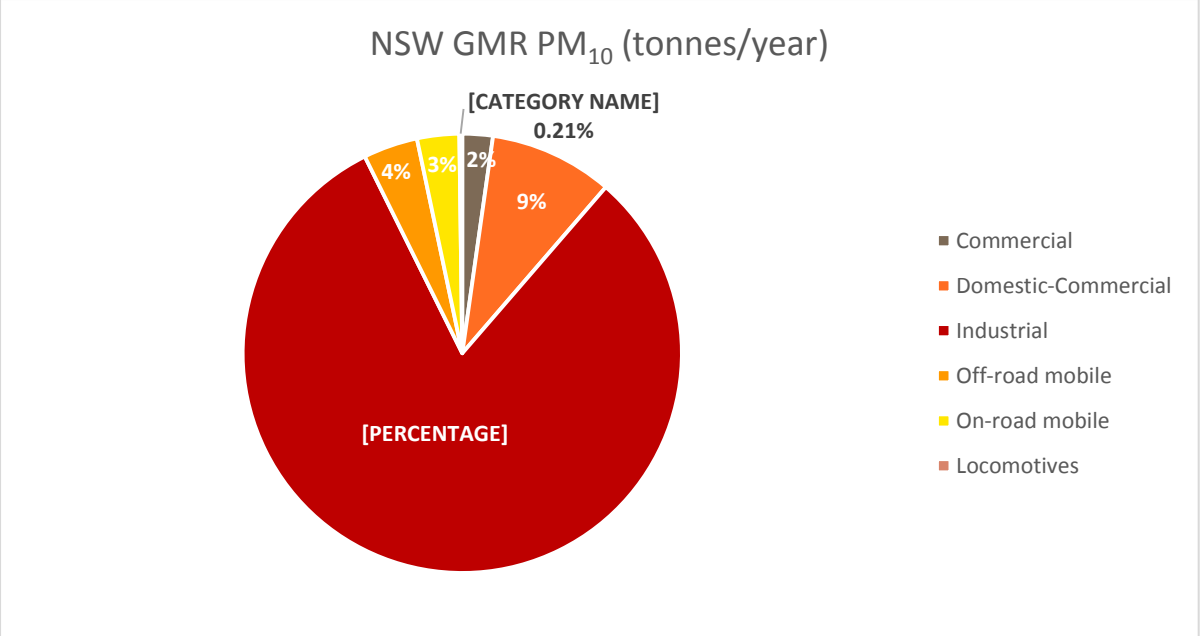


Figure 2: Sources of PM10 in the NSW Greater Metropolitan Region (GMR) 2008[13]



The assessment of FORG is that particulate matter emissions from diesel locomotives in the greater metropolitan region (GMR) of New South Wales represent a negligible component of overall particulate emissions. This assessment is supported by the figures 1 and 2 above.

Industry initiatives undertaken to manage diesel locomotive emissions

[12] Adapted from NSW Air Emissions Inventory for the Greater Metropolitan Region in New South Wales 2008, Table ES-4,http://www.epa.nsw.gov.au/resources/air/120255AEITR1NatHuman.pdf & 'Scoping Study of Potential Measures to Reduce Emissions from New and In-Service Locomotives in NSW and Australia', ENVIRON, 2013, Table 24

[13] Adapted from NSW Air Emissions Inventory for the Greater Metropolitan Region in New South Wales 2008, Table ES-4,http://www.epa.nsw.gov.au/resources/air/120255AEITR1NatHuman.pdf & 'Scoping Study of Potential Measures to Reduce Emissions from New and In-Service Locomotives in NSW and Australia', ENVIRON, 2013, Table 24

Although NSW EPA data clearly demonstrates that particulate emissions from diesel locomotives are not a major contributor to overall particulate emissions, taking account of community concern is an important consideration for rail freight operators.

As a result, reducing fuel usage and emissions have been a key focus for freight rail operators over recent years, with significant investment being undertaken to reduce locomotive diesel consumption, thereby lowering associated emissions from rail freight services.

Importantly, FORG notes that rail freight operators have worked for more than 12 months to develop a national industry standard and associated code of practice for diesel emissions from existing and new locomotives.

The agreed standard has been agreed by rail freight operators and submitted to the Rail Industry Safety and Standards Board (RISSB). The development of an agreed standard represents an industry-led approach to managing emissions from diesel locomotives over the next ten years and beyond.

The standard and the accompanying code of practice demonstrate the commitment of rail freight operators to managing environmental impacts and contributed to improved practices and reduced emissions. The standard will be formalised and published as Australian Standard AS 7512. The key features of this standard and the accompanying code of practice are set out in Attachment A.

