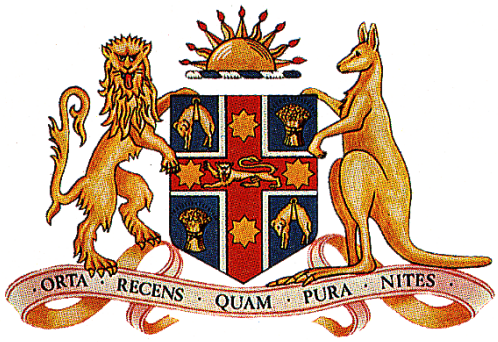


Government Gazette

of the State of

New South Wales

Number 8

Friday, 20 January 2017

The *New South Wales Government Gazette* is the permanent public record of official notices issued by the New South Wales Government. It also contains local council and other notices and private advertisements.

The Gazette is compiled by the Parliamentary Counsel's Office and published on the NSW legislation website (www.legislation.nsw.gov.au) under the authority of the NSW Government. The website contains a permanent archive of past Gazettes.

To submit a notice for gazettal – see Gazette Information.

GOVERNMENT NOTICES

Miscellaneous Instruments

CRIMES (ADMINISTRATION OF SENTENCES) ACT 1999

GOVERNOR

I, General The Honourable David Hurley AC DSC (Ret'd), Governor of the State of New South Wales, with the advice of the Executive Council, and pursuant to section 226(4) as it continues in force under clause 108(2) of Schedule 5 of the *Crimes (Administration of Sentences) Act 1999*, do, by this proclamation, revoke the proclamation published in the NSW Government Gazette of 2 August 2002 which declared the Periodic Detention Centre, Newcastle to be a periodic detention centre.

This proclamation is to take effect on and from the date of publication in the NSW Government Gazette.

Signed and sealed at Sydney, this 14th day of December 2016.

By His Excellency's Command.

David Elliott MP
Minister for Corrections

GOD SAVE THE QUEEN!

CRIMES (ADMINISTRATION OF SENTENCES) ACT 1999

GOVERNOR

I, General The Honourable David Hurley AC DSC (Ret'd), Governor of the State of New South Wales, with the advice of the Executive Council, and pursuant to section 226(4) as it continues in force under clause 108(2) of Schedule 5 of the *Crimes (Administration of Sentences) Act 1999*, do, by this proclamation, revoke the proclamation published in the NSW Government Gazette of 2 August 2002 which declared the Periodic Detention Centre, Wollongong to be a periodic detention centre.

This proclamation is to take effect on and from the date of publication in the NSW Government Gazette.

Signed and sealed at Sydney, this 11th day of January 2017.

By His Excellency's Command.

David Elliott MP
Minister for Corrections

GOD SAVE THE QUEEN!

CRIMES (ADMINISTRATION OF SENTENCES) ACT 1999

GOVERNOR

I, General The Honourable David Hurley AC DSC (Ret'd), Governor of the State of New South Wales, with the advice of the Executive Council, and pursuant to section 225(1) and 225(3) of the *Crimes (Administration of Sentences) Act 1999*, do, by this Proclamation, declare the area comprised within the boundaries hereunder (together with all buildings or premises which are now or may hereafter be erected thereon) to be a correctional centre within the meaning of the *Crimes (Administration of Sentences) Act 1999* and I further declare that the correctional centre shall be known as the Illawarra Reintegration Centre, viz.:

All that piece or parcel of land situate in the Local Government Area of Wollongong, Parishes of Kembla & Wollongong and County of Camden, being Lot 10 in Deposited Plan 830258, shown by the shading on Plan Catalogue No 57431 in the Plan Room of the NSW Department of Finance, Services & Innovation, reproduced hereunder and having an area of 5914 metres squared or thereabouts.

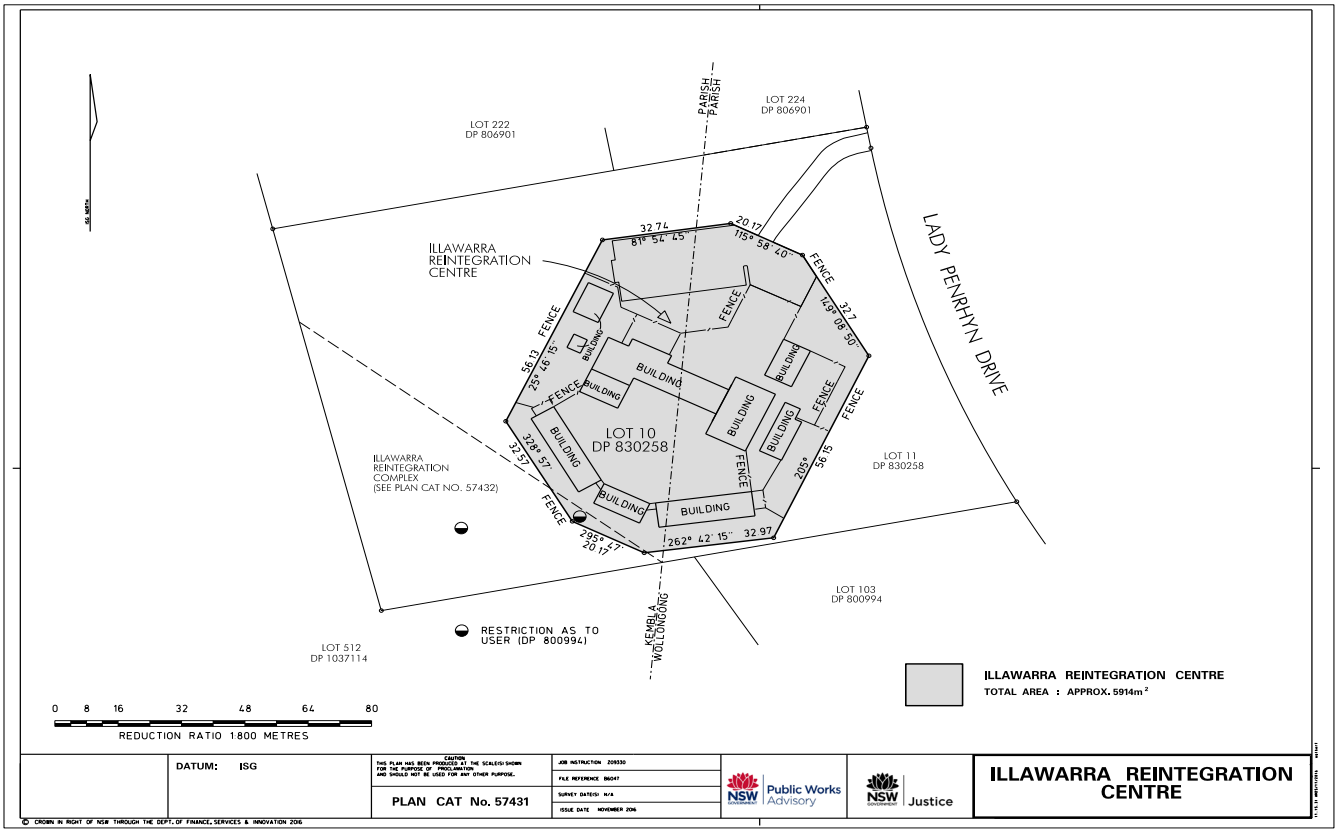
This proclamation is to take effect on and from the date of publication in the NSW Government Gazette.

Signed and sealed at Sydney, this 14th day of December 2016.

By His Excellency's Command.

David Elliott MP
Minister for Corrections

GOD SAVE THE QUEEN!



CRIMES (ADMINISTRATION OF SENTENCES) ACT 1999

GOVERNOR

I, General The Honourable David Hurley AC DSC (Ret'd), Governor of the State of New South Wales, with the advice of the Executive Council, and pursuant to section 224(1) and 224(2) of the *Crimes (Administration of Sentences) Act 1999*, do, by this Proclamation, declare the area comprised within the boundaries hereunder (together with all buildings or premises which are now or may hereafter be erected thereon) to be a correctional complex within the meaning of the *Crimes (Administration of Sentences) Act 1999* and I further declare that the correctional complex shall be known as the Illawarra Reintegration Complex, viz.:

All that piece or parcel of land situate in the Local Government Area of Wollongong, Parishes of Kembla & Wollongong and County of Camden, being Lot 10 and Lot 11 in Deposited Plan 830258, shown by the shading on Plan Catalogue Number 57432 in the Plan Room of the NSW Department of Finance, Services & Innovation, reproduced hereunder and having an area of 1.695 hectares or thereabouts.

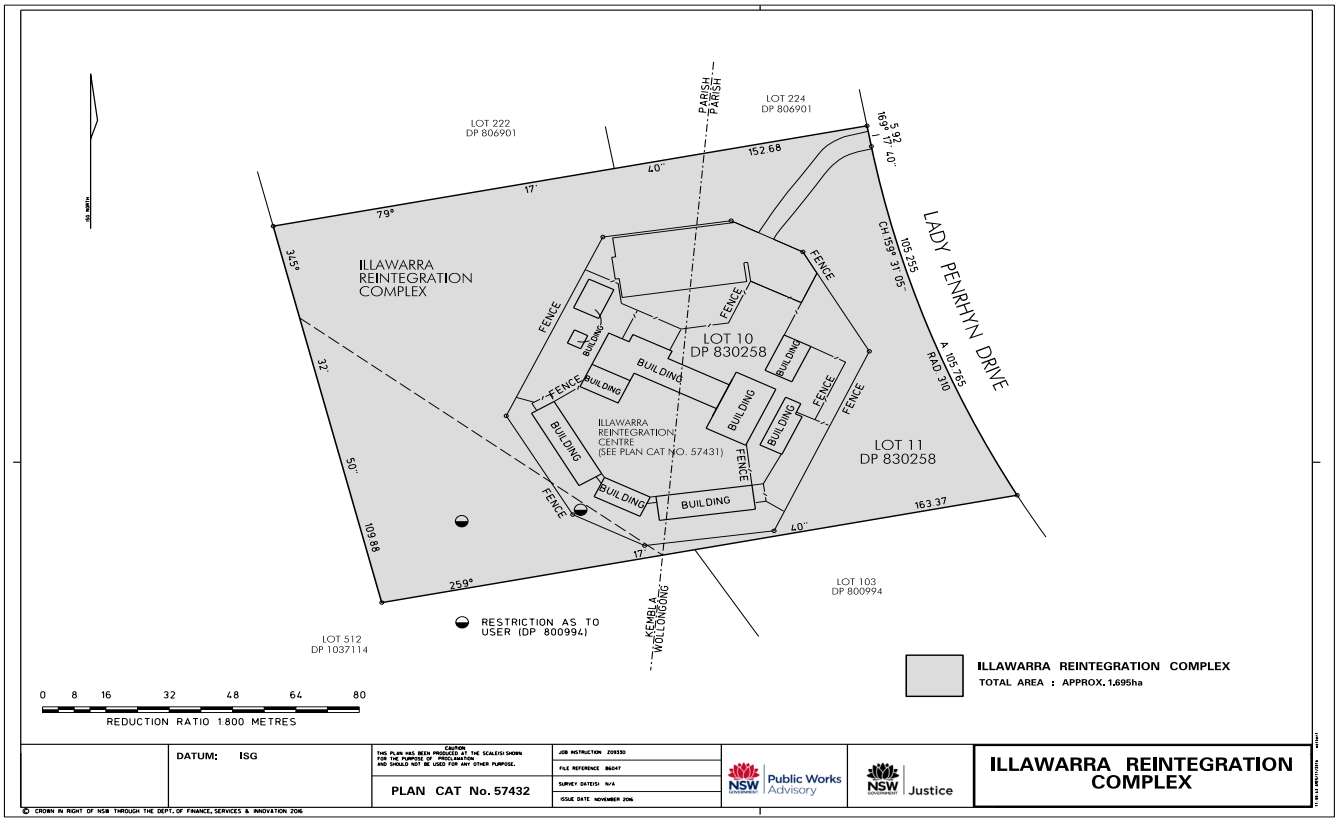
This proclamation is to take effect on and from the date of publication in the NSW Government Gazette.

Signed and sealed at Sydney, this 11th day of January 2017.

By His Excellency's Command.

David Elliott MP
Minister for Corrections

GOD SAVE THE QUEEN!



Planning and Environment Notices

HERITAGE ACT 1977

DIRECTION PURSUANT TO SECTION 32(1)

TO LIST AN ITEM ON THE STATE HERITAGE REGISTER

Dobell House

47 Dobell Drive, Wangi Wangi

SHR No. 1985

In pursuance of section 32(1) of the *Heritage Act 1977*, I, the Minister for Heritage, having considered the recommendation of the Heritage Council of New South Wales and the other matters set out at s32(1), direct the Heritage Council to list the item of environmental heritage specified in Schedule "A" on the State Heritage Register. This listing shall apply to the curtilage or site of the item, being the land described in Schedule "B".

The Hon Mark Speakman SC MP
Minister for Heritage

Sydney, 15th Day of January 2017

SCHEDULE "A"

The item known as Dobell House, situated on the land described in Schedule "B".

SCHEDULE "B"

All those pieces or parcels of land known as Lot 13 DP 8840 and part Lot 7332 DP 1164228 in Parish of Awaba, County of Northumberland shown on the plan catalogued HC 2883 in the office of the Heritage Council of New South Wales.

NATIONAL PARKS AND WILDLIFE ACT 1974

Plans of Management

The *Bomaderry Creek Regional Park Plan of Management*— was adopted by the Minister for the Environment on 20 October 2016

The *Bugong National Park and Tapitallee Nature Reserve Plan of Management*— was adopted by the Minister for the Environment on 20 October 2016

The *Jinangong Nature Reserve Plan of Management*— was adopted by the Minister for the Environment on 20 October 2016

The *Nymboi-Binderay National Park and State Conservation Area Plan of Management*— was adopted by the Minister for the Environment on 24 August 2016

The *Snake Rock Aboriginal Area Plan of Management*— was adopted by the Minister for the Environment on 10 October 2016

The *Solitary Islands Reserves Plan of Management*— was adopted by the Minister for the Environment on 27 November 2015

The *Tabbimoble Swamp Nature Reserve Plan of Management* — was adopted by the Minister for the Environment on 4 January 2016

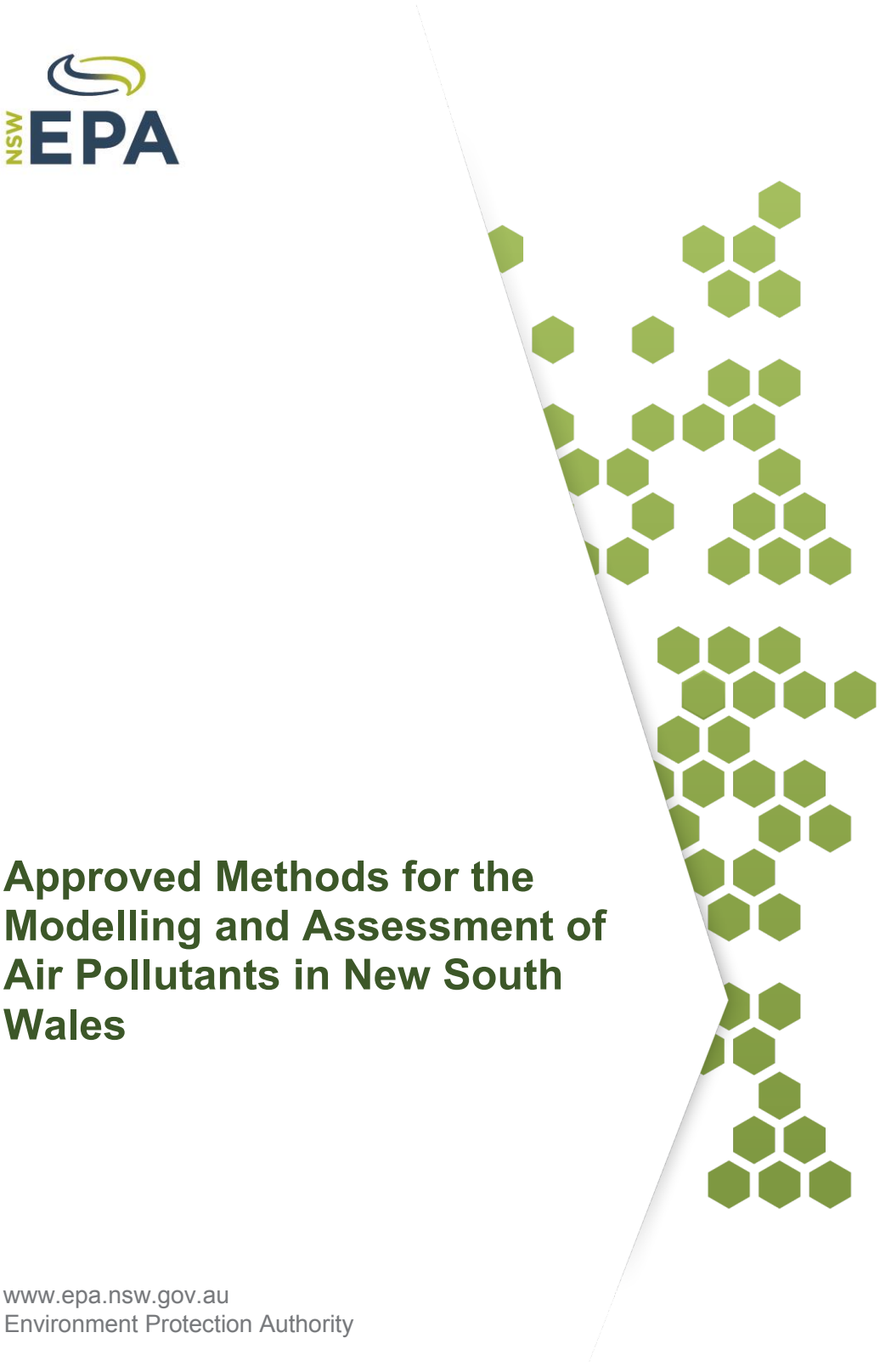
These plans are available on the web at:

www.environment.nsw.gov.au/parkmanagement/ParkManagementPlans.htm

PROTECTION OF THE ENVIRONMENT OPERATIONS (CLEAN AIR) REGULATION 2010

I, David Fowler, Acting Chief Environmental Regulator, Environment Protection Authority (EPA), with the delegated authority of the EPA, publish the document "*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*" (2016) in accordance with clause 3 of the *Protection of the Environment Operation (Clean Air) Regulation 2010*. This document takes effect upon publication in the New South Wales Government Gazette.

David Fowler,
Acting Chief Environmental Regulator,
Environment Protection Authority.



Published by:

Environment Protection Authority
59 Goulburn Street, Sydney NSW 2000
PO Box A290, Sydney South NSW 1232
Phone: +61 2 9995 5000 (switchboard)
Phone: 131 555 (NSW only – environment information and publications requests)
Fax: +61 2 9995 5999
TTY users: phone 133 677, then ask for 131 555
Speak and listen users: phone 1300 555 727, then ask for 131 555
Email: info@environment.nsw.gov.au
Website: www.epa.nsw.gov.au

Report pollution and environmental incidents
Environment Line: 131 555 (NSW only) or info@environment.nsw.gov.au
See also www.epa.nsw.gov.au

EPA 2016/0666
ISBN 978 1 76039 565 0
August 2005, minor revisions November 2016

Contents

1 Introduction

1.1 Objective

This document, the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (Approved Methods), lists the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in the state. It is referred to in Part 5: Air Impurities Emitted from Activities and Plant in the *Protection of the Environment Operations (Clean Air) Regulation 2010* (the Regulation). Industry has an obligation to ensure compliance with the requirements specified in the Regulation.

This document may also be referred to in conditions attached to statutory instruments, such as:

- licences or notices issued under the *Protection of the Environment Operations Act 1997*
- environmental assessment requirements under Part 4 of the *Environmental Planning and Assessment Act 1979*.

The procedures and methodologies contained in this document will undergo regular review, coinciding with the five-yearly review of the Regulation required by the *Subordinate Legislation Act 1989*.

1.2 Overview

This document covers:

- preparation of emissions inventory data
- preparation of meteorological data
- methods for accounting for background concentrations and dealing with elevated background concentrations
- dispersion modelling methodology
- interpretation of dispersion modelling results
- impact assessment criteria for –
    - sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), $PM_{2.5}$, PM_{10}, total suspended particulates (TSP), deposited dust, carbon monoxide (CO) and hydrogen fluoride (HF)
    - individual and complex mixtures of toxic air pollutants
    - individual and complex mixtures of odorous air pollutants
- modelling of chemical transformation
- procedures for developing site-specific emission limits, including hydrogen sulfide as specified in clause 42 of the Regulation as amended
- worked examples.

2 Methodology overview

2.1 Different levels of assessment

The two levels of impact assessment are:

- Level 1 – screening-level dispersion modelling technique using worst-case input data
- Level 2 – refined dispersion modelling technique using site-specific input data.

The impact assessment levels are designed so that the impact estimates from the second level should be more accurate than the first. This means that, for a given facility, the result of a Level 1 impact assessment would be more conservative and less specific than the result of a Level 2 assessment. It is not intended that an assessment should routinely progress through the two levels. If air quality impact is considered to be a significant issue, there is no impediment to immediately conducting a Level 2 assessment. Equally, if a Level 1 assessment conclusively demonstrates that adverse impacts will not occur, there is no need to progress to Level 2.

2.2 Impact assessment methodology

There are five main stages in an air quality impact assessment:

1. Input data collection
2. Dispersion modelling
3. Processing dispersion model output data
4. Interpretation of dispersion modelling results
5. Preparation of an impact assessment report.

2.2.1 Input data collection

The first stage in the impact assessment is the collection of all the information required to complete the dispersion modelling. This includes development of an air emissions inventory; compilation of meteorological data; background air quality data; and terrain data. Sections 3, 4 and 5 of these Approved Methods detail the EPA's requirements regarding the air quality impact assessment input data.

The development of the emissions inventory is one of the most important components of the impact assessment process. The inventory provides detailed information about all sources of air pollution at a premises. Emissions from the premises must be demonstrated to comply with the requirements of the Regulation before progressing through the other stages of the air quality impact assessment.

2.2.2 Dispersion modelling

AUSPLUME v. 6.0 is the approved dispersion model for use in most applications in NSW. However it is not approved in some applications where other more advanced dispersion models, such as CALPUFF and TAPM, may be more appropriate. The dispersion model input file should be prepared in accordance with the requirements of Section 6 of these Approved Methods and using the data collected in stage 1 of the impact assessment.

2.2.3 Processing dispersion model output data

Stage 3 of the assessment process is the prediction ground level concentrations (glcs) of pollutants in the region surrounding the premises. The predicted glcs of all pollutants must be in the same units and for the same averaging period as the relevant impact assessment criteria. The EPA's impact assessment criteria, together with the requirements regarding the presentation of the predicted glcs, are specified in Section 7.6.

2.2.4 Interpretation of dispersion modelling results

Stage 4 of the impact assessment is the interpretation of the dispersion modelling results. The predicted glcs are compared with the EPA's impact assessment criteria and compliance indicates the proposal is unlikely to result in adverse air quality impacts.

If a premises does not comply with the impact assessment criteria, the assessment must be revised to incorporate additional control or mitigation measures. To determine incremental increases in the cost of air pollution abatement, a sensitivity analysis can be carried out by varying:

- source release parameters
- separation distance
- efficiency of pollution control equipment
- level of management practice.

The results can be used to select the most cost-effective and environmentally effective control strategy.

2.2.5 Preparation of an impact assessment report

Stage 5 of the impact assessment is the preparation of a report. The air quality impact assessment report must be prepared in accordance with the requirements specified in Section 9 of these Approved Methods.

2.3 Bibliography

Earth Tech 2000, *A User's Guide for the CALPUFF Dispersion Model (Version 5)*, Earth Tech Incorporated, Long Beach CA, USA.

Earth Tech 2000, *A User's Guide for the CALMET Meteorological Model (Version 5)*, Earth Tech Incorporated, Long Beach CA, USA.

EPA Victoria 1985, *Plume Calculation Procedure: An Approved Procedure under Schedule E of State Environment Protection Policy (The Air Environment)*, Publication 210, Environment Protection Authority of Victoria, Melbourne.

EPA Victoria 1986, *The AUSPLUME Gaussian Plume Dispersion Model*, First Edition, Publication 264, Environment Protection Authority of Victoria, Melbourne.

EPA Victoria 1999, *AUSPLUME Gaussian Plume Dispersion Model: Technical User Manual*, Publication 671, Environment Protection Authority of Victoria, Melbourne.

EPA Victoria 2000, *AUSPLUME Gaussian Plume Dispersion Model: Technical User Manual*, Environment Protection Authority of Victoria, Melbourne.

Hurley, P. 2005, *The Air Pollution Model (TAPM) Version 3: User Manual*, CSIRO Atmospheric Research Technical Paper No. 31, CSIRO Division of Atmospheric Research, Melbourne.

USEPA 1999, *Guideline on Air Quality Models*, 40 CFR, Chapter I, Part 51, Appendix W, United States Environmental Protection Agency, Washington DC, USA.

3 Emissions inventory

The emissions inventory is the foundation of the air quality impact assessment. Developing a sound emissions inventory should be a priority task and requires the collation of a significant amount of data. A thorough air emissions inventory for a premises identifies all sources of air pollution, the air pollutants emitted from each source, and estimates the emission concentration and rate of all air pollutants emitted. The following section provides guidance on each step of the development of an emissions inventory.

3.1 Identify all sources of air pollution and potential emissions

A thorough understanding of the premises is essential in developing an emissions inventory. Undertaking a site visit of the existing premises or a detailed review of the engineering drawings for the proposed premises is necessary to identify all sources of air pollution and gain an understanding of the process and industry. This knowledge can be supplemented with a literature review on the industry and its most prevalent air pollution issues.

For all sources of air pollution at a premises, identify the following:

- release type
- location (in metres relative to fixed origin, elevation and discharge geometry)
- potential air pollutants emitted.

3.1.1 Release type

Source configuration may be one of the following types:

Point sources

For a point source, emissions emanate from a very small opening such as a stack or vent. Stacks usually emit hot gases forcefully into the atmosphere at a fixed height above ground level.

Tall point sources: The term ‘tall’ point source usually refers to sources that protrude out of the surface boundary layer (e.g. over 30 to 50 m tall).

Wake-affected point sources: Where nearby buildings interfere with the trajectory and growth of the plume, the source is called a wake-affected point source. A point source is wake-affected if stack height is less than or equal to 2.5 times the height of buildings located within a distance of 5L (where L is the lesser of the height or width of the building) from each release point.

Wake-free point sources: Wake-free point sources are more than 2.5 times the height of the largest nearby building, so that surrounding buildings do not influence the stack top airflow.

Area sources

An area source has a more realistic two-dimensional structure but only a limited vertical extent. It is a source with a large surface area such as a liquid surface (pond, lagoon) or a landfill surface.

Line sources

A line source is a special case of a long, thin area source. In practice, these sources are taken to be at ground level and thin. A line source becomes an area source if the breadth exceeds 20% of the length.

Volume sources

A volume source is an essentially three-dimensional structure. Usually there are a sufficient number of emission points to consider a uniform emission rate over the full source structure. They are diffuse sources, such as emissions from within a building.

3.2 Determine source release parameters

For proposed premises this information is obtained from the engineering drawings and plans. For existing premises, this information can be obtained from site-specific sampling and analysis. The release parameters for each source type are:

Point: stack height, stack diameter, temperature, discharge velocity, moisture, pressure, carbon dioxide and oxygen concentration

Diffuse area: surface area, side length and release height

Diffuse volume: side length, release height, and initial horizontal and vertical plume spread (σ_y and σ_z).

3.3 Estimate emission rates

There are a number of methods that can be used to estimate the emission rate from each source. The EPA's preferred methods are direct measurement for existing sources and manufacturers' design specifications for proposed sources. Emission factors are generally used when there is no other information available or when emissions can reasonably be demonstrated to be negligible.

3.3.1 Manufacturers' design specifications or performance guarantees

Manufacturers' design specifications or performance guarantees can be used to estimate the emission rate of air pollutants from proposed sources. Such specifications provide a reliable means of determining the upper limit to the emission rate or concentration of air pollutants for sources that are maintained and operated in a proper and efficient manner.

Post-commissioning testing may be required to establish that sources comply with the manufacturers' design specifications and/or performance guarantees.

3.3.2 Direct measurement

For sources where manufacturers' design specifications or performance guarantees are unknown, emission rates and source release parameters should normally be established from the results of source emission sampling and analysis. All sampling of source emissions and analysis of air pollutants must be in accordance with Section 1 of the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales* (DEC 2005).

3.3.3 Emission factors

An emission factor is usually an equation that relates the quantity of a pollutant released to process throughput. These factors are generally averages of all available data of acceptable quality, and are generally assumed to be representative of long-term averages for all facilities in the source category. As stated above, emission factors are generally used when there is no other information available or when emissions can reasonably be demonstrated to be negligible. Some databases of emission factors include:

- US EPA's AP-42 Emission Factors (www.epa.gov/ttn/chief)
- National Pollutant Inventory Emissions Estimation Technique Manuals (www.npi.gov.au/handbooks/approved_handbooks/sector-manuals.html).

3.3.4 Accounting for variability in emission rates

If the source is large, the frequency distribution of emission rates should be compiled and used in conjunction with the frequency distribution of meteorological conditions to predict the overall frequency distribution of predicted glcs. Manufacturers' design specifications or performance guarantees can be useful for establishing the upper bounds of likely operational variability.

If the source is smaller and data is available to describe the distribution of emission rates, use the **99.9th percentile**.

If no data is available to describe the distribution of emission rates, use the maximum measured or calculated emission rate.

Where practicable, emission rate data should be constructed using an averaging period that is the lesser of one hour or the sampling time used in the concentration calculations.

3.4 Calculate emission concentration for point sources

The concentration of a pollutant emitted from a source is calculated using equation 3.1:

Equation 3.1

$$C_i = \frac{ER_i}{FR}$$

where:

C_i = the concentration of pollutant *i* emitted from a source in mg/m^3

ER_i = the rate pollutant *i* is emitted from the source in mg/s

FR = the gaseous volumetric flow rate in m^3/s

The inventory should contain two emission concentrations:

1. Actual concentration of a pollutant emitted from a source (mg/Am^3) calculated using the actual gaseous volumetric flow rate (Am^3/s) and measured emission rate in Equation 3.1
2. Concentration of a pollutant emitted from a source corrected to the reference conditions as specified in the Regulation (mg/Nm^3 @ O_2%). This is calculated using the gaseous volumetric flow rate corrected to normal conditions (dry, 273K, 101.3 kPa) and the measured emission rate in Equation 3.1. The emission concentration (in mg/Nm^3) is then corrected to the appropriate oxygen reference condition. Further guidance on correcting to reference and equivalent values is provided in DEC (2005).

3.5 Assess compliance with the Regulation

The inventory must be used to demonstrate compliance with the Regulation. All sources of air emissions must comply with the requirements of the Regulation. If a source does not comply, the emissions inventory must be revised to reflect the implementation of new technology and/or pollution control equipment that will comply with the Regulation.

3.6 Presentation of emissions inventory

The results of the emissions inventory must be presented to include the following information:

- all release parameters of stack and fugitive sources (e.g. temperature, exit velocity, stack dimensions, flow rate, moisture content, pressure, carbon dioxide and oxygen concentration)
- pollutant emission concentrations and a comparison against the relevant requirements of the Regulation.

A suggested format for summarising and presenting the results of the emissions inventory in the impact assessment report is provided in Tables 3.1 and 3.2. The additional data that should be included in the impact assessment report for complex mixtures of odour and hydrogen sulfide is included in Table 3.3.

Table 3.1: Stack source release parameters

Source	Release type	Stack height (m)	Exit temp. (°C)	Exit diameter (m)	Exit velocity (m/s)	Oxygen conc. (%)	Moisture content (%)	Flow rate (Am^3/s)	Flow rate (Nm^3/s)
Boiler No. 1	Wake-affected	20	150	4	15	10	15	188.5	103.4

Table 3.2: Stack emission concentrations and regulation limits

Pollutant	Emission rate (g/s)	Emission concentration (mg/Am^3)	Corrected emission concentration (mg/Nm^3 at stack reference conditions)	Regulation emission concentration limit (mg/Nm^3 at stack reference conditions)
Sulfur dioxide	40	212.2	N/A	N/A
Solid particles	2	10.6	31.6	100
Oxides of nitrogen	15	79.6	237.4	350

Table 3.3: Peak odour emission rates

Source	Source type	Odour emission rate (OUm^3/s)	Stability class	Peak odour emission rate (OUm^3/s)	
				Near-field	Far-field
Lagoon No. 1	Area	20,000	A, B, C, D	50,000	46,000
			E, F	46,000	38,000

3.7 Bibliography

DEC 2005, *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wale*s, Department of Environment and Conservation NSW, Sydney.

EPA 2001, *Draft Policy: Assessment and Management of Odour from Stationary Sources in NSW*, NSW Environment Protection Authority, Sydney.

EPA 2001, *Technical Notes – Draft Policy: Assessment and Management of Odour from Stationary Sources in NSW*, NSW Environment Protection Authority, Sydney.

EPA Victoria 1985, *Plume Calculation Procedure: An Approved Procedure under Schedule E of State Environment Protection Policy (The Air Environment)*, Publication 210, Environment Protection Authority of Victoria, Melbourne.

EPA Victoria 1990, *The AUSPLUME Gaussian Plume Dispersion Model,* First Edition, Publication 264, Environment Protection Authority of Victoria, Melbourne.

EPA Victoria 1999, *AUSPLUME Gaussian Plume Dispersion Model: Technical User Manual*, Publication 671, Environment Protection Authority of Victoria, Melbourne.

EPA Victoria 2000, *AUSPLUME Gaussian Plume Dispersion Model: Technical User Manual*, Environment Protection Authority of Victoria, Melbourne.

Department of Environment and Heritage, *National Pollutant Inventory Emissions Estimation Technique Manuals* (www.npi.gov.au/handbooks/approved_handbooks/sector-manuals.html)

USEPA 1995, AP 42, *Fifth Edition Compilation of Air Pollutant Emission Factors,* Volume 1: Stationary Point and Area Sources (www.epa.gov/ttn/chief/ap42/index.html)

4 Meteorological data

The meteorological data used in the dispersion model is of fundamental importance as it drives the transport and dispersion of the air pollutants in the atmosphere. The most critical parameters are wind direction, which determines the initial direction of transport of pollutants from their sources; wind speed, which dilutes the plume in the direction of transport and determines the travel time from source to receptor; and atmospheric turbulence, which indicates the dispersive ability of the atmosphere.

4.1 Minimum data requirements

The meteorological data used in the dispersion modelling is one factor that determines the level of assessment.

Level 1 impact assessments are conducted using 'synthetic' worst-case meteorological data. Table 4.1 lists the wind speed and stability class combinations that need to be included in the synthetic worst-case meteorological data file.

Level 2 impact assessments are conducted using at least one year of site-specific meteorological data. The meteorological data must be 90% complete in order to be acceptable for use in Level 2 impact assessments (i.e. for one year, there can be no more than 876 hours of data missing). If site-specific meteorological data are not available for a Level 2 impact assessment, at least one year of site-representative meteorological data must be used. The site-representative data should be:

- preferably collected at a meteorological monitoring station. Where measured data is unavailable or of insufficient quality for dispersion modelling purposes, a meteorological data file may be generated using a prognostic meteorological model such as TAPM (Section 4.5)
- correlated against a longer-duration site-representative meteorological database of at least five years (preferably five consecutive years) to be deemed acceptable. It must be clearly established that the data adequately describes the expected meteorological patterns at the site under investigation (e.g. wind speed, wind direction, ambient temperature, atmospheric stability class, inversion conditions and katabatic drift).

4.2 Siting and operating meteorological monitoring equipment

The following methods specified in DEC (2005) must be used for establishing, siting, operating and maintaining meteorological monitoring equipment:

- AM-1 (Standards Australia 1987a)
- AM-2 (Standards Australia 1987b)
- AM-4 (USEPA 2000).

All meteorological stations used to collect data for dispersion modelling purposes must use an anemometer that has a stall speed of 0.5 m/s or less.

For the AUSPLUME dispersion model, the meteorological parameters required are:

- wind speed (m/s)
- wind direction (°)
- ambient temperature (°C)
- atmospheric stability class
- mixed layer height (m).

For deposited dust, the data file should include hourly average values for the following additional parameters:

- Monin–Obukhov length (m)
- surface friction velocity (m/s)
- surface roughness height (m).

Wind speed, wind direction and ambient temperature can be directly measured, but atmospheric stability class and mixed layer height need to be determined indirectly using other meteorological parameters with empirical formulae.

A meteorological station needs to measure and electronically log wind speed, wind direction and ambient temperature. In addition, for determining atmospheric stability class, one of the following is required:

- cloud cover and cloud ceiling height by visual observations obtained from the Bureau of Meteorology
- total solar radiation measured in conjunction with temperature at two levels and electronically logged
- sigma theta (the standard deviation of the horizontal wind direction fluctuation) electronically logged.

All parameters must be logged as 1-hour average values as a minimum requirement. In some circumstances these variables may need to be averaged and logged at intervals of 10 minutes or less.

4.3 Preparation of Level 1 meteorological data

The EPA's preferred methods for the preparation of synthetic meteorological data are specified below. The use of methods other than these should be discussed with the Air Technical Advisory Services Unit of the EPA.

4.3.1 Wind speed and stability class

Gaussian plume dispersion models use stability categories as indicators of atmospheric turbulence and the dispersive properties of the atmosphere. Based on the work of Pasquill and Gifford, seven stability categories have been defined: A – very unstable; B – unstable; C – slightly unstable; D – neutral; E – slightly stable; F – stable; and G – very stable conditions. In most dispersion models, stability classes F and G are combined into one class, F.

The stability class at any given time depends on:

- static stability (vertical temperature profile of the atmosphere, i.e. migrating high and low air-pressure masses)
- convective or thermal turbulence (caused by the rising of air heated at ground level)
- mechanical turbulence (a function of wind speed and surface roughness, i.e. wind flow over rough terrain, trees or buildings).

Table 4.1 lists the minimum wind speed and stability class combinations that must be included in a Level 1 meteorological data file.

Table 4.1: Wind speed and stability class combinations for a Level 1 data file

	Wind speed (m/s)																		
Stability class	**0.5**	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**4.5**	**5**	**6**	**7**	**8**	**10**	**12**	**14**	**16**	**18**	**20**
A	*	*	*	*	*	*													
B	*	*	*	*	*	*	*	*	*	*									
C	*	*	*	*	*	*	*	*	*	*	*	*	*	*					
D	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
E	*	*	*	*	*	*	*	*	*	*									
F	*	*	*	*	*	*													

4.3.2 Ambient temperature

For Level 1 impact assessments, the maximum and minimum ambient temperatures that are representative of the site must be included in the Level 1 meteorological data file to account for the range in possible plume rise. Higher ambient temperatures will result in the lowest plume rise and hence the largest impacts.

4.3.3 Mixing height

For Level 1 impact assessments, the mixing height for neutral and unstable conditions (classes A–D) can be calculated using an estimate of the mechanically driven mixing height. The mechanical mixing height, h, can be calculated as follows:

Equation 4.1: Mechanical mixing height for stability classes A–D

$$h = 0.3 \times u^* / f$$

where:

h = mixing height (m)

u* = friction velocity (m/s)

f = coriolis parameter

For Level 1 impact assessments, the mixing height, h, for stable conditions (classes E and F) can either be set at an unlimited value (e.g. 5000 m) or calculated as follows:

Equation 4.2: Mechanical mixing height for stability classes E and F

$$h = 0.4 \times (u^*L / f)^{0.5}$$

where:

h = mixing height (m)

u* = friction velocity (m/s)

L = Monin–Obukhov length (m)

F = coriolis parameter

4.3.4 Monin–Obukhov length

The Monin–Obukhov length, L, characterises the stability of the surface layer. The surface layer is defined as the layer above the ground in which the vertical variation of heat and momentum flux is negligible. The surface layer is typically 10% the height of the mixed layer. The parameter, L, can be calculated using the linear approximation to Golder's plot (Golder 1972) as follows:

Equation 4.3: Monin–Obukhov length

$$1/L = X + Y \times \log_{10} (Z_o)$$

where:

L = Monin–Obukhov length (m)

X & Y = parameters dependent on the Pasquill–Gifford stability class (see Table 4.2)

Z_o = surface roughness height (m) (see Table 4.3)

Table 4.2: Parameterisation of Golder's plot

	Pasquill–Gifford stability class					
Parameter	**A**	**B**	**C**	**D**	**E**	**F**
X	–0.096	–0.037	–0.002	0.000	0.004	0.035
Y	0.029	0.025	0.018	0.000	–0.018	–0.0365

In Equation 4.3:

- the value of Z_o is the surface roughness height, unless the surface roughness height is outside the range Z_{omin} to Z_{omax} presented in Table 4.3
- if the surface roughness height < Z_{omin} use the value of Z_{omin} for Z_o
- if the surface roughness > Z_{omax} use the value of Z_{omax} for Z_o.

Table 4.3: Upper and lower limits for surface roughness heights for each Pasquill–Gifford stability class

Pasquill–Gifford stability class						
Parameter	**A**	**B**	**C**	**D**	**E**	**F**
Z_{omin}	0.001	0.001	0.001	0.001	0.001	0.001
Z_{omax}	18.0	30.0	1.25	50.0	1.6	9.0

Table 4.4 presents typical values of surface roughness height for various land uses.

Table 4.4: Typical values of surface roughness height for various land-use categories (AUSPLUME version 6.0)

Land-use category	Roughness height Z_o (m)	Land-use category	Roughness height Z_o (m)
Hill	2.0	High-rise	1.0
Industrial area	0.8	Commercial	0.8
Forest	0.8	Residential	0.4
Rolling rural	0.4	Flat rural	0.1
Flat desert	0.01	Water	0.0001

4.3.5 Surface friction velocity

The surface friction velocity, u*, is a measure of mechanical turbulence and is directly related to the surface roughness. The parameter, u*, can be calculated using the procedure presented below (Businger and Fleagle 1980; McRae 1981).

Condition 1: Wind speed = 0

$u^* = 0.001$ m/s

Condition 2: Unstable conditions (Pasquill–Gifford stability classes A, B or C, or 1/L < 0)

$$u^* = VK \times W_{sp} / \phi$$

where:

u^* = surface friction velocity (m/s)

VK = von Karman constant; use a value of 0.4

W_{sp} = absolute value of the wind speed at height Z_r (m/s)

ϕ = calculated according to the following equation:

$$\phi = \ln (Z_r / Z_o) + \ln ((PZ_o^2 + 1.0) \times (PZ_o + 1.0)^2 / ((PZ_r^2 + 1.0) \times (PZ_r + 1.0)^2)) + 2 \times (\tan^{-1}(PZ_r) - \tan^{-1}(PZ_o))$$

where:

Z_r = reference height for the wind measurements (m)

Z_o = surface roughness height (m)

PZ_o and PZ_r = calculated according to the following equations:

$PZ_r = (1.0 – 15.0 \times Z_r / L)^{0.25}$

$PZ_o = (1.0 – 15.0 \times Z_o / L)^{0.25}$

Z_r = reference height for the wind measurements (m)

Z_o = surface roughness height (m)

L = Monin–Obukhov length (m)

Condition 3: Neutral conditions (Pasquill–Gifford stability class D, or 1/L = 0)

$u^* = VK \times W_{sp} / \ln (Z_r/Z_o)$

where:

u^* = surface friction velocity (m/s)

VK = von Karman constant; use a value of 0.4

W_{sp} = absolute value of the wind speed at height Z_r (m/s)

Z_r.= reference height for the wind measurements (m)

Z_o = surface roughness height (m)

Condition 4: Stable conditions (Pasquill–Gifford stability class E or F, or 1/L > 0)

$u^* = VK \times W_{sp} / (\ln (Z_r / Z_o) + 4.7 / L \times (Z_r – Z_o))$

where:

u^* = surface friction velocity (m/s)

VK = von Karman constant; use a value of 0.4

W_{sp} = absolute value of the wind speed at height Z_r (m/s)

Z_r = reference height for the wind measurements (m)

Z_o = surface roughness height (m)

4.3.6 Coriolis parameter

The coriolis parameter accounts for variation in wind direction with height (wind shear) at different latitudes and can be calculated in accordance with well-established techniques. The coriolis parameter, f, can be calculated as follows:

$f = 2\Omega\sin(\phi)$

where:

Ω = Earth's rotation rate ($2\pi/86400$ or 7.29×10^{-5} rad·s^{-1})

π = pi or 3.1416 radians (rad)

86,400 = number of seconds in the day (s/day)

ϕ = latitude in radians (rad)

Table 4.5 lists an example of typical mixing heights for a location with a similar latitude to Sydney (34°) and in a rural location (surface roughness height of 0.3 m) to be included in the Level 1 meteorological data file.

Table 4.5: Typical mixing heights for a rural location (km)

Wind speed (m/s)																			
Stability class	**0.5**	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**4.5**	**5**	**6**	**7**	**8**	**10**	**12**	**14**	**16**	**18**	**20**
A	0.2	0.4	0.6	0.8	1.0	1.2													
B	0.2	0.4	0.5	0.7	0.9	1.0	1.2	1.4	1.6	1.8									
C	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.8	2.1	2.4	3.1					
D	0.2	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3	1.4	1.7	2.0	2.2	2.8	3.3	3.9	4.5	5.0	5.0
E	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0									
F	5.0	5.0	5.0	5.0	5.0	5.0	5.0												

Table 4.6 lists an example of typical mixing heights for a location with a similar latitude to Sydney (34°) and in an urban location (surface roughness height of 1.0 m) to be included in the Level 1 meteorological data file.

Table 4.6: Typical mixing heights for an urban location (km)

Wind speed (m/s)																			
Stability class	**0.5**	**1**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**4.5**	**5**	**6**	**7**	**8**	**10**	**12**	**14**	**16**	**18**	**20**
A	0.3	0.6	1.0	1.3	1.6	2.0													
B	0.3	0.5	0.8	1.1	1.4	1.7	1.9	2.2	2.5	2.7									
C	0.2	0.4	0.7	0.9	1.1	1.3	1.5	1.8	2.0	2.2	2.6	3.1	3.5	4.4					
D	0.2	0.4	0.6	0.8	1.1	1.3	1.5	1.7	1.9	2.1	2.6	2.9	3.4	4.3	5.0	5.0	5.0	5.0	5.0
E	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0									
F	5.0	5.0	5.0	5.0	5.0	5.0	5.0												

4.4 Preparation of Level 2 meteorological data

For guidance on processing meteorological data for dispersion modelling purposes, the USEPA guide (USEPA 2000) and USEPA processor (USEPA 1996) should be used.

4.4.1 Stability class

In order of preference, the following methods outlined in USEPA (2000) should be used to determine stability class:

Turner's 1964 method: This requires information on solar altitude or zenith angle, cloud cover, cloud ceiling height and wind speed. Solar altitude can easily be calculated, but cloud cover and ceiling height are generally determined through visual observations.

Solar radiation–delta temperature method: This retains the basic structure and rationale of Turner's 1964 method but eliminates the need for observations of cloud cover and ceiling height. The method uses the surface-layer wind speed (measured at 10 m) in combination with measurements of total solar radiation during the day and a low-level vertical temperature difference (i.e. at 2 m and 10 m) at night.

Sigma theta method (the standard deviation of the horizontal wind direction fluctuation): All modern meteorological data loggers include software to determine sigma theta.

For Level 2 impact assessments, hourly stability class should be estimated using the USEPA meteorological pre-processor for regulatory models (USEPA 1996) or a processor that includes similar techniques.

4.4.2 Mixing height

Mixing height is the depth through which pollutants released to the atmosphere are typically mixed by dispersive processes. Dispersion of pollutants in the lower atmosphere is greatly aided by the convective and turbulent mixing that takes place. Mixing height determines the vertical extent of dispersion for releases occurring below that height. Releases occurring above that height are assumed to have no ground-level impact (with the exception of fumigation episodes). Therefore, the greater the vertical extent of the mixed layer, the larger the volume available to dilute pollutant emissions.

Morning and afternoon mixing heights are estimated using vertical temperature profiles (otherwise known as 'upper air data') and surface temperature measurements. For Level 2 impact assessments, hourly mixing heights should be estimated from the twice-daily mixing height values, sunrise and sunset times, and hourly stability categories by using the USEPA meteorological pre-processor for regulatory models (USEPA 1996) or a processor which includes similar techniques.

4.5 Developing site-representative meteorological data using prognostic meteorological models

In some areas of NSW neither site-specific nor site-representative meteorological data are available that are suitable for use in regulatory dispersion modelling applications. Where this is the case, prognostic meteorological models may be used.

CSIRO's TAPM (Hurley 2005a and 2005b; Hurley et al. 2005) is a three-dimensional prognostic meteorological and dispersion modelling system. TAPM is the most frequently used prognostic meteorological model in NSW. TAPM uses databases of terrain, vegetation, soil type, sea surface temperature and synoptic-scale meteorological analyses for Australia. TAPM is driven by 6-hourly synoptic analyses at approximately 75-kilometre resolution. This database is derived from Local Area Prediction System analysis data from the Bureau of Meteorology.