Coal dust

Minimising exposure to coal dust along the Hunter Valley rail corridor has been included as a priority action in the Consultation Paper. However, FORG submits that there is not a sufficient evidence base for this proposal.

The Paper refers to studies undertaken by the NSW Chief Scientist and Engineer.

Our members have proactively supported these studies together with a number of other scientific studies on the impact of coal dust from rail transport on air quality in the Hunter Valley.

The Hunter Valley region is one of the most densely monitored and tested areas in Australia, if not the world. The monitoring and studies relating to the region include the Upper Hunter Air Quality Monitoring Network, the Upper Hunter Valley Particle Characterisation Study, the Lower Hunter Particle Characterisation Study which was led by the Commonwealth Scientific and Research Organisation (CSIRO) and the Australian Nuclear Science and Technology Organisation (ANSTO), and the Lower Hunter Dust Deposition Study.

These monitoring initiatives and studies, as well as rail corridor monitoring, have shown that coal could contribute at most 10 per cent of total PM2.5 and PM10 particles. FORG is supportive of further monitoring to confirm more specifically the contribution of coal to general dust on the rail corridor.

None of these studies has indicated long term average air quality is different to other parts of the region.

However, as stated in the Paper, the Chief Scientist concluded that “further targeted studies are needed to better understand the nature and distribution of particles along rail corridors and industry”.

FORG considers that it is not accurate to refer to what the Chief Scientist has proposed as being to ‘minimise exposure to dust emissions in the Hunter rail corridor’. As we understand the Chief Scientist and Engineer’s recommendations, and the associated action presented in the Paper, the proposed work is concerned with ‘monitoring air quality’ on the rail corridor.

At this point in time, there is no available data that indicates a need to, as stated in the Paper, ‘*minimise exposure to dust emissions in the Hunter rail corridor*’. We therefore suggest this description be changed to accurately reflect the proposal to monitor air quality.

FORG supports the conclusion of the Chief Scientist and Engineer that further monitoring studies are needed, and would be pleased to work with the NSW Government as it responds to the Chief Scientist's recommendations. FORG considers that a Government-industry working group, rather than the proposed Taskforce, would provide an appropriate forum for all parties to become involved in what is undeniably important work for the rail corridor and the broader coal chain.

In the absence of evidence suggesting there is an air quality issue around the rail corridor, FORG does not support the inclusion of a priority action in the Consultation Paper to 'Manage dust emissions in the Hunter Rail corridor'.

FORG therefore recommends that the proposal to 'manage dust emissions in the Hunter rail corridor' be removed as standalone priority action. Instead, the proposal of the Chief Scientist for further monitoring around the rail corridor should form part of future air quality monitoring in NSW.

Conclusion

NSW EPA data demonstrates that particulate emissions from diesel locomotives represent a negligible component of overall particulate emissions in NSW, and therefore should not be identified as a priority area, and not a priority source of emissions in the state.

FORG members, however, recognise community concerns in this area and, as a result, has taken a number of initiatives over recent years to reduce fuel consumption in its locomotive fleet, thus reducing emissions related to rail freight operations.

Over a period of more than 12 months, rail freight operators have proactively and voluntarily worked to develop an industry standard and code of practice for managing emissions from diesel locomotives. The agreed standard has been submitted to RISSB for publication as Australian Standard AS7512.

This industry-led approach to the development of a standard for locomotive emissions demonstrates the commitment of freight rail operators to reducing emissions, despite locomotive emissions accounting for a negligible component of overall emissions in NSW.

In relation to coal dust, FORG supports the conclusion of the Chief Scientist and Engineer that further monitoring studies are needed. We are willing to work closely with the NSW Government as it responds to the Chief Scientist's proposals. However, we suggest that a Government-industry working group rather than the proposed taskforce would provide an appropriate forum that enables industry to contribute to further monitoring.

In the absence of evidence suggesting there is an air quality issue around the rail corridor, the inclusion of a priority action in the Paper to 'Manage dust emissions in the Hunter Rail corridor' is not supported.

Instead, the Chief Scientist and Engineer's proposal for further monitoring around the rail corridor should form part of any revised air quality monitoring strategies.

FORG also suggests that the Government formally adopt a set of principles for best achieving its Clean Air for NSW goals. FORG believes that the principles outlined in this submission will deliver the best possible community outcomes taking into account environmental, economic and social considerations.

FORG appreciates that this is the first stage of consultation on the Paper. We commend the NSW Government on preparing the Paper and we look forward to ongoing engagement throughout the consultation process.

Attachment A

Summary of rail freight industry Standard and Code of Practice on diesel locomotive emissions

Requirements of the agreed industry standard for diesel locomotives

The standard for diesel locomotive emissions that has been agreed by freight rail operators and is to be published by the Rail Industry Safety and Standards Board (RISSB) as Australian Standard (AS) 7512 requires the following in relation to diesel locomotives:

New Locomotives shall operate with diesel particulate emissions less than or equal to 0.27 grams per kilowatt hour.