The following model set-up is the minimum specification that must be used to generate a meteorological data file for regulatory dispersion modelling applications:

- TAPM version 2.0 or later
- GEODATA 9-second (~250 m) terrain height database
- TAPM default databases for land use, synoptic analyses and sea surface temperature
- 25 by 25 horizontal grid points
- 25 vertical levels
- outer grid of 30 kilometres, with nesting grids of 10 km, 3 km and 1 km
- TAPM defaults for advanced meteorological inputs.

4.6 Availability of meteorological processing software, guidance documents and prognostic meteorological models

Meteorological processing software and guidance documents can be electronically downloaded, free of charge, from the USEPA website: www.epa.gov/ttn/scram/

TAPM can be purchased from CSIRO and includes a terrain and land-use database CD and synoptic analysis databases for two calendar years for Australia. Data for other geographical regions can be purchased together with extra synoptic analyses for other calendar years and a finer-resolution terrain (9-second digital elevation model) dataset for Australia.

4.7 Bibliography

Businger, J. and Fleagle, R. 1980, *An Introduction to Atmospheric Physics*, Academic Press, New York.

DEC 2005, *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*, Department of Environment and Conservation NSW, Sydney.

Golder, D. 1972, 'Relations among stability parameters in the surface layer', *Boundary Layer Meteorology* 3, 47–58.

Hurley, P. 2005a, *The Air Pollution Model (TAPM) Version 3, Part 1: Technical Description*, CSIRO Atmospheric Research Technical Paper No. 71, CSIRO Division of Atmospheric Research, Melbourne.

Hurley, P. 2005b, *The Air Pollution Model (TAPM) Version 3: User Manual*, CSIRO Atmospheric Research Technical Paper No. 31, CSIRO Division of Atmospheric Research, Melbourne.

Hurley, P., Physick, W., Luhar, A. and Edwards, M. 2005, *The Air Pollution Model (TAPM) Version 3, Part 2: Summary of Some Verification Studies*, CSIRO Atmospheric Research Technical Paper No. 72, CSIRO Division of Atmospheric Research, Melbourne.

McRae, G.J. 1981, Mathematical Modelling of Photochemical Air Pollution, Chapter 4, 'Turbulent Diffusion Coefficients', PhD Thesis, California Institute of Technology, Los Angeles.

Standards Australia 1987a, AS 2922–1987, *Ambient Air – Guide for the Siting of Sampling Units*, Standards Australia, Sydney.

Standards Australia 1987b, AS 2923–1987, *Ambient Air – Guide for the Measurement of Horizontal Wind for Air Quality Applications*, Standards Australia, Sydney.

USEPA 1996, *Meteorological Processor for Regulatory Model (MPRM), User's Guide*, EPA-454/B-96-002, United States Environmental Protection Agency, Washington DC, USA.

USEPA 2000, *Meteorological Monitoring Guidance for Regulatory Modelling Applications*, EPA-450/R-99-005, United States Environmental Protection Agency, Washington DC, USA.

Zanetti, P. 1990, *Air Pollution Modelling: Theories, Computational Methods and Available Software*, Van Nostrand Reinhold, New York.

5 Background air quality, terrain, sensitive receptors and building wake effects

5.1 Background air quality data

Including background concentrations of pollutants in the assessment enables the total impact of the proposal (i.e. impact of emissions on existing air quality) to be assessed. The background concentrations of air pollutants are ideally obtained from ambient monitoring data collected at the proposed site. As this is extremely rare, data is typically obtained from a monitoring site as close as possible to the proposed location where the sources of air pollution resemble the existing sources at the proposal site.

5.1.1 Accounting for background concentrations

For impact assessments of sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), $PM_{2.5}$, PM_{10}, total suspended particulates (TSP), deposited dust, lead (Pb), carbon monoxide (CO) and hydrogen fluoride (HF), the existing background concentrations of the pollutants in the vicinity of the proposal should be included in the assessment as follows:

Level 1 assessments

- Obtain ambient monitoring data that includes at least one year of continuous measurements.
- Determine the maximum background concentration of the pollutant being assessed for each relevant averaging period.
- At the maximum exposed off-site receptor, add the maximum background concentration and the **100th percentile** dispersion model prediction to obtain the total impact for each averaging period.

Level 2 assessments

- Obtain ambient monitoring data that includes at least one year of continuous measurements and is contemporaneous with the meteorological data used in the dispersion modelling.
- At each receptor, add each individual dispersion model prediction to the corresponding measured background concentration (e.g. add the first hourly average dispersion model prediction to the first hourly average background concentration) to obtain hourly predictions of total impact.
- At each receptor, determine the **100th percentile** total impact for the relevant averaging.

The use of an approach other than those above should be discussed with the Air Technical Advisory Services Unit of the EPA.

5.1.2 Sourcing ambient monitoring data

Ambient monitoring data from a variety of locations in NSW is published in DEC's *Quarterly Air Monitoring Reports* (www.environment.nsw.gov.au/air/datareports.htm) and may be of assistance in characterising the existing ambient air quality. Data may also be obtained from various industry monitoring programs.

All monitoring to establish background concentrations must be conducted in accordance with the methods specified in DEC (2005).

5.1.3 Dealing with elevated background concentrations

In some locations, existing ambient air pollutant concentrations may exceed the impact assessment criteria from time to time. In such circumstances, a licensee must demonstrate that no additional exceedances of the impact assessment criteria will occur as a result of the proposed activity and that best management practices will be implemented to minimise emissions of air pollutants as far as is practical. Refer to the worked example included in Section 11.2.

5.2 Terrain and sensitive receptors

The dispersion modelling input file requires information regarding the surrounding terrain and sensitive receptors. Terrain and receptor files are developed which include the location and height in metres relative to a fixed origin. The location of any particularly sensitive receptors (and likely future sensitive receptors) such as residences, schools and hospitals can also be specifically included in the receptor file.

5.3 Building wake affects

PRIME is EPA's preferred building wake algorithm. AUSPLUME v. 6.0 includes the PRIME building wake algorithm and the Building Profile Input Program (BPIP) for entering the location and dimension of buildings. The location and dimensions of buildings located within a distance of 5L (where L is the lesser of the height or width of the building) from each release point for buildings with a height greater than 0.4 times the stack height should be entered in BPIP.

5.4 Bibliography

DEC 2005, *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*, Department of Environment and Conservation NSW, Sydney.

DEC 4th Quarter 2003–present, *Quarterly Air Quality Monitoring Report Part A: DEC Data*, Department of Environment and Conservation NSW, Sydney.

DEC 4th Quarter 2003–present, *Quarterly Air Quality Monitoring Report Part B: Industry Data*, Department of Environment and Conservation NSW, Sydney.

EPA 1992–3rd Quarter 2003, *Quarterly Air Quality Monitoring Report Part A: EPA Data*, NSW Environment Protection Authority, Sydney.

EPA 1992–3rd Quarter 2003, *Quarterly Air Quality Monitoring Report Part B: Industry Data*, NSW Environment Protection Authority, Sydney.

EPA Victoria 2000, *AUSPLUME Gaussian Plume Dispersion Model: Technical User Manual*, Environment Protection Authority of Victoria, Melbourne.

Schulman, L.L., Strimaitis, D.G. and Scire, J.S.1998, *Development and Evaluation of the PRIME Plume Rise and Building Downwash Model,* Preprint Volume for the Tenth Joint Conference on Applications of Air Pollution Meteorology with A&WMA, American Meteorological Society, Phoenix, Arizona.

SPCC 1975–1991, *Quarterly Air Quality Monitoring Reports*, State Pollution Control Commission, Sydney.

USEPA 1995, *User's Guide to the Building Profile Input Program*, Revised February 1995, PA-454/R-93-038, United States Environmental Protection Agency, Washington DC, USA.

6 Dispersion modelling

6.1 Dispersion models

Dispersion models provide the ability to mathematically simulate atmospheric conditions and behaviour. They are used to calculate spatial and temporal sets of concentrations and particle deposition due to emissions from various sources. Dispersion models can be used to determine the affected zone around an emitter by producing results that can be compared against impact assessment criteria.

Dispersion models can provide concentration or deposition estimates over an almost unlimited grid of user-specified locations, and can be used to evaluate both existing and forecast emission scenarios. In this capacity, air dispersion modelling is a useful tool in assessing the air quality impacts associated with existing and proposed emission sources. The results of the dispersion modelling analysis can be used to develop control strategies that should ensure compliance with the assessment criteria. Dispersion models can also be used to estimate the cumulative impacts of various industries that are located close to one another.

Dispersion models are widely used by environmental regulators in Australia, New Zealand, the United States, the United Kingdom and Europe, and industry well understands their limitations. The results have been shown, through numerous model evaluation studies, to be sufficiently robust to be relied on to calculate concentration limits for point-source stack emissions.

6.2 Approved dispersion models

AUSPLUME v. 6.0 or later is the approved dispersion model for use in most simple, near-field applications in NSW, where coastal effects and complex terrain are of no concern.

AUSPLUME is a Gaussian plume model, based on the assumption that cross-sections through elevated plumes from point sources of pollution have a Gaussian (or normal) distribution of concentration. AUSPLUME is also a steady-state model, which assumes the atmosphere is in a state of uniform flow, and wind velocity is a function of height alone and does not vary with direction. The mathematical basis of AUSPLUME is the Victorian EPA's Plume Calculation Procedure (EPA Victoria 1985), which itself is an extension of the ISC model (USEPA 1995).

AUSPLUME v. 6.0 or later is specifically *not* approved for use in the following applications:

- **complex terrain, non-steady-state conditions:** AUSPLUME is a steady-state model and is unable to adjust the winds to reflect the effects of terrain. The straight-line trajectory assumption of the plume model is unable to handle the curved flow associated with terrain-induced deflection of channelling. AUSPLUME should not be used for terrain where the height of any receptor exceeds the lowest release height.
- **buoyant line plumes** (e.g. discharges from the roof vents of aluminium smelters)
- **coastal effects such as fumigation:** AUSPLUME is unable to consider large changes in meteorological conditions which can occur over short distances across a coastline.
- **high frequency of stable calm night-time conditions:** Pollutants can accumulate under such conditions or will flow downwind with the drainage flow. AUSPLUME has no memory of the previous hour's weather conditions as each hour is treated independently of the next and material is carried away instantaneously, to the edge of the grid, even if only light winds are prevailing.

- **high frequency of calm conditions:** AUSPLUME cannot handle calm conditions because of the inverse wind speed dependence plume equation. AUSPLUME assumes a minimum wind speed, which shoots the plume out to the edge of the grid even though the plume may not have moved at all.
- **inversion break-up fumigation conditions**.

There are also other situations where another dispersion model may be more scientifically sound than AUSPLUME. In these instances, CALPUFF or TAPM (Section 6.3) may be appropriate. The two key factors that should be considered in evaluating whether to use a conventional plume model, such as AUSPLUME, or a more sophisticated approach are:

1. Is the steady-state assumption in the plume model valid?
2. Do the technical parameterisations in the plume model adequately treat the situation to be modelled?

For other applications, the choice of a dispersion model other than AUSPLUME, CALPUFF or TAPM should be discussed with the Air Technical Advisory Services Unit of the EPA. For the calculation of site-specific emission limits for hydrogen sulfide and sulfur dioxide, written approval must be obtained from the EPA for the use of a dispersion model other than AUSPLUME, CALPUFF or TAPM. The application must show that the alternative dispersion model is scientifically sound for the proposed application.

6.3 Advanced dispersion models for specialist application

In circumstances where the AUSPLUME dispersion model is not approved or suitable for use, other dispersion models may be appropriate. Guidance on choosing appropriate alternative dispersion models can be found in the USEPA publication *Guideline on Air Quality Models* (USEPA 1999). CALPUFF and TAPM are the most commonly used alternative dispersion models for regulatory dispersion modelling applications in NSW. However only experienced appropriately trained professionals should use them.

6.3.1 CALPUFF

CALPUFF is a multi-layer, multi-species, non-steady-state Gaussian puff dispersion model that is able to simulate the effects of time- and space-varying meteorological conditions on pollutant transport. This enables the model to account for a variety of effects such as spatial variability of meteorological conditions, causality effects, dry deposition and dispersion over a variety of spatially varying land surfaces, plume fumigation, low wind speed dispersion, pollutant transformation and wet removal. CALPUFF has various algorithms for parameterising dispersion processes, including the use of turbulence-based dispersion coefficients derived from similarity theory or observations.

CALPUFF has been accepted by the USEPA as a guideline model to be used in regulatory applications involving the long-range transport of pollutants (> 50 km). It can also be used on a case-by-case basis in situations involving complex flow and non-steady-state cases up to 50 kilometres form the source.

CALPUFF v. 5.7, CALMET v. 5.5 and CALPOST v. 5.4 or later should be used.

6.3.2 TAPM

The Air Pollution Model (TAPM) was developed by the CSIRO to simulate three-dimensional meteorology and pollution dispersion in areas where meteorological data are sparse or non-existent. The modelling system contains a number of dispersion modules. These include a particle/puff dispersion model for dispersion from point, line, area and volume sources, and a three-dimensional grid-point model for urban air pollution studies. The dispersion models allow for plume rise and building wake effects, wet and dry deposition and photochemistry for urban airshed applications. TAPM v. 2.0 or later should be used.

6.4 Dispersion modelling methodology using AUSPLUME

Unless otherwise stated, the default options specified in the *Technical Users Manual* (EPA Victoria 2000) must be used with AUSPLUME. These options are the most appropriate for most impact assessment applications.

Terrain effects

- Use the Egan half-height approach to account for terrain effects.

Building wake effects

- All building dimensions must be entered in 10-degree increments. Use the USEPA utility program BPIP (USEPA 1995) within AUSPLUME to calculate the 36 wind-direction-dependent building dimensions.
- Use the PRIME method to account for building wake effects.
- The USEPA's guidance document on good engineering practice (USEPA 1985) must be taken into account when designing new stacks to avoid building wake effects.

Horizontal dispersion curves

- For stacks < 100 m high, use sigma theta values or Pasquill–Gifford curves.
- For stacks > 100 m high, use Briggs rural curves.

Vertical dispersion curves

- For stacks < 100 m high, use Pasquill–Gifford curves.
- For stacks > 100 m high, use Briggs rural curves.

'Enhance plume spreads for buoyancy'

- Enable this option for both the horizontal and vertical dimensions.

'Adjust Pasquill–Gifford formulae for roughness height'

- Use this option.

Plume rise parameters

- Use the AUSPLUME defaults.

Wind speed categories

- Use the AUSPLUME defaults.

Wind profile exponents

- Use Irwin rural wind profile exponents for rural areas.
- Use Irwin urban wind profile exponents for urban areas.

6.5 Dispersion modelling methodology using CALPUFF

CALPUFF includes an option to automatically set all the options to the USEPA default values. These include:

- Wind speed profile: ISC Rural
- Transitional plume rise modelled
- Stacktip downwash
- Partial plume penetration
- Dispersion curves: Pasquill-Gifford or dispersion coefficients using turbulence-based micro-meteorology
- No adjustment of dispersion curves for roughness
- Terrain: partial plume adjustment method

6.6 Calculate peak concentrations

The evaluation of odour impacts requires the estimation of short or peak concentrations on the time scale of less than one second. Dispersion model predictions are typically valid for averaging periods of one hour and longer. Dispersion models, such as AUSPLUME, therefore need to be supplemented to accurately simulate atmospheric dispersion of odours and the instantaneous perception of odours by the human nose.

The prediction of peak concentrations from estimates of ensemble means can be obtained from a ratio between extreme short-term concentration and longer-term averages. Properly defined peak-to-mean ratios depend upon the type of source, atmospheric stability and distance downwind. Table 6.1 shows the EPA-recommended factors for estimating peak concentrations for different source types, stabilities and distances as developed by Katestone Scientific (1995 and 1998).

The P/M60 ratios in Table 6.1 are for an idealised situation for one source in flat terrain where the receptor is located along the centreline of the single plume. The ratios do not consider fluctuations away from the centre line, terrain influences or plume interaction from multiple sources.

The EPA requires peak ground level concentrations to be calculated for the following pollutants:

- hydrogen sulfide
- complex mixtures of odour.

A screening level assessment of peak glcs can be undertaken by applying the ratios in Table 6.1 to multiple sources at a premises. These ratios can be applied to the emission rates entered into the dispersion model as follows:

1. Determine the source type, stability class and if the receptors are near-field or far-field or both.
2. Select the appropriate P/M60 ratios from Table 6.1.
3. For wake-affected point sources, determine the meteorological conditions (i.e. wind speed and stability class) under which the source is wake-affected and wake-free.
4. Apply P/M60 ratios to odour and hydrogen sulfide emission rates so they vary with wind speed and stability class

More detailed procedures for estimating peak glcs from multiple sources are discussed in Katestone Scientific (1995 and1998).

Table 6.1: Factors for estimating peak concentrations in flat terrain (Katestone Scientific 1995 and 1998)

Source type	Pasquill–Gifford stability class	Near-field P/M60*	Far-field P/M60*
Area	A, B, C, D	2.5	2.3
	E, F	2.3	1.9
Line	A–F	6	6
Surface wake-free point	A, B, C	12	4
	D, E, F	25	7
Tall wake-free point	A, B, C	17	3
	D, E, F	35	6
Wake-affected point	A–F	2.3	2.3
Volume	A–F	2.3	2.3

* Ratio of peak 1-second average concentrations to mean 1-hour average concentrations

6.7 Availability of dispersion modelling software and guidance documents

Windows-based **AUSPLUME** v. 6.0 can be purchased by writing to:

Environment Protection Authority of Victoria
27 Francis Street
Melbourne Victoria 3000

The **BPIP PRIME** (BPIPPRM) user's manual and software can be electronically downloaded, free of charge, from the USEPA website at www.epa.gov/scram001/tt22.htm#bpipprm

The **CALPUFF** dispersion modelling package and guidance documents can be electronically downloaded, free of charge, from the Earth Tech Incorporated website at earthtec.vwh.net/download/download.htm

The **TAPM** software can be purchased by writing to:

Dr Peter Hurley
CSIRO Atmospheric Research
PMB 1
Aspendale Victoria 3195

Guidance documents and information about TAPM can be obtained from the CSIRO website at www.dar.csiro.au/tapm/

Other dispersion modelling software and guidance documents can be electronically downloaded free of charge from the USEPA website at www.epa.gov/ttn/scram/

6.8 Bibliography

Earth Tech 2000, *A User's Guide for the CALPUFF Dispersion Model (Version 5)*, Earth Tech Incorporated, Long Beach CA, USA.

Earth Tech 2000, *A User's Guide for the CALMET Meteorological Model (Version 5)*, Earth Tech Incorporated, Long Beach CA, USA.

EPA Victoria 1985, *Plume Calculation Procedure*, Environment Protection Authority of Victoria, Melbourne.

EPA Victoria 1986, *The AUSPLUME Gaussian Plume Dispersion Model*, First Edition, Publication 264, Environment Protection Authority of Victoria, Melbourne.

EPA Victoria 1999, *AUSPLUME Gaussian Plume Dispersion Model: Technical User Manual*, Publication 671, Environment Protection Authority of Victoria, Melbourne.

EPA Victoria 2000, *AUSPLUME Gaussian Plume Dispersion Model: Technical User Manual*, Environment Protection Authority of Victoria, Melbourne.

Hurley, P. 2005, *The Air Pollution Model (TAPM) Version 3, Part 1: Technical Description*, CSIRO Atmospheric Research Technical Paper No. 71, CSIRO Division of Atmospheric Research, Melbourne.

Hurley, P. 2005, *The Air Pollution Model (TAPM) Version 3: User Manual*, CSIRO Atmospheric Research Technical Paper No. 31, CSIRO Division of Atmospheric Research, Melbourne.

Hurley, P., Physick, W., Luhar, A. and Edwards, M. 2005, *The Air Pollution Model (TAPM) Version 3, Part 2: Summary of Some Verification Studies*, CSIRO Atmospheric Research Technical Paper No. 72, CSIRO Division of Atmospheric Research, Melbourne.

Katestone Scientific 1995, *The Evaluation of Peak-to-Mean Ratios for Odour Assessments*, volumes I and II, Katestone Scientific Pty Ltd, Brisbane.

Katestone Scientific 1998, *Peak-to-Mean Concentration Ratios for Odour Assessments*, Katestone Scientific Pty Ltd, Brisbane.

Schulman, L.L., Strimaitis, D.G. and Scire, J.S., *Development and Evaluation of the PRIME Plume Rise and Building Downwash Model*, Preprint Volume for the Tenth Joint Conference on Applications of Air Pollution Meteorology with A&WMA, American Meteorological Society, Phoenix, Arizona, 1998.

USEPA 1985, *Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations)*, Revised, EPA-450/4-80-023R, United States Environmental Protection Agency, Washington DC, USA.

USEPA 1995, *User's Guide to the Building Profile Input Program*, Revised February 1995, EPA-454/R-93-038, United States Environmental Protection Agency, Washington DC, USA.

USEPA 1995, *User's Guide for the Industrial Source Complex (ISC3) Dispersion Models, Volume 1 and Volume 2*, US EPA Office of Air Quality Planning and Standards Emissions, Monitoring, and Analysis Division Research Triangle Park, North Carolina.

USEPA 1997, *Addendum to ISC3 User's Guide, The PRIME Plume Rise and Building Downwash Model*, United States Environmental Protection Agency, Washington DC, USA.

USEPA 1999, *Guideline on Air Quality Models*, 40 CFR, Chapter I, Part 51, Appendix W, United States Environmental Protection Agency, Washington DC, USA.

7 Interpretation of dispersion modelling results

The primary purpose of an air quality impact assessment is to determine whether emissions from a premises will comply with the appropriate environmental outcomes. The assessment criteria outlined below reflect the environmental outcomes adopted by the EPA.

To ensure the environmental outcomes are achieved, emissions from a premises must be assessed against the assessment criteria. The cumulative impact of emissions from several facilities also needs to be considered. Impacts of sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), Lead (Pb), particles ($PM_{2.5}$ and PM_{10}), total suspended particulates (TSP), deposited dust, carbon monoxide (CO) and hydrogen fluoride (HF) must be combined with existing background levels before comparison with the relevant impact assessment criteria.

Assessment criteria must not be used as limit conditions in environment protection licences. Compliance with assessment criteria (i.e. in the ambient air at the boundary of the premises or nearest sensitive receptor) cannot be readily determined for regulatory purposes. For point sources, a site-specific stack emission limit can be calculated (see Section 10 and 11.1) so that the assessment criteria will not be exceeded at and beyond the boundary of a premise because of emissions from those sources.

Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales

7.1 SO_2, NO_2, O_3, Pb, $PM_{2.5}$, PM_{10}, TSP, deposited dust, CO and HF

7.1.1 Impact assessment criteria

Table 7.1: Impact assessment criteria for SO_2, NO_2, O_3, Pb, $PM_{2.5}$, PM_{10}, TSP, deposited dust, CO and HF

Pollutant	Averaging period	Concentration		Source
		pphm	µg/m³	
Sulfur dioxide (SO_2)	10 minutes	25	712	NHMRC (1996)
	1 hour	20	570	NEPC (1998)
	24 hours	8	228	NEPC (1998)
	Annual	2	60	NEPC (1998)
Nitrogen dioxide (NO_2)	1 hour	12	246	NEPC (1998)
	Annual	3	62	NEPC (1998)
Photochemical oxidants (as ozone)	1 hour	10	214	NEPC (1998)
	4 hours	8	171	NEPC (1998)
Lead	Annual	–	0.5	NEPC (1998)
$PM_{2.5}$	24 hours	–	25	DoE (2016)
	Annual	–	8	DoE (2016)
PM_{10}	24 hours	–	50	DoE (2016)
	Annual	–	25	DoE (2016)
Total suspended particulates (TSP)	Annual	–	90	NHMRC (1996)
		g/m²/month[a]	g/m²/month[b]	
Deposited dust[c]	Annual	2	4	NERDDC (1988)
		ppm	mg/m³	
Carbon monoxide (CO)	15 minutes	87	100	WHO (2000)
	1 hour	25	30	WHO (2000)
	8 hours	9	10	NEPC (1998)
		µg/m³ [d]	µg/m³ [e]	
Hydrogen fluoride	90 days	0.5	0.25	ANZECC (1990)
	30 days	0.84	0.4	ANZECC (1990)
	7 days	1.7	0.8	ANZECC (1990)
	24 hours	2.9	1.5	ANZECC (1990)

a. Maximum increase in deposited dust level.
b. Maximum total deposited dust level.
c. Dust is assessed as insoluble solids as defined by AS 3580.10.1–1991 (AM-19).
d. General land use, which includes all areas other than specialised land use.
e. Specialized land use, which includes all areas with vegetation sensitive to fluoride, such as grape vines and stone fruits.