Existing Locomotives shall operate with diesel particulate emissions less than or equal to 0.30 grams per kilowatt hour.

If a locomotive is pre-owned and previously operated outside Australia, if it was manufactured after 1 January 2010, or had covered less than 50,000 kilometres at the date of importation, it shall be considered a new locomotive for the purposes of the standard.

Implementation of these Standard shall be as provided for in the associated Code of Practice. In summary implementation includes:

Purchase of new locomotives

Locomotives ordered after the Effective Date of the standard, AS7512, shall be certified to meet or exceed the requirements of the standard.

Upgrading of existing locomotives

Operators shall undertake a specified upgrading of existing locomotives which are not already capability compliant at the first major overhaul of a locomotive after the effective date of AS7512[14].

Reporting

Operators shall Report to the Reporting Organisation within two months after the end of each calendar year on:

- The number of new locomotives purchased and the number of those meeting the standard;
- The numbers of non-compliant locomotives;
- Of non-compliant locomotives, the numbers that have received a Major Overhaul and an upgrade; and
- Reasons why any non-compliant locomotive did not receive an upgrade.

General actions to reduce emissions

The code of practice (CoP) that accompanies AS7512 also requires that locomotive operators take general actions to reduce emissions, including:

- Compliant maintenance arrangements;
- Reduction in unnecessary idling; and
- Actions to reduce emissions of NOx.

[14] In relation to upgrading requirements, there are special provisions that are to apply to locomotives where the distance of operations over a year is relatively low, or where an upgrade kit is not available.

Estimated benefits of the standard and code of practice[15]

Benefits excluding effects of Scrapping

If no existing locomotives are scrapped, and noting the assumptions above, the benefits are estimated to be:

- 295 locomotives upgraded
- 12.8% reduction in total PM emissions
- 29% reduction in emissions from upgradeable locomotives.

Benefits including effects of scrapping

The industry has already scrapped a material number of older locomotives, and subject to economic conditions and industry profitability enabling this to continue, further older parts of the fleet are planned to be scrapped.

It is assumed in the data below that the task currently met by these scrapped locomotives is instead met by new locomotives emitting 0.27kg/MWH or better.

The planned programme will particularly address the non-upgradable locomotives. It is estimated that this could result in larger reductions in industry emissions of PM, as outlined in the following:

- 298 locomotives to be scrapped over the period of the standard and CoP;
- this total includes 188 non-upgradable locos;
- separately, 185 locomotives upgraded;
- 19% reduction in total industry emissions of particulate matter; and
- emissions from non-upgradable locomotives reduced to only 1.2% of total emissions.

Current status of the standard

The standard has been submitted to the Rail Industry Safety and Standards Board (RISSB) for publication.

[15] Note: the estimated benefits are for locomotives operating on the interstate network and in South Eastern Australia.


RAIL
CROSSING
WAY
STOP
LOOK
FOR
TRAINS

Rolling Stock
FUNCTIONAL AREA 3

RISSB
RAIL INDUSTRY SAFETY AND STANDARDS BOARD

Overview

The main focus of the Rail Industry Safety and Standards Board (RISSB) Rolling stock functional area is the development of a suite of Rolling stock Standards for the Australian railway industry. There have been 34 subject areas, comprising of more than 130 individual Standards, identified for development with application to conventional Rolling stock on narrow, standard and broad gauges.

About RISSB

The Rail Industry Safety and Standards Board (RISSB) develops and manages rail industry Standards, Rules, Codes of Practice and Guidelines on behalf of the Australasian rail industry. Our vision is to engage the Rail Industry and Government to achieve industry-wide harmonisation.

Current Projects

AS 7502	**Road Rail Vehicles** This Standard covers the basic requirements for road rail vehicles across their life cycle, including design, construction, testing/certification, operation, maintenance, modification and disposal.
AS 7503	**Train Operation Interface** This Standard covers issues related to Rolling Stock operation such as Rolling Stock identification, automatic equipment identification tags, operational signage, movement prevention and operational integrity.
AS 7510	**Braking Systems** This Standard covers the requirements for braking systems for individual Rolling Stock and trains.
AS 7511	**Train Protection Systems** This Standard is to cover the requirements relating to train supervisory systems on Rolling Stock such as Automatic Train Protection Systems. (Was Driver Supervisory Systems)
AS 7512	**Exterior Environment** This Standard details the Rolling Stock requirements related to the exterior environment.
AS 7513	**Interior Environment** This Standard looks at the interior environment on Rolling Stock in regard to noise, vibration, ride comfort, air, atmospheric contaminants, temperature and humidity.
AS 7529	**Fire Safety** This Standard will set the requirements for Rolling Stock fire safety performance.
AS 7532	**Rolling Stock Audible Warning Devices** This Standard will set the requirements for audible warning devices on Rolling Stock. It will cover warning horns, reversing beepers and plant start up warning devices.
Code of Practice: ECP Braking This Code of Practice will expand on the Electronically Controlled Pneumatic braking requirements given in AS 7510 Rolling Stock Braking Systems, and provide further information to Rolling Stock manufacturers and operators on how to design and maintain safe ECP systems for Australian conditions. This project may be integrated into AS7510 Rollingstock Braking Systems.	
Guideline: In-Line Refuelling This guideline will provide good practice guidance on in-line refuelling practices.	
Guideline : Wheel-Rail Profile Development This guideline will provide good practice guidance on assessing wheel profiles theoretically and in the field. It will also provide a change management process for developing, trialling and implementing new wheel and/or rail profiles.	

RISSB
RAIL INDUSTRY SAFETY AND STANDARDS BOARD

5-Year Review

The following projects are currently undergoing 5-Year Review

AS 7505 Signalling Detection Interface
This Standard details the requirements for Rolling Stock regarding signalling detection on the major Australian open access rail networks.

AS 7507 Rolling Stock Outlines
This Standard covers the process for assessment of Rolling Stock outlines and includes 31 reference Rolling Stock outlines including their kinematic dimensions.

AS 7508 Track Forces & Stresses
This Standard covers the interface between Rolling Stock and the track in relation to evaluation and testing, axle load and vehicle mass, rail contact stresses, P2 forces, lateral track shifting forces, lateral wheel to rail force, rail stress during track work and residual dynamic imbalance forces.

AS 7509 Dynamic Behaviour
This Standard looks at Rolling Stock dynamic behaviour in regard to evaluation and testing, hunting, base ride accelerations, curve negotiation, rollover negotiation of track irregularities and wind load considerations.

AS 7514 Wheels
This Standard covers the design, manufacture and maintenance of wheels for use on Rolling Stock.

AS 7515 Axles
This Standard covers the design, manufacture and maintenance of axles for use on Rolling Stock.

AS 7516 Axle Bearings
This Standard covers the design, manufacture and maintenance of axle bearings for use on Rolling Stock.

AS 7517 Wheelsets
This Standard covers the design, manufacture and maintenance of wheelsets for use on Rolling Stock.

AS 7519 Bogie Structural Requirements
This Standard details the structural requirements to be considered in the design, manufacture and maintenance of bogies.

AS 7531 Lighting & Rolling Stock Visibility
This Standard looks at the visibility and lighting requirements for Rolling Stock.

Completed Projects

AS 7501 Rolling Stock Certification
This Standard details the certification process for Rolling Stock that has been designed, built and tested to the RISSB Rolling Stock Standards.

AS 7518 Suspension
This Standard covers the design, manufacture and maintenance of suspension components for use on Rolling Stock.

AS 7520 Body Structural Requirements
This Standard details the structural requirements to be considered in the design, manufacture and maintenance of Rolling Stock.

AS 7522 Access and Egress
This Standard looks at the access and egress requirements for Rolling Stock including Disability Discrimination Act (DDA) access requirements.

AS 7523 Emergency Equipment
This Standard details the emergency equipment required on Rolling Stock such as first aid equipment, fire extinguishers and communication equipment.

AS 7524 Drawgear
This Standard details the requirements to be considered in the design, manufacture and maintenance of drawgear for Rolling Stock.

AS 7527 Event Recorders
This Standard sets out the requirements for event recorders on Rolling Stock.

AS 7533 Driving Cabs
This Standard sets the requirements for driving cabs for Rolling Stock including ergonomic considerations, sighting requirements and controls.

Guideline: Glossary of Rail Terminology
Scheduled update of the former COP for the DIRN Volume 2. This has been re-configured to be a national Guideline on Rail Terminology.

Guideline: Rail Industry Hazard Register
This Guideline is a comprehensive overarching register of hazards relating to rail. It captures around 3500 hazards spaning accreditation, security, environment, Rolling Stock, infrastructure (and separately signalling infrastructure), human factors and operations and is designed to be the starting point for future RISSB standards. It will also be useful to rail industry members as a reference document for performing hazard identifications/risk assessments.

Code of Practice: Locomotive Boilers
This Code of Practice provides practical advice on the inspection and maintenance of high pressure heritage locomotive boilers.

Code of Practice: Wheel Defect Manual
This Code of Practice provides practical good practice instructions on identifying and managing wheel defects.

ARCADIS Design & Consultancy for natural and built assets