7.1.2 Application of impact assessment criteria

The assessment criteria in Table 7.1 must be applied as follows:

1. At the **nearest existing or likely future off-site sensitive receptor**.
2. The **incremental impact** (predicted impacts due to the pollutant source alone) for each pollutant must be reported in units and averaging periods consistent with the impact assessment criteria.
3. **Background concentrations** must be included using the procedures specified in Section 5.
4. **Total impact (incremental impact plus background)** must be reported as the **100th percentile** in concentration or deposition units consistent with the impact assessment criteria and compared with the relevant impact assessment criteria.

7.2 Individual toxic air pollutants

7.2.1 Impact assessment criteria

Tables 7.2a and 7.2b list the impact assessment criteria for individual toxic air pollutants. The principal toxic air pollutants in Table 7.2a are defined on the basis that they are carcinogenic, mutagenic, teratogenic, highly toxic or highly persistent in the environment. Criteria for other individual toxic air pollutants are shown in Table 7.2b.

Principal toxic air pollutants must be minimised to the maximum extent achievable through the application of best-practice process design and/or emission controls. Decisions with respect to achievability will have regard to technical, logistical and financial considerations. Technical and logistical considerations include a wide range of issues that will influence the feasibility of an option: for example, whether a particular technology is compatible with an enterprise's production processes.

Financial considerations relate to the financial viability of an option. It is not expected that reductions in emissions should be pursued 'at any cost'. Nor does it mean that the preferred option will always be the lowest cost option. However it is important that the preferred option is cost-effective. The costs need to be affordable in the context of the relevant industry sector within which the enterprise operates. This will need to be considered on a case-by-case basis through discussions with the EPA.

Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales

Table 7.2a: Impact assessment criteria for principal toxic air pollutants (Victorian Government Gazette 2001)

Substance	Averaging period	Code	Impact assessment criteria	
			mg/m³ [a]	ppm
Acrolein	1 hour	1	0.00042	0.00018
Acrylonitrile	1 hour	2	0.008	0.0037
Alpha chlorinated toluenes and benzoyl chloride	1 hour	3	0.009	0.0018
Arsenic and compounds	1 hour	4	0.00009	N/A
Asbestos	1 hour	4	0.18	N/A
Benzene	1 hour	4	0.029	0.009
Beryllium and beryllium compounds	1 hour	4	0.000004	N/A
1,3-butadiene	1 hour	3	0.04	0.018
Cadmium and cadmium compounds	1 hour	4	0.000018	N/A
Chromium VI compounds	1 hour	4	0.00009	N/A
1,2-dichloroethane (ethylene dichloride)	1 hour	5	0.07	0.018
Dioxins and furans[b]	1 hour	4	2.0E–09	N/A
Epichlorohydrin	1 hour	3	0.014	0.0037
Ethylene oxide	1 hour	4	0.0033	0.0018
Formaldehyde	1 hour	6	0.02	0.018
Hydrogen cyanide	1 hour	1	0.20	0.18
MDI (diphenylmethane diisocyanate)	1 hour	1	0.00004	N/A
Nickel and nickel compounds	1 hour	4	0.00018	0.00009
Polycyclic aromatic hydrocarbon (as benzo[a]pyrene)[c]	1 hour	3	0.0004	N/A
Pentachlorophenol	1 hour	1	0.0009	N/A
Phosgene	1 hour	1	0.007	0.0018
Propylene oxide	1 hour	2	0.09	0.037
TDI (toluene-2,4-diisocyanate; toluene-2,6-diisocyanate)	1 hour	1	0.00004	N/A
Trichloroethylene	1 hour	3	0.5	0.09
Vinyl chloride	1 hour	4	0.024	0.009

a. Gas volumes are expressed at 25°C and at an absolute pressure of 1 atmosphere (101.325 kPa).

b. Toxic equivalent as defined in clause 29 of the Regulation

c. Refer to Table 7.2c

Codes:

1. USEPA extremely toxic
2. USEPA Group B1 carcinogen (probable human carcinogen)
3. IARC Group 2A carcinogen (probable human carcinogen)
4. IARC Group 1 carcinogen (known human carcinogen)
5. Mutagen (USEPA)
6. IARC Group 2B carcinogen (possible human carcinogen)

Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales

Table 7.2b: Impact assessment criteria for individual toxic air pollutants (Victorian Government Gazette 2001)

Substance	Averaging period	Impact assessment criteria	
		mg/m^3 [a]	ppm
Acetone	1 hour	22	9.2
Acrylic acid	1 hour	0.11	0.037
Ammonia	1 hour	0.33	0.46
Aniline	1 hour	0.14	0.037
Antimony and compounds	1 hour	0.009	N/A
Asphalt (petroleum) fumes	1 hour	0.09	N/A
Barium (soluble compound)	1 hour	0.009	N/A
Biphenyl	1 hour	0.024	0.0037
Bromochloromethane	1 hour	19	3.7
Bromoform (tribromomethane)	1 hour	0.09	0.009
Bromotrifluoromethane	1 hour	112	18
Carbon black	1 hour	0.05	N/A
Carbon tetrachloride (tetrachloromethane)	1 hour	0.012	0.0018
Chlorine	1 hour	0.05	0.018
Chlorine dioxide	1 hour	0.0051	0.0018
Chloroform (trichloromethane)	1 hour	0.9	0.18
Chloromethane (methyl chloride)	1 hour	1.9	0.9
Chromium (III) compounds	1 hour	0.009	N/A
Copper fumes	1 hour	0.0037	N/A
Copper dusts and mists	1 hour	0.018	N/A
Cotton dust (raw)	1 hour	0.0037	N/A
Crotonaldehyde	1 hour	0.1	0.037
Cyanide (as CN)	1 hour	0.09	N/A
Cyclohexane	1 hour	19	5
Cyclohexanol	1 hour	3.8	0.9
o-dichlorobenzene	1 hour	5.5	0.9
1,2-dichloroethylene	1 hour	14.4	3.7
Dichlorvos	1 hour	0.018	0.0018
Dinitrobenzene (all isomers)	1 hour	0.018	0.003
Dinitrotoluene	1 hour	0.027	N/A
Ethanolamine	1 hour	0.14	0.05
Ethylbenzene	1 hour	8.0	1.8
Ethyl butyl ketone	1 hour	4.2	0.9
Ethyl chloride (chloroethane)	1 hour	48	18
Ethylene glycol (vapour)	1 hour	1	N/A
n-hexane	1 hour	3.2	0.9
2-hexanone	1 hour	1.8	0.46
Hydrogen chloride	1 hour	0.14	0.09

Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales

Substance	Averaging period	Impact assessment criteria	
		mg/m^3 [a]	ppm
Iron oxide fumes	1 hour	0.09	N/A
Magnesium oxide fumes	1 hour	0.18	N/A
Maleic anhydride	1 hour	0.018	0.0046
Manganese and compounds	1 hour	0.018	N/A
Mercury organic	1 hour	0.00018	N/A
Mercury inorganic	1 hour	0.0018	N/A
Methyl acrylate	1 hour	0.66	0.18
Methyl bromide (bromomethane)	1 hour	0.35	0.09
Methylene chloride (dichloromethane)	1 hour	3.19	0.9
Nitric acid	1 hour	0.09	0.037
n-pentane	1 hour	33	11
2-pentanone	1 hour	12.8	3.7
Phthalic anhydride	1 hour	0.1	0.018
Propylene glycol monomethyl ether	1 hour	6.6	1.8
Silver metal	1 hour	0.0018	N/A
Silver, soluble compounds (as Ag)	1 hour	0.00018	N/A
Sulfuric acid	1 hour	0.018	N/A
1,1,1-trichloroethane (methyl chloroform)	1 hour	12.5	2.3
1,1,2-trichloroethane	1 hour	1.0	0.18
Trichlorofluoromethane	1 hour	103	18.3
Trimethylbenzene (mixed isomers)	1 hour	2.2	0.46
Vinyl toluene	1 hour	4.4	0.9
Welding fumes (total particulate)	1 hour	0.09	N/A
Wood dust hardwoods	1 hour	0.0018	N/A
Wood dust softwoods	1 hour	0.009	N/A
Zinc chloride fumes	1 hour	0.018	N/A
Zinc oxide fumes	1 hour	0.09	N/A

a. Gas volumes are expressed at 25°C and at an absolute pressure of 1 atmosphere (101.325 kPa).

Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales

Table 7.2c: Potency equivalency factors (PEFs) for PAHs (OEHHA 1994)

PAH or derivative	CAS number	PEF
Benzo[a]pyrene	50-32-8	1
Benzo[a]anthracene	56-55-3	0.1
Benzo[b]fluoranthene	205-99-2	0.1
Benzo[j]fluoranthene	205-82-3	0.1
Benzo[k]fluoranthene	207-08-9	0.1
Bibenz[a,j]acridine	224-42-0	0.1
Bibenz[a,h]acridine	226-36-8	0.1
7h-dibenzo[c,g]carbazole	194-59-2	1
Dibenzo[a,e]pyrene	192-65-4	1
Dibenzo[a,h]pyrene	189-64-0	10
Dibenzo[a,i]pyrene	189-55-9	10
Dibenzo[a,l]pyrene	191-30-0	10
5-nitroacenaphthene	602-87-9	0.01
Indeno[1,2,3-cd]pyrene	193-39-5	0.1
5-methylchrysene	3697-24-3	1
1-nitropyrene	5522-43-0	0.1
4-nitropyrene	57835-92-4	0.1
1,6-dinitropyrene	42397-64-8	10
1,8-dinitropyrene	42397-65-9	1
6-nitrocrysene	7496-02-8	10
2-nitrofluorene	607-57-8	0.01
Chrysene	218-01-9	0.01
Dibenz[a,h]anthracene	53-70-3	0.4
7,12-dimethylbenzanthracene	57-97-6	21.8
3-methylcholanthrene	56-49-5	1.9

7.2.2 Application of impact assessment criteria

The impact assessment criteria for individual toxic air pollutants in Tables 7.2a and 7.2b must be applied as follows:

1. **At and beyond the boundary of the facility**.
2. The **incremental impact** (predicted impacts due to the pollutant source alone) for each pollutant must be reported in concentration units consistent with the criteria (mg/m^3 or ppm), for an **averaging period of 1 hour** and as the:
   a. **100th percentile** of dispersion model predictions for Level 1 impact assessments, or
   b. **99.9th percentile** of dispersion model predictions for Level 2 impact assessments.
3. Polycyclic aromatic hydrocarbons (PAH) as benzo[a]pyrene (BaP) must be calculated using the potency equivalency factors for PAHs in Table 7.2c.
4. Dioxins and furans as toxic equivalent must be calculated according to the requirements of clause 29 of the Regulation.

7.3 Complex mixtures of toxic air pollutants

7.3.1 Risk assessment criteria

Where a number of toxic and carcinogenic air pollutants are emitted in significant amounts, demonstrating compliance with impact assessment criteria may not adequately demonstrate the protection of human health. A risk assessment can be used to assess the potential risk arising from exposure to emissions of toxic air pollutants after emissions of principal toxic air pollutants have been reduced to the maximum extent achievable, and compliance with the impact assessment criteria has been demonstrated. Health risk assessment is particularly useful for the assessment of multiple chemicals and exposure through multiple pathways (e.g. inhalation, ingestion or dermal adsorption).

Take care when interpreting the results of a risk assessment. A risk assessment does not demonstrate that a particular impact will happen. Often the information available to risk assessors is imperfect, and consequently assumptions are made that tend to overestimate a risk. It is legitimate for a risk assessor to go through a process of refining assumptions to obtain a more realistic assessment of risk.

Guidelines for undertaking risk assessment in Australia have been prepared by the enHealth Council (enHealth 2002). These guidelines provide a broad framework for risk assessment that aims to enhance its use in environmental impact assessment.

The risk assessment process includes the following aspects:

- hazard identification
- assessment of exposure
- dose response assessment
- risk characterisation.

Assessment of exposure should be based on enHealth's published information on the assessment of exposure in Australia (enHealth 2001 and 2003).

Dose response assessment and risk characterisation can be undertaken in accordance with the following:

- *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (OEHHA 2003)
- *Hot Spots Analysis and Reporting Program* (HARP) (CARB 2003a)
- *Hot Spots Analysis and Reporting Program – User Guide Version 1.0* (CARB 2003b).

The results of the risk assessment should be compared with the criteria specified in Table 7.3 for carcinogenic risk and the acute and chronic non-carcinogenic hazard index.

Table 7.3: Acceptance criteria for risk and hazard index

Evaluation	Carcinogenic risk (CR)	Acute and chronic non-carcinogenic hazard index (HI)
Acceptable	Less than 1 in 1 million (1×10^{-6})	Less than 0.2
Require best practice for air toxics and CR < 1 in 1 million and HI < 0.2	1 in 1 million to 1 in 10 thousand (1×10^{-6} to 1×10^{-4})	0.2 to 10
Not acceptable	Greater than 1 in 10 thousand (1×10^{-4})	Greater than 10

7.4 Individual odorous air pollutants

7.4.1 Impact assessment criteria

Table 7.4a lists the impact assessment criteria for individual odorous air pollutants. Equation 7.1 must be used to select the appropriate impact assessment criterion for hydrogen sulfide as a function of population density:

Equation 7.1

$$\text{Impact assessment criterion } (\mu g/m^3) = (\log_{10} (\text{population}) - 4.5) / -0.87$$

Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales

Table 7.4a: Impact assessment criteria for individual odorous air pollutants (Victorian Government Gazette 2001)

Substance	Averaging period	Impact assessment criteria	
		mg/m^3 [a]	ppm
Acetaldehyde	1 hour	0.042	0.023
Acetic acid	1 hour	0.27	0.11
n-butanol	1 hour	0.5	0.16
n-butyl acetate	1 hour	1.02	0.21
Butyl acrylate	1 hour	0.10	0.019
Butyl mercaptan	1 hour	0.007	0.002
Carbon disulfide	1 hour	0.07	0.023
Chlorobenzene	1 hour	0.1	0.023
Cumene (isopropyl benzene)	1 hour	0.021	0.004
Cyclohexanone	1 hour	0.26	0.07
Diacetone alcohol	1 hour	0.7	0.15
Diethylamine	1 hour	0.03	0.01
Dimethylamine	1 hour	0.009	0.0052
Diphenyl ether	1 hour	0.08	0.01
Ethanol	1 hour	2.1	1.1
Ethyl acetate	1 hour	12.1	3.5
Ethyl acrylate	1 hour	0.0004	0.0001
Methanol	1 hour	3.0	2.4
Methylamine	1 hour	0.0027	0.0023
Methyl ethyl ketone	1 hour	3.2	1.1
Methyl isobutyl ketone	1 hour	0.23	0.05
Methyl mercaptan	1 hour	0.00046	0.00023
Methyl methacrylate	1 hour	0.12	0.027
Methyl styrene	1 hour	0.14	0.028563
Nitrobenzene	1 hour	0.0026	0.00052
Perchlorethylene (tetrachloroethylene)	1 hour	3.5	0.52
Phenol	1 hour	0.020	0.0052
Phosphine	1 hour	0.0031	0.0023
n-propanol	1 hour	0.041	0.016
Pyridine	1 hour	0.007	0.0023
Styrene (monomer)	1 hour	0.12	0.027
Toluene	1 hour	0.36	0.09
Triethylamine	1 hour	0.20	0.05
Xylenes	1 hour	0.19	0.04

a. Gas volumes are expressed at 25°C and at an absolute pressure of 1 atmosphere (101.325 kPa)

Table 7.4b provides a summary of appropriate impact assessment criteria for hydrogen sulfide as a function of population density.

Table 7.4b: Impact assessment criteria for hydrogen sulfide (nose-response-time average, 99th percentile) (AWT, 2001)

Population of affected community	Impact assessment criteria (µg/m^3)
Urban (≥~2000)	1.38
~500	2.07
~125	2.76
~30	3.45
~10	4.14
Single residence (≤~2)	4.83

7.4.2 Application of impact assessment criteria

The impact assessment criteria for individual odorous air pollutants in Tables 7.4a and 7.4b must be applied as follows:

1. **At the nearest existing or likely future off-site sensitive receptor**.
2. The **incremental impact** must be reported in concentration units consistent with the impact assessment criteria (µg/m^3) for an **averaging period of 1 hour, except for hydrogen sulfide, which must be reported as peak concentrations** (i.e. approximately one second average) in accordance with the requirements of Section 6, and as the
   a. **100th percentile** of dispersion model predictions for Level 1 impact assessments, or
   b. **99.9th percentile** of dispersion model predictions for Level 2 impact assessments, **except hydrogen sulfide**, which must be reported as the **99th percentile** of dispersion model predictions.

7.5 Complex mixtures of odorous air pollutants

7.5.1 Impact assessment criteria

The impact assessment criteria for complex mixtures of odours have been designed to take into account the range of sensitivity to odours within the community and to provide additional protection for individuals with a heightened response to odours. This is achieved by using a statistical approach dependent upon population size. As the population density increases, the proportion of sensitive individuals is also likely to increase, indicating that more stringent criteria are necessary in these situations.

Equation 7.2 should be used to determine the appropriate impact assessment criteria for complex mixtures of odorous air pollutants:

Equation 7.2

$$\text{Impact assessment criterion (OU)} = (\log_{10}(\text{population}) - 4.5) / -0.6$$

Table 7.5 provides a summary of appropriate impact assessment criteria for various population densities.

Table 7.5: Impact assessment criteria for complex mixtures of odorous air pollutants (nose-response-time average, 99th percentile) (EPA 2001)

Population of affected community	Impact assessment criteria for complex mixtures of odorous air pollutants (OU)
Urban (≥~2000) and/or schools and hospitals	2.0
~500	3.0
~125	4.0
~30	5.0
~10	6.0
Single rural residence (≤~2)	7.0

7.5.2 Application of impact assessment criteria

The impact assessment criteria for complex mixtures of odorous air pollutants must be applied as follows:

1. **At the nearest existing or likely future off-site sensitive receptor**.
2. The **incremental impact** (predicted impact due to the pollutant source alone) must be reported in units consistent with the impact assessment criteria (OU), as **peak concentrations** (i.e. approximately 1 second average) in accordance with the requirements of Section 6 and as the:
   a. **100th percentile** of dispersion model predictions for Level 1 impact assessments, or
   b. **99th percentile** of dispersion model predictions for Level 2 impact assessments.

7.6 Presentation of assessment results

The results of an impact assessment should be presented as follows:

1. Concentration, hazard index and/or risk contours (isopleths) to define potential affected zones
2. Concentration, hazard index and/or risk predictions in tabular form for each of the following:
   a. existing and likely future sensitive receptors
   b. maximum exposed off-site receptor
   c. maximum outside the boundary of the premises.

7.7 What if impact assessment criteria are exceeded?

If the EPA's impact assessment criteria are exceeded, the dispersion modelling must be revised to include various pollution control strategies until compliance is achieved. To determine incremental increases in the cost of air pollution abatement, a sensitivity analysis can be carried out by varying:

- source release parameters
- separation distance
- efficiency of pollution control equipment
- level of management practice.

The results can be used to select the most cost-effective and environmentally effective control strategy.

7.8 Bibliography

ANZECC 1990, *National Goals for Fluoride in Ambient Air and Forage*, Australian and New Zealand Environment and Conservation Council, Canberra.

AWT 2001, *Literature Review – Australian and Overseas Odour Threshold Data and Ambient Air Quality Criteria for Hydrogen Sulphide, A Report to the NSW EPA*, Australian Water Technologies, Sydney.

Carson, P. and Round, J. 1989, *Feedlot Odours*, Department of Primary Industry, Brisbane.

CARB 2003a, *Hot Spots Analysis and Reporting Program (HARP)*, California Environmental Protection Agency, Air Resources Board, www.arb.ca.gov/toxics/harp/harp.htm

CARB 2003b, *Hot Spots Analysis and Reporting Program, User Guide Version 1.0*, California Environmental Protection Agency, Air Resources Board, Sacramento.

DoE 2016, *National Environment Protection (Ambient Air Quality) Measure – as amended,* Federal Register of Legislative Instruments F2016C00215, Department of the Environment, Canberra.

enHealth 2001, *Exposure Scenarios and Exposure Settings, March 2001*, Department of Health and Ageing and enHealth Council, Canberra.

enHealth 2002, *Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards, June 2002*, Department of Health and Ageing and enHealth Council, Canberra.

enHealth 2003, *Australian Exposure Assessment Handbook, Consultation Draft, December 2003*, Department of Health and Ageing and enHealth Council, Canberra.

EPA 1998, *Action for Air: The NSW Government's 25-Year Air Quality Management Plan*, NSW Environment Protection Authority, Sydney.

EPA 2001, *Draft Policy: Assessment and Management of Odour from Stationary Sources in NSW*, NSW Environment Protection Authority, Sydney.

EPA 2001, *Technical Notes – Draft Policy: Assessment and Management of Odour from Stationary Sources in NSW*, NSW Environment Protection Authority, Sydney.

EPA Victoria 1985, *Plume Calculation Procedure: An Approved Procedure Under Schedule E of State Environment Protection Policy (The Air Environment)*, Publication 210, Environment Protection Authority of Victoria, Melbourne.

NEPC 1998, *Ambient Air – National Environment Protection Measure for Ambient Air Quality*, National Environment Protection Council, Canberra.

NERDDC 1988, *Air Pollution from Surface Coal Mining: Measurement, Modelling and Community Perception*, Project No. 921, National Energy Research Development and Demonstration Council, Canberra.

NHMRC 1996, *Ambient Air Quality Goals Recommended by the National Health and Medical Research Council*, National Health and Medical Research Council, Canberra.

OEHHA 1994, *Benzo[a]pyrene as a Toxic Air Contaminant, Executive Summary*, California Air Resources Board and the Office of Environmental Health Hazard Assessment, Sacramento.

OEHHA 2003, *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, Sacramento.

Streeton, J.A. 1990, *Air Pollution, Health Effects and Air Quality Objectives in Victoria*, Environment Protection Authority of Victoria, Melbourne.

SPCC 1983, *Air Pollution from Coal Mining and Related Developments*, State Pollution Control Commission, Sydney.

Victorian Government Gazette, Friday 21 December 2001, 'State Environment Protection Policy (Air Quality Management)', No. S 240, Government of Victoria, Melbourne.

WHO 2000, *WHO Air Quality Guidelines for Europe*, 2nd Edition, World Health Organization, Geneva.

8 Modelling pollutant transformations

Photochemical smog is a complex mixture of chemicals and is sometimes visible as a white haze during the warmer months. In the Greater Metropolitan Region of NSW (Sydney, the Lower Hunter and Illawarra), its most significant components are ground-level ozone (O_3) and nitrogen dioxide (NO_2). These pollutants are formed in the atmosphere when volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) react under the influence of sunlight.

Oxides of nitrogen are formed during high-temperature combustion processes from the oxidation of nitrogen in the air or fuel. NO_x from combustion consists largely of nitrogen oxide (NO) and partly of NO_2. After emission from the stack, NO is transformed to NO_2 through oxidation with atmospheric ozone.

The formation of O_3 and NO_2 in the atmosphere can be assessed by various methods. Minor sources of NO_x and VOCs may need only a simplistic assessment to demonstrate compliance with impact assessment criteria, while larger sources may need a more detailed scientific assessment. An assessment of impacts of a new source of NO_x and/or VOCs on NO_2 and/or O_3 formation is unlikely to be necessary outside the Greater Metropolitan Region.

Various methods of assessment are described below.

8.1 Nitrogen dioxide assessment

The oxidation of NO to NO_2 in the atmosphere can be assessed by various methods. The methods below range from the simplistic (Method 1) to more detailed (Method 3).

8.1.1 Method 1: 100% conversion of NO to NO_2

Level 1 assessment: Maximum prediction and maximum background concentrations

1. Use a dispersion model to predict 1-hour and annual average ground-level concentrations of NO_x (as NO_2).
2. Assume that 100% of the NO_x emitted is converted to NO_2.
3. Determine the total ground-level concentration of NO_2 by adding the maximum predicted 1-hour and annual average ground-level concentrations with the maximum 1-hour and annual average background concentrations respectively.
4. If the impact assessment criteria are exceeded, a more refined assessment should be undertaken and/or additional management practices or emission controls applied.

Level 2 assessment: Contemporaneous prediction and background concentrations – 1-hour average

1. Use a dispersion model to predict 1-hour average ground-level concentrations of NO_x (as NO_2).
2. Assume that 100% of the NO_x emitted is converted to NO_2.
3. Determine the total ground-level concentration of NO_2 by adding the predicted 1-hour average ground-level concentration with the contemporaneous 1-hour average background concentration.
4. Determine the frequency at which the 1-hour average impact assessment criteria are exceeded at each sensitive receptor with and without the subject source.
5. If additional exceedances of the impact assessment criteria are caused by the addition of the subject source, a more refined assessment should be undertaken and/or additional management practices or emission controls applied.

8.1.2 Method 2: NO to NO_2 conversion limited by ambient ozone concentration (OLM)

The USEPA's Ozone Limiting Method (OLM) (Cole and Summerhays 1979; Tikvart 1996) may be used to predict ground-level concentrations of NO_2. This method assumes that all the available ozone in the atmosphere will react with NO in the plume until either all the O_3 or all the NO is used up. This approach assumes that the atmospheric reaction is instant. In reality, the reaction takes place over a number of hours. A detailed methodology can be downloaded from the following website: www.epa.gov/scram001/tt25.htm#review

Using Equation 8.1, various levels of refinement can be adopted, depending on the scale of emissions and impact.

Equation 8.1

$$[NO_2]_{total} = \{0.1 \times [NO_x]_{pred}\} + MIN\{(0.9) \times [NO_x]_{pred} \text{ or } (46/48) \times [O_3]_{bkgd}\} + [NO_2]_{bkgd}$$

where:

$[NO_2]_{total}$ = the predicted concentration of NO_2 in $\mu g/m^3$

$[NO_x]_{pred}$ = the dispersion model prediction of the ground-level concentration of NO_x in $\mu g/m^3$

MIN = the minimum of the two quantities within the braces

$[O_3]_{bkgd}$ = the background ambient O_3 concentration in $\mu g/m^3$

(46/48) = the molecular weight of NO_2 divided by the molecular weight of O_3 in $\mu g/m^3$

$[NO_2]_{bkgd}$ = the background ambient NO_2 concentration in $\mu g/m^3$

Level 1 assessment: Maximum prediction and maximum background concentrations

1. Use a dispersion model to predict 1-hour average and annual ground-level concentrations of NO_x (as NO_2).
2. Assume 100% of the NO_x emitted is converted to NO_2 ($[NO_x]_{pred}$ in Equation 8.1).
3. Determine the maximum 1-hour and annual average background concentrations of NO_2 and O_3 ($[NO_2]_{bkgd}$ and $[O_3]_{bkgd}$ respectively in Equation 8.1).
4. Determine the maximum total 1-hour and annual average ground-level concentrations of NO_2 ($[NO_2]_{total}$ in Equation 8.1) by substituting $[NO_x]_{pred}$, $[NO_2]_{bkgd}$ and $[O_3]_{bkgd}$ into Equation 8.1.
5. If the impact assessment criteria are exceeded, a more refined assessment should be undertaken and/or additional management practices or emission controls applied.

Level 2 assessment: Contemporaneous prediction and background concentrations – 1-hour average

1. Use a dispersion model to predict 1-hour average ground-level concentrations of NO_x (as NO_2).
2. Assume 100% of the NO_x emitted is converted to NO_2 ($[NO_x]_{pred}$ in Equation 8.1).
3. Obtain continuous 1-hour average ambient measurements of NO_2 and O_3 for the same period as the dispersion modelling predictions ($[NO_2]_{bkgd}$ and $[O_3]_{bkgd}$ respectively in Equation 8.1).
4. Determine the total ground-level concentration of NO_2 ($[NO_2]_{total}$ in Equation 8.1) by substituting $[NO_x]_{pred}$, $[NO_2]_{bkgd}$ and $[O_3]_{bkgd}$ into Equation 8.1 for each hour of the dispersion model simulation.
5. Determine the frequency at which the 1-hour average impact assessment criteria are exceeded at each sensitive receptor with and without the subject source.
6. If additional exceedances of the impact assessment criteria are caused by the addition of the subject source, a more refined assessment should be undertaken and/or additional management practices or emission controls applied.

8.1.3 Method 3: NO to NO_2 conversion using empirical relationship

Janssen et al. (1988) developed an empirical equation for estimating the oxidation rate of NO in power plant plumes. The equation is dependent on distance downwind from the source and the parameters A and α and has the following form:

Equation 8.2

$$NO_2 / NO_x = A(1 - \exp(-\alpha x))$$

where:

x = the distance from the source

A and α are classified according to O_3 concentration, wind speed and season (Janssen et al. (1988) provides values for A and α).

Equation 8.2 can be used with various levels of refinement to calculate ground-level concentrations of NO_2.

Level 1 assessment: Maximum prediction and maximum background concentrations

1. Use a dispersion model to predict 1-hour average and annual ground-level concentrations of NO_x (as NO_2).
2. Assume 100% of the NO_x emitted is converted to NO_2.
3. Determine the distance of the maximum predicted 1-hour and annual average NO_2 ground-level concentrations from the source (x in Equation 8.2).
4. Determine the maximum 1-hour and annual average background concentrations of NO_2.
5. Calculate the ratio of NO_2 to NO_x by substituting x in Equation 8.2 and assuming worst-case values for A and α.
6. Determine the total ground-level concentration of NO_2 by applying the ratio of NO_2 to NO_x to the maximum predicted 1-hour and annual average NO_2 ground-level concentrations and adding the result to the maximum 1-hour and annual average background concentrations respectively.
7. If the impact assessment criteria are exceeded, a more refined assessment should be undertaken and/or additional management practices or emission controls applied.

Level 2 assessment: Contemporaneous prediction and background concentrations – 1-hour average

1. Use a dispersion model to predict 1-hour average and annual ground-level concentrations of NO_x (as NO_2).
2. Assume 100% of the NO_x emitted is converted to NO_2.
3. For each hour of the dispersion model simulation, determine the distance of the maximum predicted 1-hour average NO_2 ground level concentration from the source (x in Equation 8.2).
4. Obtain continuous 1-hour average ambient measurements of NO_2 for the same period as the dispersion modelling predictions.
5. For each hour of the dispersion model simulation, calculate the ratio of NO_2 to NO_x by substituting x and appropriate values for A and α in Equation 8.2.
6. Determine the total ground-level concentration of NO_2 for each hour of the dispersion model simulation by applying the ratio of NO_2 to NO_x to the predicted 1-hour average NO_2 ground-level concentration and adding the result to the 1-hour average background concentration.
7. Determine the frequency at which the 1-hour average impact assessment criteria are exceeded at each sensitive receptor with and without the subject source.
8. If additional exceedances of the impact assessment criteria are caused by the addition of the subject source, a more refined assessment should be undertaken and/or additional management practices or emission controls applied.

8.2 Detailed assessment of ozone and nitrogen dioxide

Before undertaking a quantitative assessment of photochemical smog, seek advice from the EPA's Air Technical Advisory Services Unit. Some models that can provide a more detailed assessment of changes in ambient O_3 and NO_2 are outlined below.

8.2.1 Integrated Empirical Rate (IER) Reactive Plume Model

The CSIRO's IER-Reactive Plume Model (Johnson 1983; Johnson et al. 1990; Azzi et al. 1993; Azzi and Johnson 1994) can be used to provide a more refined assessment of the changes in ambient NO_2 concentrations than the methods specified above. The IER-Reactive Plume Model can also predict changes in ambient O_3 concentrations.

8.2.2 TAPM

CSIRO TAPM includes gas-phase photochemistry based on the semi-empirical mechanism, called the Generic Reaction Set (GRS). In chemistry mode, TAPM includes 10 reactions for the following 13 species: smog reactivity, radical pool, hydrogen peroxide (H_2O_2), NO, NO_2, O_3, SO_2, stable non-gaseous organic carbon, stable gaseous nitrogen products, stable non-gaseous nitrogen products, stable non-gaseous sulfur products, airborne particulate matter and fine particulate matter.

8.3 Bibliography

Azzi, M. and Johnson, G.M. 1994, 'Photochemical smog assessment for NO_x emissions using an IER-Reactive Plume technique', *Proceedings of the 12th International Clean Air Conference*, Clean Air Society of Australia and New Zealand, Perth, Australia, vol. 2, pp. 219–30, November, 1994.

Azzi, M., Johnson, G.M., Hyde, R. and Young, M. 1993, 'Predicting the chemistry of NO_x plumes for urban regions, *Proceedings of the International Congress on Modelling and Simulation*, eds M. McAleer and A. Jakeman, vol. 1, pp. 287–92, Perth, 6–10 December 1993.

Cole, H.S. and Summerhays, J.E. 1979, 'A review of the techniques available for estimating short term NO_2 concentrations', *Journal of the Air Pollution Control Association*, 29(8), 812–17.

Hurley, P. 2005a, *The Air Pollution Model (TAPM) Version 3, Part 1: Technical Description*, CSIRO Atmospheric Research Technical Paper No. 71, CSIRO Division of Atmospheric Research, Melbourne.

Hurley, P. 2005b, *The Air Pollution Model (TAPM) Version 3: User Manual*, CSIRO Atmospheric Research Technical Paper No. 31, CSIRO Division of Atmospheric Research, Melbourne.

Hurley, P., Physick, W., Luhar, A. and Edwards, M. 2005b, *The Air Pollution Model (TAPM) Version 3, Part 2: Summary of Some Verification Studies*, CSIRO Atmospheric Research Technical Paper No. 72, CSIRO Division of Atmospheric Research, Melbourne.

Janssen, L.H.J.M., van Wakeren, J.H.A., van Duuran, H. and Elshout, A.J. 1988, 'A classification of NO oxidation rates in power plant plumes based on atmospheric conditions', *Atmospheric Environment*, 22(1), 43–53.

Johnson, G.M. 1983, 'An empirical model of photochemical smog formation', *Proceedings of the 7th World Congress on Air Quality*, 16–20 May, Paris, 1, 25–32.

Johnson, G.M., Quigley, S.M. and Smith, J.G. 1990, 'Management of photochemical smog using Airtrak approach', *Proceedings of the 10th International Conference of the Clean Air Society of Australia and New Zealand*, Auckland, NZ, pp. 209–14.

Tikvart, J.A. 1996, *Application of Ozone Limiting Method*, Model Clearinghouse Memorandum No. 107, US Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, USA.

9 Impact assessment report

An air quality impact assessment report must clearly document the methodology and result of the assessment. The EPA's minimum requirements regarding the information contained within an impact assessment report are specified below.

9.1 Site plan

- Layout of the site clearly showing all unit operations
- All emission sources clearly identified
- Plant boundary
- Sensitive receptors (e.g. nearest residences)
- Topography

9.2 Description of the activities carried out on the site

- A process flow diagram clearly showing all unit operations carried out on the premises
- A detailed discussion of all unit operations carried out on the site, including all possible operational variability
- A detailed list of all process inputs and outputs
- Plans, process flow diagrams and descriptions that clearly identify and explain all pollution control equipment and techniques for all processes on the premises
- A description of all aspects of the air emission control system, with particular regard to any fugitive emission capture systems (e.g. hooding, ducting), treatment systems (e.g. scrubbers, bag filters) and discharge systems (e.g. stacks)
- The operational parameters of all emission sources, including all operational variability, i.e. location, release type (stack, volume or area) and release parameters (e.g. stack height, stack diameter, exhaust velocity, temperature, emission concentration and rate)

9.3 Emissions inventory

- A detailed discussion of the methodology used to calculate the expected pollutant emission rates for each source
- All supporting reports of source emission tests. All analytical reports must contain all the information specified in Section 4 of DEC (2005).
- Methodologies used to sample and analyse for each of the pollutants considered
- Detailed calculations of pollutant emission rates for each source
- Tables showing all release parameters of stack and fugitive sources (e.g. temperature, exit velocity, stack dimensions, and emission concentrations and rates), and all pollutant emission concentrations with a comparison of the emission concentrations against the relevant requirements of the Regulation. A suggested format for the tables is provided in Tables 3.1, 3.2 and 3.3.

9.4 Meteorological data

9.4.1 Level 1 meteorological data

- A description of the techniques used to prepare the meteorological data in a format for use in the dispersion modelling
- The meteorological data used in the dispersion modelling supplied in a *Microsoft* Windows-compatible format

9.4.2 Level 2 meteorological data

- A detailed discussion of the prevailing dispersion meteorology at the proposed site. The report should typically include wind rose diagrams; an analysis of wind speed, wind direction, stability class, ambient temperature and mixing height; and joint frequency distributions of wind speed and wind direction as a function of stability class.
- Demonstration that the site-representative data adequately describes the expected meteorological patterns at the site under investigation (e.g. wind speed, wind direction, ambient temperature, atmospheric stability class, inversion conditions and katabatic drift)
- A description of the techniques used to prepare the meteorological data into a format for use in the dispersion modelling
- A quality assurance and quality control analysis of the meteorological data used in the dispersion modelling. Provide and discuss any relevant results of this analysis.
- The meteorological data used in the dispersion modelling supplied in a *Microsoft* Windows-compatible format

9.5 Background air quality data

- Methods used to sample and analyse for each of the pollutants considered
- A detailed discussion of the methodology used to calculate the background concentrations for each pollutant
- Tables summarising the ambient monitoring data

9.6 Dispersion modelling

- A detailed discussion and justification of all parameters used in the dispersion modelling and the manner in which topography, building wake effects and other site-specific peculiarities that may affect plume dispersion have been treated
- A detailed discussion of the methodology used to account for any atmospheric pollutant formation and chemistry
- A detailed discussion of air quality impacts for all relevant pollutants, based on predicted ground-level concentrations at the plant boundary and beyond, and at all sensitive receptors
- Ground-level concentrations, hazard index and risk isopleths (contours) and tables summarising the predicted concentrations of all relevant pollutants at sensitive receptors
- All input, output and meteorological files used in the dispersion modelling supplied in a *Microsoft* Windows-compatible format

9.7 Bibliography

DEC 2005, *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*, Department of Environment and Conservation NSW, Sydney.

10 Emission limits

10.1 Legislation

The *Protection of the Environment Operations Act 1997* (POEO Act) is the major legislation governing environment protection in NSW. The Act is administered by the EPA.

Section 128 of the POEO Act makes it an offence for emissions of air impurities to exceed 'standards of concentration' as prescribed by the POEO Regulation. These standards are in-stack emission limits and are the maximum emissions permissible for an industrial source anywhere in NSW. These limits are based on levels that are achievable through the application of reasonably available technology and good environmental practices.

The emission limits in the POEO Regulation do not take into account site-specific features such as meteorology and background air quality, and therefore do not necessarily protect against adverse air quality impacts in the areas surrounding the premises. An objective shared by the EPA and the POEO Act is to reduce the risks to human health and the environment by reducing to harmless levels the discharge of substances into the air (section 6 of the *Protection of the Environment Administration Act 1991* and section 3 of the POEO Act). The impact of emissions on local air quality from premises is determined through an air quality impact assessment. The methods required by statute to be used to model and assess emissions of air pollutants from stationary sources in NSW are outlined in this document.

10.2 How does the EPA set emission limits in environment protection licences?

In an environment protection licence for a new or expanded industrial source:

1. **Emission limits reflect reasonably available technology and good environmental practice:** The POEO Regulation sets the maximum emissions permissible for an industrial source located anywhere in NSW. The Regulation limits are based on levels that are achievable through the application of reasonably available technology and good environmental practices.
2. **Emission limits reflect proper and efficient operation:** Consistent with the requirement of the POEO Act (section 124), it is EPA policy to prescribe emission limits that are consistent with the proper and efficient operation of plant and equipment. Depending on the plant and equipment, these levels can be lower than those prescribed by the POEO Regulation.
3. **Emission limits protect the health and amenity of the surrounding community:** This document sets out:
    a. health- and amenity-based impact assessment criteria for the protection of ambient air quality
    b. the process for assessing the impacts of air pollutant emissions on ambient air quality and the surrounding community.

Proponents of new or expanding developments must use this process to demonstrate that a proposed development will not adversely affect human health and amenity or the surrounding air quality.

By using the above three criteria, emission limits in a licence can be even more stringent than the requirements of the Regulation.

10.3 What information does the EPA use to set emission limits?

The information submitted by the proponent or licensee in the impact assessment is used to set the emission limits in an environment protection licence. This includes the emission concentration and rates used in the dispersion modelling.

11 Worked examples

11.1 Developing site-specific emission limits

This section provides a worked example for developing a site-specific emission limit.

The example is for hydrogen sulfide, but the principles are equally applicable to other air pollutants that are regulated in NSW.

11.1.1 Scenario

A major industry is proposed to be located near Deniliquin (latitude 35.53°S, longitude 144.95°E).

Hydrogen sulfide will be emitted through a stack 40 metres high. The stack is more than 2.5 times as high as the nearest buildings located within 200 m, which is five times the stack height, meaning building wake effects are not likely to occur. The topography of the proposed site is dominated by flat terrain.

It is not practicable for this industry type to meet the Regulation emission limit for hydrogen sulfide of 5 mg/m^3.

What would be an appropriate site-specific emission limit calculated using a Level 2 assessment?

11.1.2 Source characteristics

Source characteristics are summarised in Table 11.1.

Table 11.1: Worked example 1 – source characteristics

Stack height (m)	40
Stack diameter (m)	1
Exhaust temperature (°C)	180
Exhaust velocity (m/s)	20
Building wake effects	No
Exhaust flow rate – Am^3/s – Nm^3/s	 15.71 9.47
Hydrogen sulfide emission concentration –mg/Am^3 –mg/Nm^3	 21.0 34.8
Hydrogen sulfide emission rate (g/s)	0.33
Location	Rural
Terrain	Flat
Roughness height (m)	0.3
Location of nearest sensitive receptor (m)	2950

11.1.3 Methodology

Dispersion modelling was conducted using AUSPLUME v. 5.4. A Level 2 meteorological data file, prepared according to the requirements of Section 4.4, was used for the assessment.

Since the nearest sensitive receptor is located at a distance that is greater than 10 times the largest source dimension (i.e. 2950 m > 400 m or 10 times the stack height), far-field peak-to-mean ratios for a tall wake-free point from Table 6.1 are appropriate.

11.1.4 Results

A hydrogen sulfide emission concentration of 34.8 mg/Nm^3 gave a maximum 100th percentile ground-level concentration of 4.22 µg/m^3 at a distance of 2950 m from the stack. This is less than the impact assessment criterion for hydrogen sulfide of 4.83 µg/m^3 at a single residence (see Table 7.4b).

Hence, an appropriate site-specific emission limit for hydrogen sulfide would be approximately 35 mg/Nm^3.

11.2 Dealing with elevated background concentrations

11.2.1 Scenario

A mine is proposed to be located in a sparsely populated area. The nearest sensitive receptors are rural residential dwellings located to the north and west at distances of 1000 and 1500 m, respectively.

Background PM_{10} levels are elevated. Accounting for background concentrations using the Level 1 assessment methodology results in exceedances of the PM_{10} impact assessment criteria.

How are background concentrations taken into account using a level 2 impact assessment?

11.2.2 Background ambient monitoring results

Ambient monitoring data for PM_{10} are available from a nearby mine in a similar rural environment and have been shown to be site-representative.

This data can be summarised as:

Maximum 24-hour average: 41 µg/m^3
Annual average: 22 µg/m^3

11.2.3 Results of modelling

a. Level 1 assessment – Maximum impact

Dispersion modelling has been undertaken and 24-hour average and annual increments of PM_{10} have been predicted at each sensitive receptor.

Table 11.2 presents the maximum impact (Section 5.1.1, Level 1 assessment).

Table 11.2: Worked example 2 – Maximum impact

Particulates (PM_{10})	Predicted concentrations (µg/m^3) Maximum impact (increment)		Impact assessment criteria (µg/m^3)
	A: 1000 m north	B: 1500 m west	
24-hour average	**63 (22)**	49 (8)	50
Annual average	24 (2)	23 (1)	25

The dispersion modelling results indicate that:

- The maximum impact at receptor A (shown in bold) is likely to exceed the 24-hour average impact assessment criterion. Further assessment is required.
- The 24-hour and annual average impact assessment criteria are not likely to be exceeded at receptor B. No additional assessment is required.

b. Level 2 assessment – Contemporaneous impact and background

To refine the assessment at receptor A, each individual dispersion model prediction is added to the corresponding measured background concentration (Section 5.1.1, Level 2 assessment).

From this refined analysis, no additional exceedances of the 24-hour average impact assessment criterion (50 µg/m^3) are likely.

The results of this analysis are summarised in Table 11.3.

The left side of the table shows the total predicted concentration on days with the highest background, and the right side shows the total predicted concentration on days with the highest predicted incremental glcs.

No additional assessment is required.

Table 11.3: Worked example 2 - Summary of contemporaneous impact and background

	PM_{10} 24-hour average (µg/m^3)				PM_{10} 24-hour average (µg/m^3)		
Date	Background	Predicted increment	Total	Date	Background	Highest predicted increment	Total
27/01/01	41	5	46	23/05/01	20	22	42
26/01/01	40	3	43	15/09/01	21	18	39
08/10/01	40	5	45	25/09/01	15	17	32
04/03/01	38	8	46	24/02/01	30	17	47
02/02/01	37	10	47	04/01/01	34	15	49
31/05/01	36	12	48	12/04/01	29	14	43
06/08/01	34	10	44	14/11/01	34	13	47
09/10/01	34	8	42	13/02/01	30	11	41

In cases where additional exceedances might be predicted at a receptor, the applicant should either:

1. review site selection and/or apply more effective mitigation measures or emission controls that reduce emissions to a greater extent, and revise the impact assessment, or
2. if emissions and impacts have been reduced as far as they can, consider whether there are opportunities to mitigate impacts through other measures such as negotiated agreements and/or acquisition of sensitive receptors.

12 Conversion factors

The physical state of gaseous air pollutants at atmospheric concentrations may be described by the ideal gas law:

Equation 12.1: Ideal gas law

$$pv = nRT$$

where:

p = absolute pressure of gas (atm)

v = volume of gas (L)

n = number of moles of gas (mol)

R = universal gas constant (L.atm/mol.K)

T = absolute temperature (K)

The number of moles (n) may be calculated from the weight of a pollutant (W) and its molecular weight (m) by:

Equation 12.2

$$n = W / m$$

Substituting Equation 12.2 into Equation 12.1 and rearranging terms yields:

Equation 12.3

$$v = WRT / pm$$

Parts per million (ppm) refers to the volume of pollutant (v) per million volumes of air (V):

Equation 12.4

$$ppm = v/V \times 10^6$$

Substituting Equation 12.3 into Equation 12.4 yields:

Equation 12.5: Conversion from volume to mass units of concentration

$$ppm = (W / V) \times RT / pm \times 10^6$$

Using the appropriate values for the variables in Equation 12.5, a conversion from volume to mass units of concentration for carbon monoxide may be derived as shown below:

T = 298.15 K (25°C)

P = 1 atm

M = 28 g/mol

R = 0.08205 L.atm/mol.K

$$ppm = \frac{W(g) \times 10^3 (mg/g)}{V(l)} \times \frac{0.08205 (L.atm/mol.K) \times 298.15(K)}{1(atm) \times 28 (g/mol) \times 10^6}$$

1 ppm = 1.15 mg/m^3

1 mg/m^3 = 0.873 ppm

Table 12.1 contains some common conversion factors for the criteria air pollutants.

Table 12.1: Common conversion factors for criteria air pollutants

Pollutant	Units	To convert to:	Multiply by:
Ozone (O_3)	pphm	$\mu g/m^3$ (0°C) $\mu g/m^3$ (25°C)	21.4 19.6
Nitric oxide (NO)	pphm	$\mu g/m^3$ (0°C) $\mu g/m^3$ (25°C)	13.4 12.3
Nitrogen dioxide (NO_2)	pphm	$\mu g/m^3$ (0°C) $\mu g/m^3$ (25°C)	20.5 18.8
Sulfur dioxide (SO_2)	pphm	$\mu g/m^3$ (0°C) $\mu g/m^3$ (25°C)	28.6 26.2
Lead (Pb)	$\mu g/m^3$ (0°C)	$\mu g/m^3$ (25°C)	0.92
Carbon monoxide (CO)	ppm	mg/m^3 (0°C) mg/m^3 (25°C)	1.25 1.15

13 Glossary

Affected zone	The area within which the impact assessment criteria are likely to be exceeded, and unacceptable air quality impacts may result
Am^3	Actual cubic metre; the volume of gas that occupies a volume of 1 m^3 at stack discharge conditions
AUSPLUME	EPA Victoria's Gaussian dispersion model
Background levels	Existing concentrations of pollutants in the ambient air
BPIP	Building Profile Input Program (USEPA software used to generate data for AUSPLUME to account for building wake effects)
Building wake effects	The effect on plume dispersion caused by the presence of buildings near a stack, usually resulting in increased ground-level concentrations of pollutants
C	Convective atmospheric conditions
°C	Temperature in degrees Celsius
C_p	Peak concentration
CALPUFF	A multi-layer, multi-species, non-steady-state Gaussian puff dispersion model that is able to simulate the effects of time- and space-varying meteorological conditions on pollutant transport
Criteria air pollutants	The pollutants sulfur dioxide, nitrogen dioxide, ozone, $PM_{2.5}$, PM_{10}, lead and carbon monoxide
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Deposition velocity	The ratio of deposition at the surface ($g/m^2/s$) to its concentration in the atmosphere (g/m^3) for a particular substance
Diffuse source	Activities that are generally dominated by fugitive area or volume-source emissions of odour, which can be relatively difficult to control, such as wastewater treatment plants
Dispersion modelling	Modelling by computer to mathematically simulate the effect on plume dispersion under varying atmospheric conditions; used to calculate spatial and temporal fields of concentrations and particle deposition due to emissions from various source types
DEC	Department of Environment and Conservation NSW
Ensemble mean	The average of a predicted variable over an ensemble of forecasts.
EPA	NSW Environment Protection Authority
Far-field	The far-field region is the zone where plume rise and meandering have fully occurred and the plume is well mixed

	in the vertical plane from ground level to the base of the first temperature inversion
g	Mass in grams
glc	Ground-level concentration
glc criteria	Criteria for individual odorous or toxic air pollutants; specified in mg/m^3 or ppm as a 3-minute average
IARC	International Agency for Research on Cancer
IER	CSIRO's Integrated Empirical Rate model
Incremental impact	The impact due to an emission source (or group of sources) in isolation, i.e. without including background levels
K	Temperature in kelvins
kPa	Pressure in kilopascals
L	Monin–Obukhov length, which characterises the stability of the surface layer
Level 1	A screening dispersion modelling procedure
Level 2	A refined dispersion modelling procedure
m	Length in metres
m^3	Volume in cubic metres
µg	Mass in micrograms
Mid-field	The mid-field region is the zone where source characteristics are important but not dominant
mg	Mass in milligrams
Near-field	The near field is the zone where source structure directly affects plume dispersion. The near field is typically 10 times the largest source dimension, either height or width.
Nm^3	Normal cubic metre; the volume of dry gas that occupies a volume of 1 m^3 at a temperature of 273.15 K (0°C) and an absolute pressure of 101.3 kPa
NO_x	Oxides of nitrogen, including NO and NO_2
OLM	USEPA's Ozone Limiting Method
OU	Odour units; indicates concentration of odorous mixtures. The number of odour units is the concentration of a sample divided by the odour threshold or the number of dilutions required for the sample to reach the threshold. This threshold is the numerical value equivalent to when 50% of a testing panel correctly detect an odour. For complex mixtures of odours, odour is specified in OU/m^3 (odour units per cubic metre) as a nose-response-time average.
OU/m^3	Odour units per cubic metre
PAH	Polycyclic aromatic hydrocarbon

Peak-to-mean ratio	A conversion factor that adjusts mean dispersion model predictions to the peak concentrations perceived by the human nose
PEF	Potency equivalency factor
pphm	Concentration in parts per hundred million
ppm	Concentration in parts per million
PM_{10}	Particulate matter less than 10 µm in aerodynamic equivalent diameter
$PM_{2.5}$	Particulate matter less than 2.5 µm in aerodynamic equivalent diameter
Point source	Source of emissions of odour, generally a stack. Emissions can generally be relatively easily controlled by using waste reduction, waste minimisation and cleaner production principles or conventional emission control equipment.
Sensitive receptor	A location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area. An air quality impact assessment should also consider the location of known or likely future sensitive receptors. For hydrogen fluoride, a sensitive receptor includes land-use areas with vegetation sensitive to hydrogen fluoride such as grapevines and stone fruit.
Separation distance	The distance between a source and sensitive receptors (or likely future sensitive receptors)
Source separation	The distance between two emission sources
σ	Standard deviation
σ_y	Initial horizontal plume spread for volume sources
σ_z	Initial vertical plume spread for volume sources
Stack	A vertical pipe used to vent pollutants from a process
Stationary source	Any premises-based activity; does not include motor vehicles
TAPM	CSIRO's PC-based, 3-D prognostic model for air pollution studies
Total impact	The total impact of an emission source (or group of sources) and existing ambient levels of a pollutant; i.e. total impact = background levels + incremental impact
TSP	Total suspended particulate [matter]
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compound

Roads and Maritime Notices

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

The Georges River – within an area from the M5 road bridge at Milperra, downstream for approximately 750m, to a position adjacent to the Deepwater Motor Boat Club.

Duration

8:00 am to 6:00pm – Saturday 21 January 2017

8:00 am to 6:00pm – Sunday 22 January 2017

8:00 am to 6:00pm – Sunday 19 March 2017

8:00 am to 6:00pm – Sunday 4 June 2017

8:00 am to 6:00pm – Sunday 30 July

Detail

Competitive power boat racing will be conducted on the waters of the Georges River (as described above), involving the use of high speed power vessels which will be active in the area on the days listed above, between the specified times. There will also be support vessels present to manage the event and power boat travelling at high speed – presenting a significant potential hazard to other waterway users.

All vessel operators and persons using the waters of Georges River in the vicinity of the event should keep a proper lookout, keep well clear of competing and support vessels, and exercise extreme caution.

An **EXCLUSION ZONE** is specified during the event at the above location.

Unauthorised vessels and persons are strictly prohibited from entering the exclusion zone, which will be marked by buoys and patrolled by Roads and Maritime Services and Deep Water Motor Boat Club support vessels.

Penalties may apply (section 12(5) – *Marine Safety Act 1998*)

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice SY1704

Date: 18 January 2017

Shayne Wilde
A/Principal Manager Sydney (Boating Operations)
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS –EXCLUSION ZONES AND RESTRICTIONS

Location – Regulated Area

Sydney Harbour – from Goat Island to Steele Point, Vaucluse, comprising all navigable waters bounded by imaginary lines drawn from:

- Balls Head to Balmain immediately West of Goat Island (inclusive of Darling Harbour) and;
- Bradleys Head Light to Steele Point.

Duration

From 8:00am to 10:00pm, 26 January 2017

Detail

The annual Australia Day Celebration on Sydney Harbour – a Special Event on the waters of Sydney Harbour conducted by the Department of Premier and Cabinet and Sydney Festival – will be taking place within the

Area specified above. Due to the potential to affect the safety of navigation and in order to safeguard the special event, Roads and Maritime Services will establish a **Regulated Area** for the duration, with declared special restrictions (including 'No Anchoring' and Exclusion Zones).

Pursuant to section 12(3) of the *Marine Safety Act 1998*, details of those special restrictions and exclusion zones are as follows:

Exclusion Zones

Strict Exclusion Zones will be established as detailed below inside the Regulated Area which will be enforced by Roads and Maritime, Police, and other control vessels and may also be marked by a perimeter of yellow buoys.

NO UNAUTHORISED VESSELS OR PERSONS are to enter the Exclusion Zones under any circumstances. The Area will be patrolled by Police, Roads and Maritime, and other official control vessels.

Times may be extended without notice by Roads and Maritime in the interests of public safety. Entry of unauthorised vessels or persons into the Exclusion Zone renders the vessel operator or person liable to an offence.

Note: Provided that vessels stay outside the Exclusion Zones (and despite any existing signposted regulation), vessels are permitted to stop or drift within the Sydney Harbour Transit Zone between 11:45am and 12:30pm. In addition, a buoyed spectator area will be established in the vicinity of Jeffrey Street Wharf to allow registered Harbour Parade entrants and small vessels to anchor or drift so that spectators can watch the events.

(a) **10:00am to 2:00pm** – a moving zone forming a perimeter 200 metres ahead and 60 metres either side or astern of HMAS Canberra while the vessel is underway between the Sydney Harbour Bridge and Garden Island;

(b) **10.45am to 11:30am** – a moving zone forming a perimeter of 50 metres around the bow, sides and stern of the "First Fleet" ferries participating in the 'Ferrython' as they navigate on a course between Fort Denison, Rose Bay and the Sydney Harbour Bridge;

(c) **11:45am to 12:30pm** – between imaginary lines drawn between Milsons Point and Dawes Point under the Sydney Harbour Bridge, Dawes Point to the Sydney Opera House, the Sydney Opera House to Kirribilli Point and Kirribilli Point to Milsons Point – for the 'Salute to Australia' and the 'Tug and Yacht Ballet'. This zone will be marked by the presence of Roads and Maritime control vessels;

(d) **1.00pm to 2.00pm** – a moving zone forming a perimeter of 50 metres around the bow, sides and stern of the Tall Ships participating in the 'Tall Ships Race' as they sail on a course from Bradleys Head north of Fort Denison to the Sydney Harbour Bridge;

(e) **1:45pm to 2:15pm** – inside Farm Cove between Bennelong Point and Mrs Macquaries Point during the 'Parachute and Flag Drop'. This zone will be marked by the presence of Roads and Maritime control vessels and yellow boundary buoys;

(f) **9:20pm to 9:40pm** – the entirety of Sydney Cove. All vessels already within the cove must follow the directions of control vessels and if moving, must pass at a safe distance from the fireworks barges and tugs or remain alongside. No vessels will be able to enter or depart Sydney Cove for the duration of the fireworks display;

(g) **All times** – Within 500 metres ahead and 30 metres either side or astern of any seagoing ships while underway, and within 30 metres of ships when at anchor or moored within Sydney Harbour.

Special Restrictions

Within the Regulated Area, the following special restrictions apply:

(a) A **Speed Limit of 6 knots** applies to all non-participating vessels within 200m of any Exclusion Zone for the duration of the events. Maximum Penalty $1,100.00 (*Marine Safety Act 1998* s.12(5));

(b) A "**No Wash Zone**" will be enforced within 200m of any Exclusion Zone for the duration of the events. Maximum Penalty $1,100.00 (*Marine Safety Act 1998* s 12(5)).

(c) Certain commuter and commercial vessel wharves will not be accessible during various Exclusion Zone times. Operators should check availability prior to approaching a wharf.

Directions

Roads and Maritime advises:

1) Persons within the vicinity of the Regulated Area **must** comply with any directions given by a Boating Safety Officer or Police Officer in relation to the Special Event or to marine safety. Failure to comply with any such direction is an offence (*Marine Safety Act 1998* s.15A – Maximum Penalty $3,300.00).

2) Any vessel operator or person
   - breaching the Special Restrictions detailed above; or
   - entering an Exclusion Zone

is liable to an offence (*Marine Safety Act 1998* s.12(5) – Maximum Penalty $1,100.00)

Maps and Charts Affected

Roads and Maritime Boating Map – 9D and 9G

RAN Hydrographic Chart AUS 200, AUS 201 AUS 202

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice SE1702

Date: 18 January 2017

Hendrik Clasie
Principal Manager Statewide Coordination
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Tasman Sea adjoining Wollongong Harbour – defined by:

1. along the northern shoreline of Flagstaff Point and the Wollongong Harbour break wall
2. and the shoreline of North Wollongong beach
3. to the North Wollongong Beach reef
4. to a location 500m east & 500m north of Flagstaff Point

Duration

1.45pm to 2.30pm and 6.35pm to 7.20pm on Thursday 26 January 2017.

Detail

An aircraft acrobatic display will be conducted in the air space above the waters of the Tasman Sea adjoining Wollongong Harbour as specified above.

An **EXCLUSION ZONE** is specified during the event and will be created at the location detailed above.

As a result vessel operations in and out of Wollongong Harbour will be restricted.

Unauthorised vessels and persons are strictly prohibited from entering the exclusion zone which will be patrolled by Roads and Maritime and Water Police vessels.

All vessel operators and persons using the waters specified above should keep a proper lookout, keep well clear of support vessels, watch for low flying overhead aircraft, and exercise extreme caution when navigating near the exclusion zone.

Penalties may apply (section 12(5) – *Marine Safety Act 1998*).

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice: SO1712

Date: 18 January 2017

Mike Hammond
Principal Manager South (Boating Operations)
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Brisbane Water – Woy Woy Channel behind Pelican Island Nature Reserve north of Memorial Park Woy Woy

Duration

7:00pm to 10:00pm Thursday 26 January 2017.

Detail

To celebrate Australia Day, a fireworks display will be conducted from a barge on the waters of Woy Woy Channel at the location described above. The area directly around the moored firing barge may be dangerous and hazardous while fireworks are being launched.

An **EXCLUSION ZONE** is specified during the event, which will form an area of the waterway around the firing barge.

Vessel operators must keep a proper lookout and should exercise caution near the exclusion zone.

Unauthorised vessels and persons are strictly prohibited from entering the exclusion zone, which will form a 150 metre perimeter around the firing barge and will be patrolled by Roads and Maritime.

Penalties may apply (section 12(5) – *Marine Safety Act 1998*)

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice: SY1703

Date: 17 January 2017

Shayne Wilde
A/Principal Manager Sydney (Boating Operations)
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Lake Macquarie, adjacent to Speers Point Park.

Duration

8.00pm to 9.30pm — Thursday 26 January 2017.

Detail

A fireworks display will be conducted on Lake Macquarie, adjacent to Speers Point Park during the above times. The area directly around the firing position may be dangerous and hazardous while fireworks are being launched.

An **EXCLUSION ZONE** is specified during the event, which will form an area of the waterway adjacent to the firing position.

Vessel operators must keep a proper lookout and should exercise caution near the exclusion zone.

Unauthorised vessels and persons are strictly prohibited from entering the exclusion zone, which will be marked with buoys and patrolled by control vessels.

Penalties may apply (Section 12(5) – *Marine Safety Act 1998*)

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice NH1702

Date: 16 January 2017

Sonia McKay
Principal Manager North (Boating Operations)
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Wollongong Harbour and Tasman Sea adjoining Wollongong Harbour – defined by:

1. the shoreline of Wollongong Harbour adjacent to the intersection of Harbour Street and Cliff Road
2. to the eastern side of the remnants of the stone structure adjacent to the former Wollongong Slipway, Wollongong Harbour
3. to the entrance into the Wollongong Harbour, Tasman Sea.

Duration

8.40pm to 9pm Thursday 26 January 2017.

Detail

A Personal Watercraft and pyrotechnic flare demonstration will be conducted on the waters of the Wollongong Harbour and Tasman Sea adjoining Wollongong Harbour as specified above.

An **EXCLUSION ZONE** is specified during the event and will be created at the location detailed above.

As a result vessel operations in and out of Wollongong Harbour will be restricted.

Unauthorised vessels and persons are strictly prohibited from entering the exclusion zone which will be patrolled by Roads and Maritime and Water Police vessels.

All vessel operators and persons using the waters specified above should keep a proper lookout, keep well clear of participating vessels, and exercise extreme caution when navigating near the exclusion zone.

Penalties may apply (section 12(5) – *Marine Safety Act 1998*).

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice: SO1713

Date: 18 January 2017

Mike Hammond
Principal Manager South (Boating Operations)
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Tuggerah Lake – 200m off Canton Beach

Duration

8:45pm- 9:30pm Thursday 26 January 2017.

Detail

A fireworks display will be conducted from a barge on the waters of Tuggerah Lake at the location described above. The area directly around the moored firing barge may be dangerous and hazardous while fireworks are being launched.

An **EXCLUSION ZONE** is specified during the event, which will form an area of the waterway around the firing barge.

Vessel operators must keep a proper lookout and should exercise caution near the exclusion zone.

Unauthorised vessels and persons are strictly prohibited from entering the exclusion zone, which will form a 150 metre perimeter around the firing barge.

Penalties may apply (section 12(5) – *Marine Safety Act 1998*)

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice: SY1705

Date: 18 January 2017

Shayne Wilde
Acting Principal Manager, Sydney Region
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Botany Bay, Brighton-le Sands – between the Cooks River Entrance and Ramsgate Beach – 800 metres from the shore for a length of 3000 metres

Duration

9:00am to 4:00pm Saturday 28 and Sunday 29 January 2017

Detail

Competitive ski racing will be conducted on the waters of Botany Bay (as described above), involving the use of high speed power vessels which will be active in the area on both days between the specified times. There will also be support vessels present to manage the event, persons in the water from time to time, and persons being towed at speed using tow-lines – presenting a significant potential hazard to other waterway users.

All vessel operators and persons using the waters of Botany Bay in the vicinity of the event should keep a proper lookout, keep well clear of competing and support vessels, and exercise extreme caution.

An **EXCLUSION ZONE** is specified during the event at the above location.

Unauthorised vessels and persons are strictly prohibited from entering the exclusion zone, which will be marked by buoys and patrolled by Roads and Maritime Services and Ski Racing NSW support vessels.

Penalties may apply (section 12(5) – *Marine Safety Act 1998*)

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice SY1704

Date: 17 January 2017

Shayne Wilde
A/Principal Manager Sydney (Boating Operations)
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Lake Talbot, Narrandera – all navigable waters.

Duration

7:00am to 8:00pm Friday 3 to Sunday 5 February 2017 (inclusive)

Detail

A competitive water ski tournament will be conducted on the waters of Lake Talbot, Narrandera, involving the use of power vessels which will be active at the location on all three days during the above times.

There will be support vessels present to manage the event and persons being towed at speed, over jumps, and along a slalom course using tow-lines with the possibility of persons in the water from time to time – presenting a significant potential hazard to other waterway users.

An **EXCLUSION ZONE** is specified during the event and will comprise the entirety of Lake Talbot. This will in effect close the Lake between the above times for this event.

Unauthorised vessels and persons are strictly prohibited from entering the exclusion zone (the Lake) which will be patrolled by Roads and Maritime vessels.

Penalties may apply (section 12(5) – *Marine Safety Act 1998*)

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice: SO1709

Date: 18 January 2017

Mike Hammond
Principal Manager South (Boating Operations)
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Lake Canobolas, Orange.

Duration

7.00am to 2.00pm — Saturday 4 February 2017.

Detail

A swim event will be conducted on Lake Canobolas, Orange during the above times.

An **EXCLUSION ZONE** is specified during the event, which will form an area of the waterway adjacent to the Lakehouse.

Vessel operators in the vicinity of the exclusion zone must keep a proper lookout for swimmers in the water and should exercise extreme caution.

Unauthorised vessels and persons are strictly prohibited from entering the exclusion zone, which will be marked with buoys and patrolled by control vessels.

Penalties may apply (Section 12(5) – *Marine Safety Act 1998*)

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice NH1703

Date: 16 January 2017

Sonia McKay
Principal Manager North (Boating Operations)
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Upper Shoalhaven River, near the locality of the Shoalhaven Ski Park on Rock Hill Road, North Nowra, and bounded by –

- The southern extent of the western river bank at the Shoalhaven Ski Park,
- Downstream along the western riverbank for a distance of 1 kilometre,
- To the centre of the river, and adjacent to Thompsons Point on the eastern river bank,
- Downstream along the rivers centre to a position adjacent to the southern extent of the western river bank at the Shoalhaven Ski Park.

Duration

8:00am to 5:00pm Saturday 4 February 2017.

Detail

A competitive wakeboarding tournament will be conducted on the waters of the Upper Shoalhaven River, North Nowra, involving the use of power vessels which will be active at the location during the above times.

There will be support vessels present to manage the event and persons being towed at speed and over jumps with the possibility of persons in the water from time to time – presenting a significant potential hazard to other waterway users.

An **EXCLUSION ZONE** is specified during the event and will be created at the location specified above.

Unauthorised vessels and persons are strictly prohibited from entering the exclusion zone which will be patrolled by Roads and Maritime vessels.

Penalties may apply (section 12(5) – *Marine Safety Act 1998*)

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice: SO1717

Date: 18 January 2017

Mike Hammond
Principal Manager South (Boating Operations)
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Lake Albert, Wagga Wagga – all navigable waters.

Duration

8:00am to 6:00pm Saturday 4 and Sunday 5 February 2017.

Detail

Competitive ski racing will be conducted on the waters of Lake Albert, Wagga Wagga, involving the use of high speed power vessels which will be active at the location on both days during the above times.

There will also be support vessels present to manage the event, persons being towed at speed using tow-lines, and the possibility of persons in the water from time to time – presenting a significant potential hazard to other waterway users.

An **EXCLUSION ZONE** is specified during the event and will comprise the entirety of Lake Albert. This will in effect close the Lake between the above times for this event.

Unauthorised vessels and persons are strictly prohibited from entering the exclusion zone (the Lake) which will be patrolled by Roads and Maritime vessels.

Penalties may apply (section 12(5) – *Marine Safety Act 1998*)

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice: SO1716

Date: 18 January 2017

Mike Hammond
Principal Manager South (Boating Operations)
Delegate

MARINE SAFETY ACT 1998

MARINE NOTICE

Section 12(2)

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Murray River, near the township of Moama and between the following locations –

- Saturday 11 February 2017 – between Perricoota Marina at the 1690km marker and upstream to the Victoria Park boat ramp, Echuca, at the 1712km marker, and
- Sunday 12 February 2017 – between Torrumbarry Weir, at the 1630km marker, and upstream to the Victoria Park boat ramp, Echuca, at the 1712km marker.

Duration

6:00am to 7:00pm Saturday 11 and Sunday 12 February 2017.

Detail

Competitive ski racing will be conducted on the waters of the Murray River involving the use of high speed power vessels which will be active in the area on both days during the above times. There will also be support vessels present to manage the event, persons being towed at speed using tow-lines, and persons in the water from time to time – presenting a significant potential hazard to other waterway users.

An **EXCLUSION ZONE** is specified during the event between the times specified above and comprising the entirety of the River between the sections detailed on the respective days above.

No unauthorised vessels (i.e. vessels that are not already lawfully moored in the Zone) may enter the zone between the specified times. The Zone will be marked by the presence of official patrol and control vessels.

In addition, pursuant to section 12(3) of the *Marine Safety Act 1998*, for the duration of the event, **SPECIAL RESTRICTIONS** are imposed on vessels that are lawfully moored within the exclusion zone as follows:

- Vessels lawfully moored within the area must remain at their moorings and MUST NOT be operated during the event.
- All houseboats are required to be moored parallel to the river bank, in a safe location well away from river bends and corners. Failure to do this will delay the race.

Occupants of moored vessels are strongly urged to vacate their vessels during the event, and if they wish to view the race, to do so from shore.

Due to high speeds involved in the event, Roads and Maritime urges all spectators to exercise extreme caution when near the area. Be aware of approaching race vessels and of your escape route in case of an emergency.

Penalties may apply (section 12(5) – *Marine Safety Act 1998*)

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice: SO1710

Date: 18 January 2017

Mike Hammond
Principal Manager South, Boating Operations
Delegate

MARINE SAFETY ACT 1998

Section 12(2)

MARINE NOTICE

REGULATION OF VESSELS – EXCLUSION ZONE

Location

Tweed River – within a buoyed area between Condong and Murwillumbah Road Bridges.

Duration

7:00am to 4:00pm — 12 March 2017

Detail

Rowing Regattas will be conducted on the Tweed River, between Condong and Murwillumbah Road Bridges at the above times.

An **EXCLUSION ZONE** is specified at the above location while the events are running.

The Zone will consist of a buoyed area between the bridges and will be monitored and patrolled by control vessels.

Provision has been made for a 'transit zone' adjacent to the course and along the south eastern foreshore, within which control vessel operator will, at times, authorise local vessel traffic to transit the exclusion zone. Vessels navigating the transit zone must do so at a speed not exceeding 4 knots, must produce no wash, and must comply with any direction given by an authorised officer.

Unauthorised vessels and persons are strictly prohibited from entering the Exclusion Zone during the times above.

Vessel operators should comply with directions issued from control vessels and must keep a proper lookout and exercise extreme caution at all times when navigating near the zone.

Penalties may apply (section 12(5) – *Marine Safety Act 1998*)

For full details visit the Roads and Maritime Services website – www.rms.nsw.gov.au/maritime

Marine Notice: NH1704

Date: 16 January 2017

Sonia McKay
Principal Manager North (Boating Operations)
Delegate

ROADS ACT 1993

Notice of Dedication of Land as Public Road at Boggabri in the Narrabri Shire Council Area

Roads and Maritime Services, by its delegate, dedicates the land described in the schedule below as public road under section 10 of the *Roads Act 1993*.

A C NORTH
Manager, Compulsory Acquisition & Road Dedication
Roads and Maritime Services

Schedule

All those pieces or parcels of land situated in the Narrabri Shire Council area, Parish of Boggabri and County of Nandewar, shown as Lots 8 to 14 inclusive Deposited Plan 1197060.

(RMS Papers: SF2017/008553; RO 2012/012311)

ROADS ACT 1993

Notice of Dedication of Land as Public Road at West Hoxton in the Liverpool City Council Area

Roads and Maritime Services, by its delegate, dedicates the land described in the schedule below as public road under section 10 of the *Roads Act 1993*.

A C NORTH
Manager, Compulsory Acquisition & Road Dedication
Roads and Maritime Services

Schedule

All those pieces or parcels of land situated in the Liverpool City Council area, Parish of Minto and County of Cumberland, shown as Lots 54, 55 and 56 Deposited Plan 1210703.

(RMS Papers: SF2016/262586; RO 2013/005268)

ROADS ACT 1993

LAND ACQUISITION (JUST TERMS COMPENSATION) ACT 1991

Notice of Compulsory Acquisition of Land at South Penrith in the Penrith City Council Area

Roads and Maritime Services by its delegate declares, with the approval of His Excellency the Governor, that the land described in Schedule 1 and the interests in land described in Schedule 2 below are acquired by compulsory process under the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991* for the purposes of the *Roads Act 1993*.

A C NORTH
Manager, Compulsory Acquisition & Road Dedication
Roads and Maritime Services

Schedule 1

All those pieces or parcels of land situated in the Penrith City Council area, Parish of Mulgoa and County of Cumberland, shown as:

Lot 7 Deposited Plan 1224249, being part of the land in Certificate of Title 1/264332; excluding any existing easements from the compulsory acquisition of the said Lot 7;

Lot 6 Deposited Plan 1224249, being part of the land in Certificate of Title 11/236368;

Lot 5 Deposited Plan 1224249, being part of the land in Certificate of Title 131/258807;

Lot 117 Deposited Plan 1224009, being part of the land in Certificate of Title 26/247948; and

Lot 220 Deposited Plan 260512, being the whole of the land in Certificate of Title 220/260512.

The land is said to be in the possession of Penrith City Council.

Schedule 2

A lease for a specified period of two years as described in Memorandum AE293511 recorded at Land and Property Information, of all those pieces or parcels of land situated in the Penrith City Council area, Parish of Mulgoa and County of Cumberland, shown as:

Lot 4 Deposited Plan 1224249, being part of the land in Certificate of Title 11/236368;

Lot A in RMS Sketch SR 3404 – CA, being part of the land in Certificate of Title 10/236368;

Lot A in RMS Sketch SR 3396 – CA, being part of the land in Certificate of Title 26/247948; and

Lots 11 and 12 Deposited Plan 220581, being the whole of the land in Certificates of Title 11/220581 and 12/220581 respectively.

The land is said to be in the possession of Penrith City Council.

(RMS Papers: SF2016/158603; RO SF2016/021326)

TRANSPORT ADMINISTRATION ACT 1988

LAND ACQUISITION (JUST TERMS COMPENSATION) ACT 1991

Notice of Compulsory Acquisition of Land in the Local Government Area of Inner West

Transport for NSW by its delegate declares, with the approval of His Excellency the Governor, that the interest in land described in the schedule below is acquired by compulsory process under the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991* as authorised by clause 11 of Schedule 1 of the *Transport Administration Act 1988* for the purposes of the *Transport Administration Act 1988*.

TOM GELLIBRAND
Deputy Program Director
Sydney Metro
Transport for NSW

SCHEDULE 1

All that piece of land situated in the Local Government Area of Inner West, Parish of Petersham and County of Cumberland, comprising Lot 1 in DP613757, Lot 103 in DP630403, Lot 618 in DP720786, Lot 620 in DP720786

and Lot 4 in DP802920 and being the whole of land in Certificates of Title Folio Identifiers 1/613757, 103/630403, 618/720786, 620/720786 and 4/802920 said to be in the ownership of Transport for NSW ABN 18 804 239 602, but **excluding from the acquisition**:

- Reservations and conditions in the Crown grant(s) in relation to the land comprised in Folio Identifiers 1/613757, 103/630403 and 4/802920;
- Easement for drainage D302380 affecting part of the land comprised in Folio Identifier 1/613757 shown so burdened in DP613757;
- Right of carriageway P387559 5 wide & variable affecting part of the land comprised in Folio Identifier 1/613757 shown so burdened in DP613757;
- Right of carriageway P387559 6.695 & 10.06 wide appurtenant to the land comprised in Folio Identifier 1/613757 affecting the part shown so burdened in DP577370;
- Easement P387559 for drainage 2.75 & variable width affecting part of the land comprised in Folio Identifier 1/613757 shown so burdened in DP613757;
- Easement for railway purposes P528823 appurtenant to the land comprised within Folio Identifier 1/613757 and affecting part of the land shown as easement for railway purposes in plan with P528823;
- Lease S440192 to Ausgrid ABN 67 505 337 385 (formerly known as Sydney County Council) of Substation No 4560 together with a right of way and easement for electricity purposes shown in plan with Dealing S440192 in relation to the land comprised within Folio Identifier 1/613757. Expires 31 December 2032;
- Right of Way E860110 limited in depth appurtenant to the land comprised in Folio Identifier 1/613757 and affecting the land so designated (A) and (B) in plan with Dealing E860110;
- Unregistered (Sub) Lease AK971351 from Ausgrid to Blue Asset Partner Pty Ltd (ACN 615 217 493), ERIC Alpha Asset Corporation 1 Pty Ltd (ACN 612 974 044), ERIC Alpha Asset Corporation 2 Pty Ltd (ACN 612 975 023), ERIC Alpha Asset Corporation 3 Pty Ltd (ACN 612 975 032) and ERIC Alpha Asset Corporation 4 Pty Ltd (ACN 612 975 078) in relation to the land comprised in Folio Identifiers 1/613757, 618/720786 and 4/802920;
- Unregistered Mortgage of Lease AK971502 to Australia and New Zealand Banking Group Limited ACN 005 357 522 in respect of Unregistered (Sub) Lease AK971351 in relation to the land comprised in Folio Identifiers 1/613757, 618/720786 and 4/802920;
- Unregistered (Sub Sub) Lease AK971352 from Blue Asset Partner Pty Ltd (ACN 615 217 493), ERIC Alpha Asset Corporation 1 Pty Ltd (ACN 612 974 044), ERIC Alpha Asset Corporation 2 Pty Ltd (ACN 612 975 023), ERIC Alpha Asset Corporation 3 Pty Ltd (ACN 612 975 032) and ERIC Alpha Asset Corporation 4 Pty Ltd (ACN 612 975 078) to Blue Op Partner Pty Ltd (ACN 615 217 500), ERIC Alpha Operator Corporation 1 Pty Ltd (ACN 612 975 096), ERIC Alpha Operator Corporation 2 Pty Ltd (ACN 612 975 121), ERIC Alpha Operator Corporation 3 Pty Ltd (ACN 612 975 185) and ERIC Alpha Operator Corporation 4 Pty Ltd (ACN 612 975 210) in relation to the land comprised in Folio Identifiers 1/613757, 618/720786 and 4/802920;
- Lease AJ22185 to Metodiolineum Pty Limited ACN 078 996 639 of Bay 1, Warehouse A and Warehouse B, 1C Sydney Steel Road, Marrickville in relation to the land comprised in Folio Identifier 1/613757. Expires 30 November 2017 and with an option of renewal of three years;
- Lease AJ22186 to TYCHE Progressive Pty Ltd ACN 151 330 648 of Warehouse C, 1C Sydney Steel Road, Marrickville in relation to the land comprised in Folio Identifier 1/613757. Expires 30 November 2017 and with an option of renewal of three years;
- Monthly tenancy arising pursuant to an unsigned sublease granted by Metodiolineum Pty Limited ACN 078 996 639 to Kreman Transport Pty Limited ACN 097 446 850 in respect of Office Space at Unit B, 1C Sydney Steel Road, Marrickville in relation to the land comprised in Folio Identifier 1/613757. Expired 30 November 2010;
- Monthly tenancy arising pursuant to an unregistered sublease granted by Metodiolineum Pty Limited ACN 078 996 639 to William Eliades in respect of Part B of Building C (ground floor only), 1C Sydney Steel Road, Marrickville in relation to the land comprised in Folio Identifier 1/613757. Expired 29 February 2012;
- Right of carriageway DP577370 affecting part of the land comprised in Folio Identifier 103/630403 shown so burdened in DP630403;

- Lease AI654854 to Summit Sea and Air Pty Limited ACN 003 867 427 of Warehouse 2, 1A Sydney Steel Road, Marrickville and Office 2, 1B Sydney Steel Road, Marrickville in relation to the land comprised in Folio Identifiers 103/630403, 618/720786, 620/720786 and 4/802920. Expires 31 March 2018;
- Memorandum S700000A in respect of the exclusion of minerals from land and subject to reservations and condition in favour of the Crown in relation to the land comprised in Folio Identifiers 618/720786 and 620/720786;
- Lease X779107 to Ausgrid ABN 67 505 337 385 (formerly known as Sydney County Council) of Substation Premises No 4986 together with a right of way and an easement for electricity purposes shown in plan with Lease X779107, in relation to the land comprised in Folio Identifiers 618/720786 and 4/802920. Expires 31 December 2037;
- Unregistered lease to Bidvest Australia Limited ACN 000 228 231 of Warehouse 1, Office (GF), Office (L1) and adjacent awning as shown on the floor plan exhibited to the parties, 1A Sydney Steel Road, Marrickville. Expires 15 March 2026 and with an option of renewal of five years;
- The exclusion of minerals on the land reserved by Crown Grants Volume 5103 Folio 39 and Volume 10742 Folio 224 and the land below a depth of 15.24 metres from the surface reserved by Crown Grant Volume 5103 Folio 39 in relation to the land comprised in Folio Identifier 4/802920;
- Easement for transmission line M631747 affecting part of the land comprised in Folio Identifier 4/802920 shown so burdened in DP802920;
- Right of carriageway DP577370 6.695 and 10.06 wide affecting part of the land comprised in Folio Identifier 4/802920 shown so burdened in DP802920;
- Easement for railway purposes P528823 affecting part of the land comprised in Folio Identifier 4/802920 shown so burdened in DP802920;
- Easement for stormwater drainage Z707857 variable width affecting part of the land comprised in Folio Identifier 4/802920 shown so burdened in DP802920;
- Right of way Z707860 limited in depth appurtenant to the land comprised in Folio Identifier 4/802920 affecting the land designated (G) in plan with Dealing Z707860;
- Right of way E860109 limited in depth appurtenant to the land comprised in Folio Identifier 4/802920 affecting the land shown so designated (C), (D), (E) & (F) in plan with Dealing E860109;
- Easement for transmission line AA107889 affecting the site shown as easement for electricity purposes 6 metre(s) wide and variable designated (C) in DP1039750 in relation to the land comprised in Folio Identifier 4/802920; and
- Caveat AJ343067 by Ausgrid ABN 67 505 337 385 in relation to an equitable interest as grantee of an easement for electricity and other purposes pursuant to a Deed of Agreement for Easement dated 10 March 2015 in relation to the land comprised in Folio Identifier 4/802920.

(Transport for NSW Document Number: A5664023)

TRANSPORT ADMINISTRATION ACT 1988

LAND ACQUISITION (JUST TERMS COMPENSATION) ACT 1991

Notice of Compulsory Acquisition of Land in the Local Government Area of Sydney

Transport for NSW by its delegate declares, with the approval of His Excellency the Governor, that the interest in land described in the schedule below is acquired by compulsory process under the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991* as authorised by clause 11 of Schedule 1 of the *Transport Administration Act 1988* for the purposes of the *Transport Administration Act 1988*.

JANE RICHARDSON
Acting Deputy Program Director
Metro Product and Integration
Transport for NSW

SCHEDULE 1

All that piece of land situated in the Local Government Area of Sydney, Parish of St James and County of Cumberland, comprising Lot 1 in DP222356, being the whole of land in Certificate of Title 1/222356, said to be in the ownership of Transport for NSW ABN 18 804 239 602, **but excluding from the acquisition**:

- Easement M301506 for air vents appurtenant to the land within described shown in diagrams A, C, E, F & H in DP548142;
- Easement M301506 to drain water appurtenant to the land within described shown in diagrams C, D, E & G in DP548142;
- Easement M301506 for support appurtenant to the land within described shown in diagrams B & C in DP548142;
- Easement DP647285 for air vent appurtenant to the land within described shown in DP647285;
- Lease V269294 to Sydney County Council of substation no. 1664, shown in plan with J489524. Expires 30 September 2033;
- Lease AC738639 to New Zealand Trade and Enterprise of Suite 701, Level 7, 55 Hunter Street, Sydney. Expired 30 June 2011 with an option of renewal of 6 years;
- Lease AC738640 to The Sovereign in Right of New Zealand acting by and through the Secretary Of Internal Affairs of Suite 1001, Level 10, 55 Hunter Street, Sydney. Expired 30 June 2011 with an option of renewal of 6 years;
- Lease AC738641 to The Sovereign in Right of New Zealand acting by and through the Secretary Of Foreign Affairs and Trade of Suite 1002, Level 10, 55 Hunter Street, Sydney. Expired 30 June 2011 with an option of renewal of 6 years; and
- Lease AH100510 to Telstra Corporation Limited ACN 051 775 556 being the 'works area' shown hatched in plan with AH100510. Expires 17 April 2021 with an option of renewal of 5 years.

(Transport for NSW Document Number: 5685811)

Mining and Petroleum Notices

NOTICE is given that the following applications have been received:

EXPLORATION LICENCE APPLICATIONS

(T17-1013)

No. 5428, UNION GOLD AU PTY LTD (ACN 616486036), area of 52 units, for Group 1, dated 11 January, 2017. (Orange Mining Division).

(T17-1014)

No. 5429, PROTON GEOSCIENCE PTY LTD (ACN 125 500 398), area of 19 units, for Group 1, dated 11 January, 2017. (Broken Hill Mining Division).

(T17-1016)

No. 5431, PEEL MINING LIMITED (ACN 119 343 734), area of 32 units, for Group 1, dated 13 January, 2017. (Cobar Mining Division).

(T17-1017)

No. 5432, PEEL MINING LIMITED (ACN 119 343 734), area of 43 units, for Group 1, dated 13 January, 2017. (Cobar Mining Division).

The Hon Anthony Roberts MP
Minister for Industry, Resources and Energy

NOTICE is given that the following applications for renewal have been received:

(V17-0342)

Exploration Licence No. 5674, SILVER MINES LIMITED (ACN 107 452 942), area of 4 units. Application for renewal received 11 January, 2017.

(V17-0522)

Exploration Licence No. 8341, COPETON DIAMOND MINES PTY LTD (ACN 601 157 475), area of 47 units. Application for renewal received 16 January, 2017.

(V17-0532)

Exploration Licence No. 8342, COPETON DIAMOND MINES PTY LTD (ACN 601 157 475), area of 29 units. Application for renewal received 17 January, 2017.

The Hon Anthony Roberts MP
Minister for Industry, Resources and Energy

RENEWAL OF CERTAIN AUTHORITIES

Notice is given that the following authorities have been renewed:

(12-1716)

Authorisation No. 459, MACH ENERGY AUSTRALIA PTY LTD (ACN 608 495 441), County of Brisbane, Map Sheet (9033), area of 385 hectares, for a further term until 8 April, 2018. Renewal effective on and from 23 December, 2016.

(92-0349)

Authorisation No. 460, CENTENNIAL SPRINGVALE PTY LIMITED (ACN 052 096 812) AND SPRINGVALE SK KORES PTY LIMITED (ACN 051 015 402), County of Cook, Map Sheet (8931), area of 1104 hectares, for a further term until 6 June, 2020. Renewal effective on and from 22 November, 2016.

(10-6425)

Exploration Licence No. 5362, MURRAY BASIN TITANIUM PTY LTD (ACN 082 497 827), Counties of Perry and Wentworth, Map Sheet (7430, 7431), area of 192 units, for a further term until 9 October, 2018. Renewal effective on and from 11 January, 2017.

(12-1601)

Exploration Licence No. 5712, SHOALHAVEN COAL PTY LTD (ACN 070 863 893), County of Roxburgh, Map Sheet (8831), area of 333.5 hectares, for a further term until 10 April, 2019. Renewal effective on and from 21 December, 2016.

(08-4598)

Exploration Licence No. 5958, RIMFIRE PACIFIC MINING N.L. (ACN 006 911 744), County of Yancowinna, Map Sheet (7133, 7134), area of 27 units, for a further term until 23 June, 2017. Renewal effective on and from 20 December, 2016.

(15-1627)

Exploration Licence No. 5967, WHITEHAVEN COAL MINING LIMITED (ACN 086 426 253), County of Nandewar, Map Sheet (8936), area of 4790 hectares, for a further term until 24 July, 2021. Renewal effective on and from 10 January, 2017.

(10-3930)

Exploration Licence No. 6007, SHOALHAVEN COAL PTY LTD (ACN 070 863 893), County of Roxburgh, Map Sheet (8931), area of 140 hectares, for a further term until 7 October, 2018. Renewal effective on and from 10 January, 2017.

(15-0913)

Exploration Licence No. 6234, RENISON COAL PTY LTD (ACN 100 163 942) AND NORTHERN ENERGY CORPORATION LIMITED (ACN 081 244 395), County of Arrawatta, Map Sheet (9139), area of 800 hectares, for a further term until 19 April, 2018. Renewal effective on and from 7 December, 2016.

(15-0958)

Exploration Licence No. 7334, IDYLWAY VENTURE PTY LTD (ACN 141397006), Counties of Buccleuch, Harden and Wynyard, Map Sheet (8527), area of 29 units, for a further term until 24 April, 2019. Renewal effective on and from 7 December, 2016.

(T10-0177)

Exploration Licence No. 7679, SUGEC RESOURCES LIMITED (ACN 162 033 098), Counties of Clarke and Sandon, Map Sheet (9236, 9336), area of 32 units, for a further term until 11 January, 2018. Renewal effective on and from 11 January, 2017.

(T11-0321)

Exploration Licence No. 7954, TARAGO OPERATIONS PTY LTD (ACN 127 810 413), County of Argyle, Map Sheet (8728, 8828), area of 51 units, for a further term until 19 June, 2022. Renewal effective on and from 11 January, 2017.

(T12-1188)

Exploration Licence No. 8299, BELAMANDA RESOURCES PTY LTD (ACN 011 062 285), County of Buckland, Map Sheet (9035), area of 24 units, for a further term until 2 September, 2022. Renewal effective on and from 10 January, 2017.

The Hon Anthony Roberts MP
Minister for Industry, Resources and Energy

Crown Lands Notices

1300 886 235 www.crownland.nsw.gov.au

ARMIDALE OFFICE

ROADS ACT 1993

ORDER

TRANSFER OF A CROWN ROAD TO A COUNCIL

In pursuance of the provisions of section 151, *Roads Act 1993*, the Crown road specified in Schedule 1 is hereby transferred to the Roads Authority specified in Schedule 2 hereunder, and as from the date of publication of this notice, the road specified in schedule 1 ceases to be a Crown road.

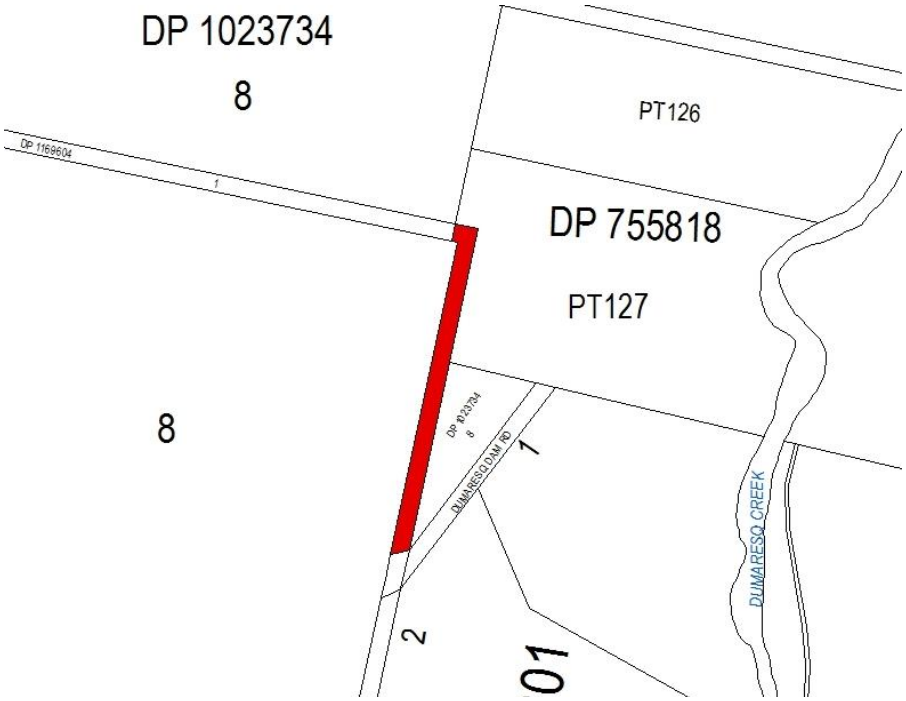
The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE 1

Parish – Dumaresq; County – Sandon

Land District – Armidale; LGA – Armidale Regional

Crown road shown coloured in red on diagram hereunder.



SCHEDULE 2

Roads Authority: Armidale Regional Council

Lands Reference: 17/00120

APPOINTMENT OF TRUST BOARD MEMBERS

Pursuant to section 93 of the *Crown Lands Act 1989*, the persons whose names are specified in Column 1 of the Schedule hereunder are appointed, for the terms of office specified in that Column, as members of the trust board for the reserve trust specified opposite thereto in Column 2, which has been established and appointed as trustee of the reserve referred to opposite thereto in Column 3 of the Schedule.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2	COLUMN 3
Mary Helena Hollingworth (re-appointment) Jennifer Anne Sloman (new member) Jennifer Clarendon Lanz (new member) For a term commencing the date of this notice and expiring 19 January 2022.	Deepwater Public Hall Trust	Reserve No. 110017 Public Purpose: Public Hall Notified: 25 March 1988 File Reference: AE85R42

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
ENVIRONMENTAL REHABILITATION	Reserve No. 31462 Public Purpose: Police Purposes Notified: 15 September 1900 File Reference: 16/05712 Reserve No. 96041 Public Purpose: Future Public Requirements Notified: 11 June 1982 File Reference: 16/05712

DUBBO OFFICE

REVOCATION OF RESERVATION OF CROWN LAND

Pursuant to section 90 of the *Crown Lands Act 1989*, the reservation of Crown lands specified in Column 1 of the Schedule hereunder is revoked to the extent specified opposite thereto in Column 2 of the Schedule.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
Land District: Mudgee Local Government Area: Mid-Western Regional Council Locality: Bungaba Reserve No. 95080 Public Purpose: Future Public Requirements Notified: 5 June 1981 File Reference: 16/03537	The whole being Lot 52 DP No 750742 Parish Bungaba County Bligh Lot 76 DP No 750742 Parish Bungaba County Bligh Lot 51 DP No 750742 Parish Bungaba County Bligh of an area of 71.07ha

ESTABLISHMENT OF RESERVE TRUST

Pursuant to section 92(1) of the *Crown Lands Act 1989*, the reserve trust specified in Column 1 of the Schedule hereunder is established under the name stated in that Column and is appointed as trustee of the part reserve specified opposite thereto in Column 2 of the Schedule.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
Gulgong Pony & Polocrosse Ground Reserve Trust	Part Dedication No. 520071 being Lot 450 DP 755434 Public Purpose: Racecourse, Public Recreation Notified: 22 January 1960 File Reference: 16/05729

APPOINTMENT OF TRUST BOARD MEMBERS

Pursuant to section 93 of the *Crown Lands Act 1989*, the persons whose names are specified in Column 1 of the Schedule hereunder are appointed, for the terms of office specified in that Column, as members of the trust board for the reserve trust specified opposite thereto in Column 2, which has been established and appointed as trustee of the part reserve referred to opposite thereto in Column 3 of the Schedule.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2	COLUMN 3
Brian Trengove (new member) David Deutscher (new member) Stephen Birt (new member) Mark Southwell (new member) Helen Dickinson (new member) For a term commencing the date of this notice and expiring 19 January 2022.	Gulgong Pony & Polocrosse Ground Reserve Trust	Part Dedication No. 520071 being Lot 450 DP 755434 Public Purpose: Racecourse, Public Recreation Notified: 22 January 1960 File Reference: 16/05729

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
STOCKYARD	Reserve No. 94033 Public Purpose: Public Recreation Notified: 5 December 1980 File Reference: 16/03978

GRAFTON OFFICE

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Coff; County – Fitzroy

Land District – Bellingen; LGA – Coffs Harbour

Road Closed: Lot 1 DP 1219250

File No: 15/07984

SCHEDULE

On closing, the land within Lot 1 DP 1219250 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Yarralaw; County – Argyle

Land District – Goulburn; LGA – Goulburn Mulwaree

Road Closed: Lot 1 DP 1225263

File No: 08/10534

SCHEDULE

On closing, the land within Lot 1 DP 1225263 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Tarcutta; County – Wynyard

Land District – Wagga Wagga; LGA – Wagga Wagga

Road Closed: Lot 12 DP 1225528

File No: 14/11051

SCHEDULE

On closing, the land within Lot 12 DP 1225528 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Willala; County – Pottinger

Land District – Gunnedah; LGA – Narrabri

Road Closed: Lot 2 DP 1220402

File No: 16/01209

SCHEDULE

On closing, the land within Lot 2 DP 1220402 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Burgess; County – Buller

Land District – Casino; LGA – Kyogle

Road Closed: Lots 1-9 DP 1226846

File No: 15/03977

SCHEDULE

On closing, the land within Lots 1-5 and Lots 7-9 DP 1226846 remains vested in the State of New South Wales as Crown land.

On closing, that part of the land within Lot 6 DP1226846 which was formerly Crown Rd remains vested in the State of New South Wales as Crown Land.

On closing, that part of the land within Lot 6 DP1226846 which was formerly Council Rd becomes vested in the State of New South Wales as Crown Land.

Council's reference: JB151214

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Nullamanna; County – Arrawatta

Land District – Inverell; LGA – Inverell

Road Closed: Lot 1 DP 1225833

File No: 15/03901

SCHEDULE

On closing, the land within Lot 1 DP 1225833 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Yarranbar; County – Jamison

Land District – Narrabri; LGA – Narrabri

Road Closed: Lot 1 DP 1223981

File No: 10/15310

SCHEDULE

On closing, the land within Lot 1 DP 1223981 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Gordon; County – Gough

Land District – Glen Innes; LGA – Glen Innes Severn Shire

Road Closed: Lot 1 DP 1225338

File No: 14/02150

SCHEDULE

On closing, the land within Lot 1 DP 1225338 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Tywong; County – Wynyard

Land District – Wagga Wagga; LGA – Wagga Wagga

Road Closed: Lot 1 DP 1219861

File No: 10/08375

SCHEDULE

On closing, the land within Lot 1 DP 1219861 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Ellerslie; County – Buller

Land District – Casino; LGA – Tenterfield

Road Closed: Lots 1-2 DP 1223287

File No: 07/3114

SCHEDULE

On closing, the land within Lots 1-2 DP 1223287 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Hogarth; County – Richmond

Land District – Casino; LGA – Richmond Valley

Road Closed: Lots 3-4 DP 1205653

File No: 15/10908

SCHEDULE

On closing, the land within Lots 3-4 DP 1205653 remains vested in the State of New South Wales as Crown land.

APPOINTMENT OF TRUST BOARD MEMBERS

Pursuant to section 93 of the *Crown Lands Act 1989*, the persons whose names are specified in Column 1 of the Schedule hereunder are appointed, for the terms of office specified in that Column, as members of the trust board for the reserve trust specified opposite thereto in Column 2, which has been established and appointed as trustee of the reserve referred to opposite thereto in Column 3 of the Schedule.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2	COLUMN 3
Paula Carol Vamvas (new member) Robert John Keane (new member) For a term commencing the date of this notice and expiring 27 March 2019.	The Channon Public Hall Reserve Trust	Reserve No. 140076 Public Purpose: Environmental Protection, Rural Services, Public Recreation Notified: 31 July 1992 Reserve No. 88821 Public Purpose: Public Hall, Public Hall Site Notified: 12 January 1973 File Reference: GF81R149-002

GRIFFITH OFFICE

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
GRAZING	Reserve No. 76566 Public Purpose: Future Public Requirements Notified: 12 February 1954 File Reference: 15/11214 Reserve No. 94613 Public Purpose: Future Public Requirements Notified: 10 April 1981 File Reference: 15/11214 Reserve No. 750851 Public Purpose: Future Public Requirements Notified: 29 June 2007 File Reference: 15/11214

MAITLAND OFFICE

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
DECK; CAR PARK; OUTDOOR DINING	Reserve No. 170169 Public Purpose: Port Facilities and Services Notified: 28 June 1996 File Reference: 16/10107

SCHEDULE

COLUMN 1	COLUMN 2
GRAZING; GARDEN	Reserve No. 755259 Public Purpose: Future Public Requirements Notified: 29 June 2007 File Reference: 16/00248

SCHEDULE

COLUMN 1	COLUMN 2
GRAZING	Reserve No. 145A Public Purpose: Trigonometrical Purposes Notified: 7 May 1883 File Reference: 16/08670

MOREE OFFICE

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
GRAZING	Reserve No. 97712 Public Purpose: Access Notified: 8 March 1985 File Reference: 15/11493

NEWCASTLE OFFICE

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Awaba; County – Northumberland

Land District – Newcastle; LGA – Lake Macquarie

Road Closed: Lot 1 DP 1213550

File No: 11/11237

SCHEDULE

On closing, the land within Lot 1 DP 1213550 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Myall Cowall; County – Flinders

Land District – Nyngan; LGA – Bogan

Road Closed: Lot 1 DP 1221769

File No: 09/15121

SCHEDULE

On closing, the land within Lot 1 DP 1221769 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Ganoo; County – Gordon

Land District – Molong; LGA – Dubbo Regional

Road Closed: Lots 1-2 DP 1226505

File No: 08/5448 RS

SCHEDULE

On closing, the land within Lots 1-2 DP 1226505 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Nanima; County – Bligh

Land District – Wellington; LGA – Dubbo Regional

Road Closed: Lot 2 DP 1210652

File No: 10/19066

SCHEDULE

On closing, the land within Lot 2 DP1210652 becomes vested in the State of New South Wales as Crown Land.

Council's reference: 2015/030/2

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parishes – Galbraith, Three Brothers; County – Bathurst

Land District – Bathurst; LGA – Blayney

Road Closed: Lot 1 DP 1226384

File No: 16/00224

SCHEDULE

On closing, the land within Lot 1 DP 1226384 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parishes – Piangula, Yarragrin; County – Gowen

Land District – Coonabarabran; LGA – Gilgandra, Warrumbungle

Road Closed: Lot 1 DP 1225852

File No: 09/15480

SCHEDULE

On closing, the land within Lot 1 DP 1225852 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parishes – Duckmaloi, Bulgarres; County – Westmoreland

Land District – Lithgow; LGA – Oberon

Road Closed: Lots 2-3 DP 1225853

File No: 12/05412

SCHEDULE

On closing, the land within Lots 2-3 DP 1225853 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

DESCRIPTION

Parish – Eiraban; County – Ewenmar

Land District – Dubbo; LGA – Gilgandra

Road Closed: Lot 1 DP 1224524

File No: DB05H662

SCHEDULE

On closing, the land within Lot 1 DP 1224524 remains vested in the State of New South Wales as Crown land.

NOTIFICATION OF CLOSING OF A ROAD

In pursuance of the provisions of the *Roads Act 1993*, the road hereunder described is closed and the lands comprised therein cease to be public road and the rights of passage and access that previously existed in relation to the road is extinguished. Upon closing, title to the land, comprising the former public road, vests in the body specified in the Schedule hereunder.

The Hon Niall Blair MLC
Minister for Lands and Water

DESCRIPTION

Parish – Prospect; County – Cumberland

Land District – Metropolitan; LGA – Cumberland

Road Closed: Lot 101 DP1227388

File No: 16/02393

SCHEDULE

On closing, the land within Lot 101 DP1227388 remains vested in Cumberland Council as operational land for the purposes of the *Local Government Act 1993*.

Council Reference: SC129

NOWRA OFFICE

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
ENVIRONMENTAL PROTECTION	Reserve No. 750236 Public Purpose: Future Public Requirements Notified: 29 June 2007 File Reference: 16/07541

ORANGE OFFICE

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
ENVIRONMENTAL PROTECTION; CONSERVATION	Reserve No. 751655 Public Purpose: Future Public Requirements Notified: 29 June 2007 File Reference: 14/02078

ORDER – AUTHORISATION OF ADDITIONAL PURPOSE UNDER S121A

Pursuant to s121A of the *Crown Lands Act 1989*, I authorise by this Order, the purpose specified in Column 1 to be an additional purpose to the declared purpose of the reserves specified opposite thereto in Column 2 of the Schedule.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
PUBLIC RECREATION	Dedication No. 1000246 Public Purpose: Reservoir Notified: 16 July 1890 File Reference: 17/00149

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
POWER/TRANSMISSION LINE	Reserve No. 50992 Public Purpose: Rifle Range Notified: 15 September 1915 File Reference: 16/09581 Reserve No. 84622 Public Purpose: Research Station Notified: 8 November 1963 File Reference: 16/09581 Reserve No. 87034 Public Purpose: Travelling Stock, Camping Notified: 3 January 1969 File Reference: 16/09581

COLUMN 1	COLUMN 2
	Reserve No. 92631 Public Purpose: Public Recreation Notified: 6 June 1980 File Reference: 16/09581 Reserve No. 1027968 Public Purpose: Urban Development Notified: 25 June 2010 File Reference: 16/09581

SCHEDULE

COLUMN 1	COLUMN 2
ENVIRONMENTAL PROTECTION; CONSERVATION	Reserve No. 751655 Public Purpose: Future Public Requirements Notified: 29 June 2007 File Reference: 14/02078

SYDNEY METROPOLITAN OFFICE

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
ENCROACHMENTS	Dedication No. 500032 Public Purpose: Recreation, Wharf Site Notified: 20 August 1886 File Reference: 16/03778

TAREE OFFICE

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
ACCESS; STORAGE AREA	Reserve No. 754449 Public Purpose: Future Public Requirements Notified: 29 June 2007 File Reference: 14/02294

WAGGA WAGGA OFFICE

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
LANDSCAPING; DRAIN WATER	Dedication No. 1015348 Public Purpose: Environmental Protection, Access, Public Recreation Notified: 26 June 2009 File Reference: 15/08169

SCHEDULE

COLUMN 1	COLUMN 2
WALKWAY; LANDSCAPING; DRAIN WATER	Reserve No. 1036788 Public Purpose: Public Recreation, Environmental Protection, Rural Services, Future Public Requirements, Tourist Facilities and Services Notified: 16 November 2012 File Reference: 15/08169

WESTERN REGION OFFICE

ALTERATION OF PURPOSE/CONDITIONS OF A WESTERN LANDS LEASE

It is hereby notified that in pursuance of the provisions of Section 18J *Western Lands Act 1901*, the purpose and conditions of the undermentioned Western Lands Lease have been altered as shown.

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

Administrative District – Wilcannia

Shire – Central Darling, County – Livingstone

The purpose of Western Lands Lease 9181, being the land contained within Folio Identifier 29/754390 has been altered from "Residence & Cultivation" to "Cultivation" effective from

13 January 2017.

As a consequence of the alteration of purpose/conditions rent will be assessed annually in line with the *Western Lands Act 1901* and Regulations.

The conditions have been altered by the inclusion of the special conditions following.

Special Condition to be Attached to Western Lands Lease 9181

1. The land leased must only be used for the purpose of Cultivation.

Special Condition to be Removed from Western Lands Lease 9181

1. The lessee shall reside on the land leased. "Residence" for the purpose of this condition, shall be taken to mean continuous and bona fide living on the land leased as the holder's usual home without any other habitual residence.

NOTICE OF PURPOSE OTHER THAN THE DECLARED PURPOSE PURSUANT TO SECTION 34A(2)(b) OF THE CROWN LANDS ACT 1989

PURSUANT to section 34A(2)(b) of the *Crown Lands Act 1989*, the Crown reserve(s) specified in Column 2 of the Schedule is to be used or occupied under a relevant interest granted for the purpose(s) specified in Column 1 of the Schedule where such use or occupation is other than the declared purpose of the reserve

The Hon NIALL BLAIR, MLC
Minister for Lands and Water

SCHEDULE

COLUMN 1	COLUMN 2
RESIDENCE	Reserve No. 1013810 Public Purpose: Future Public Requirements Notified: 29 June 2007 File Reference: 16/06334

SCHEDULE

COLUMN 1	COLUMN 2
ENVIRONMENTAL PROTECTION	Reserve No. 1013830 Public Purpose: Future Public Requirements Notified: 29 June 2007 File Reference: 16/07316

Other Government Notices

CHARITABLE TRUSTS ACT 1993

ORDER UNDER SECTION 12

ADMINISTRATIVE SCHEME RELATING TO

THE MAURICE SENDAK AND BETSY SENDAK TRUST FUND

Section 12(1) of the *Charitable Trusts Act 1993* permits the Attorney General to establish a scheme for the administration of any charitable trust.

By deed dated 21 January 1988 (the 'trust deed'), a charitable trust was created by Mrs Betsy Sendak for the promotion and encouragement of education at the Newcastle Conservatorium of Music (a part of the University of Newcastle) through the establishment and award of an annual scholarship prize. The Trust is known as the 'Dr Maurice Sendak OBE Prize Trust Fund' ('the Trust'). As at September 2014 the value of the trust fund was $332,481.45.

The existing trustees seek to be removed from their appointment and for the trust to be dissolved and the funds transferred to the University of Newcastle ('University') to be held on the same terms and conditions as under the trust deed. The University consents to its appointment as trustee and has approved the appointment of the Vice–Chancellor as second trustee. The new trustees undertake to manage the fund and apply the income in accordance with the original purposes of the Trust, subject to certain minor variation being made to the operation of the Trust. While the trust deed contains a power to vary the purposes for which the income of the trust fund is directed to be applied, and for the appointment of new trustees, it does not contain any power to amend its terms not does it contain a winding up clause.

The original purposes of the Trust have not failed and the trust funds are intended to be applied to the same purpose specified in the trust deed. Therefore, a cy près scheme under the *Charitable Trusts Act 1993* is not required. So long as there are two continuing trustees to manage the trust, the University and the Vice Chancellor can be appointed as new trustees pursuant to section 6 of the *Trustee Act 1925*.

An administrative scheme will however be required to effect necessary variations to the operation of the Trust, to reflect the discharge of the current trustees and a change in position titles at the University.

As delegate of the Attorney General, I have formed a view that this is an appropriate matter in which the Attorney General should approve an administrative scheme under section 12(1)(b) of the *Charitable Trusts Act 1993* for the purposes of varying the operation of the trust as presently set out in clauses 7, 8 and 11 of the trust deed. I am satisfied that it would be advantageous and desirable to do so, as the variations are necessary to reflect the current circumstances and new arrangements in respect of administering the prize, as well as to reflect the change in trustee. These changes enable the purposes of the trust to be achieved.

I have approved the Attorney General establishing an administrative scheme pursuant to section 12 of the *Charitable Trusts Act 1993* and, pursuant to section 12 of the Charitable Trusts Act, I now hereby **order** that operation of the Dr Maurice Sendak OBE Prize Trust Fund be varied by an administrative scheme which effects variations of the operation of clauses 7,8, and 11 of the Trust deed.

This Order will take effect 21 days after its publication in the Government Gazette, in accordance with section 16(2) of the *Charitable Trusts Act 1993*.

Date of Order: 22 December 2016

SIGNED
MG SEXTON, SC
Solicitor General (Under delegation from the Attorney General)

PARENTS AND CITIZENS ASSOCIATIONS INCORPORATION ACT 1976

Section 13 (4)

NOTICE OF INCORPORATION OF PARENTS AND CITIZENS ASSOCIATIONS

The following associations are hereby incorporated under the *Parents and Citizens Associations Incorporation Act 1976*.

1. Merewether Public School
2. Bexley Public School

3. Attunga Public School
4. Brookvale Public School

Sarah Hargans
Relieving General Counsel
Department of Education

12 January 2017

SURVEYING AND SPATIAL INFORMATION ACT 2002

Registration of Surveyors

PURSUANT to the provisions of the *Surveying and Spatial Information Act 2002*, Section 10(1) (a), the undermentioned persons have been Registered as a Land Surveyor in New South Wales under the *Mutual Recognition Act 1992* from the dates shown.

Name	Address	Effective Date
TULLOCH John Craig	1 Seagrove Court Noosaville QLD 4566	09 January 2017

Narelle Underwood
President

Michael Spiteri
Registrar

SURVEYING AND SPATIAL INFORMATION ACT 2002

Restoration of Name to the Register of Surveyors

PURSUANT to the provisions of the *Surveying and Spatial Information Act 2002*, Section 10A (3), the undermentioned Land Surveyors has been restored to the Register of Surveyors.

Name	Date of Original Registration	Removal Date	Restoration Date
SEARLES Thomas Matthew	04 October 2009	01 September 2016	17 January 2017

Narelle Underwood
President

Michael Spiteri
Registrar

SURVEYING AND SPATIAL INFORMATION ACT 2002

Restoration of Name to the Register of Surveyors

PURSUANT to the provisions of the *Surveying and Spatial Information Act 2002*, Section 10A (3), the undermentioned Land Surveyors has been restored to the Register of Surveyors.

Name	Date of Original Registration	Removal Date	Restoration Date
CAMPBELL Thomas Frank	26 March 2012	01 September 2014	18 January 2017

Narelle Underwood
President

Michael Spiteri
Registrar

DISAPPEARANCE

TWO HUNDRED AND FIFTY THOUSAND DOLLARS ($250,000) REWARD

On the 23rd August 2007, Matthew LEVESON, aged 20 years, was last seen leaving the ARQ nightclub in Oxford Street, Darlinghurst. Matthew has not been seen since and it is believed that he was murdered. His body has never been located.

Notice is hereby given that a reward of up to two hundred and fifty thousand dollars ($250,000) will be paid by the Government of New South Wales for information leading to the location of the body of Matthew LEVESON or for information leading to the arrest and conviction of the person or persons responsible for the murder of Matthew LEVESON.

The allocation of this reward will be at the sole discretion of the Commissioner of Police.

The urgent assistance and co-operation of the public is especially sought in the matter. Any information, which will be treated as confidential, may be given at any time of the day or night at any Police Station or by telephone -

Police Headquarters telephone (02) 9281 0000
or Crime Stoppers on 1800 333 000

This reward notice replaces the previous notice published in the NSW Government Gazette, issue number 26 on the 9th March 2012.

THE HON. TROY GRANT, MP
Minister for Justice and Police

13 January 2017

COUNCIL NOTICES

ARMIDALE REGIONAL COUNCIL

ROADS ACT 1993

Naming of Roads

Notice is hereby given that Armidale Regional Council, pursuant to section 162 of the *Roads Act 1993*, has officially named the road(s) as shown hereunder:

Name	**Locality**
VICS PARADISE ROAD	Brushy Creek
Description	
Private Road off Old Armidale Road. Leading to: Lot 24 DP 753674 Lot 7001 DP 1001441 Lot 170 DP 753674	

RALF STOECKELER, Director of Engineering, Armidale Regional Council, 158 Bradley Street, GUYRA NSW 2365

GNB Ref: 0008 [8968]

BEGA VALLEY SHIRE COUNCIL

ROADS ACT 1993

Naming of Roads

Notice is hereby given that Bega Valley Shire Council, pursuant to section 162 of the Roads Act 1993, has officially named the road(s) as shown hereunder:

Name	**Locality**
POSIDONIA ESPLANADE	Bermagui
Description	
Posidonia Esplanade is the name proposed for an unnamed section of road in Bermagui, which heads north from Lamont Street between an oval and the marina.	

Name	**Locality**
DURVILLAEA LANE	Bermagui
Description	
Durvillaea Lane is proposed for an L shaped laneway in the shopping precinct of Bermagui that runs between Lamont Street and Bunga Streets.	

Name	**Locality**
LAURENCIA LANE	Bermagui
Description	
Laurencia Lane is proposed for a short section of unnamed lane between Hill Street and Murrah Streets in Bermagui.	

LEANNE BARNES, General Manager, Bega Valley Shire Council, PO Box 492, BEGA NSW 2550

GNB Ref: 0329 [8969]

BEGA VALLEY SHIRE COUNCIL

Roads Act 1993

Naming of Roads

Notice is hereby given that Bega Valley Shire Council, pursuant to section 162 of the *Roads Act 1993*, has officially named the roads as shown hereunder:

Road Name	**Locality**
Reservoir Street	Candelo
Description	
Reservoir Street is located off Candelo Wolumla Road in Candelo.	

Road Name	Locality
Juno Drive	Boydtown
Description	
Juno Drive is located off Ben Boyd Parade in Boydtown.	

Road Name	Locality
Huggetts Lane	Tathra
Description	
Huggetts Lane is located between Pacific Street and Dilkera Road in Tathra.	

Road Name	Locality
Church Lane	Tantawangalo
Description	
Church Lane is located between Tantawangalo Lane and Slaters Lane in Tantawangalo.	

Road Name	Locality
Cobargo Tip Road	Cobargo
Description	
Cobargo Tip Road is the access road to the Cobargo tip located off the Princes Highway in Cobargo.	

LEANNE BARNES, General Manager, Bega Valley Shire Council, PO Box 492, Bega NSW 2550. [8970]

INNER WEST COUNCIL

Roads Act 1993

Section 16

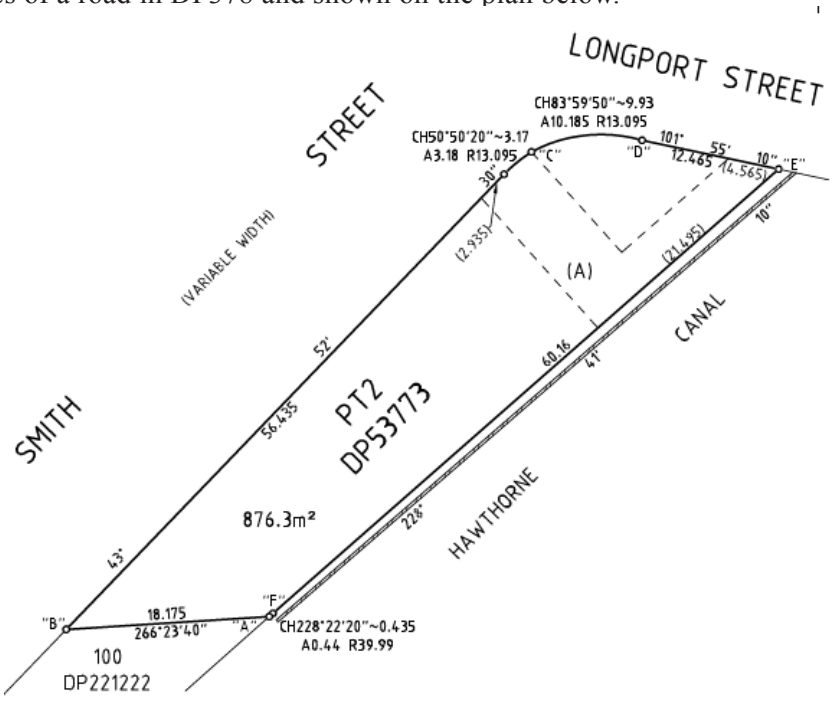
Dedication of Land as Public Road

Having given notice to the owner under section17(1) and there being no application to the Court under section 17(2) of the *Roads Act 1993*, BY THIS NOTICE Inner West Council, pursuant to section 16(2) of the *Roads Act 1993*, dedicates the land described in the schedule as public road.

Signed at Leichhardt on 20 January 2017. Rik Hart, General Manager, Inner West Council PO Box 45 Leichhardt 2040.

SCHEDULE

Part of Lot 2 in Deposited Plan 53773, and being part of Certificate of Title Volume 354 Folio 134 and located at the intersection of Carlton Crescent, Longport Street and Smith Street, Summer Hill and part of the land set aside for the purposes of a road in DP378 and shown on the plan below.



[8971]

LAKE MACQUARIE CITY COUNCIL

ERRATUM

The notice published in the New South Wales Government Gazette of 23 December 2016, folio's 3862, 3863 & 3864, under the heading of "Naming of Roads" detailing the 21 new road names at Cameron Park, is to be amended as follows:

Under Description, the suburb name shown as Morisset is to be amended to Cameron Park

This erratum now amends the error with the gazettal date remaining 23 December 2016. BRIAN BELL, General Manager, Lake Macquarie City Council, Box 1906, HRMC, Warabrook NSW 2310 [8972]

LISMORE CITY COUNCIL

ROADS ACT 1993

Section 16

Notice of Dedication of Land as Public Road

NOTICE is hereby given by Lismore City Council in pursuance of section 16, Division 2 of Part 2 of the *Roads Act 1993*, that the lands described in the Schedule below are hereby dedicated as public road. Dated at Lismore, 16 January 2017. GARY MURPHY, General Manager, Lismore City Council, PO Box 23A, Lismore NSW 2480.

SCHEDULE

The undedicated Road 20.115 wide shown in Deposited Plan 1735 being the cross roads separating Sections 7, 8, 9 and 10 in Plan of Subdivision of Portion 17 Parish of Blakebrook, County of Rous (as coloured green on diagram). [8973]

LIVERPOOL CITY COUNCIL

ROADS ACT 1993

Naming of Roads

Notice is hereby given that Liverpool City Council, pursuant to section 162 of the *Roads Act 1993*, has officially named the road(s) as shown hereunder:

Name	**Locality**
SPIRE COURT	HOXTON PARK
Description	
A road that was renamed from Illaroo Road to Spire Court.	

K FISHBURN, Chief Executive Officer, Liverpool City Council, Locked Bag 7064, 1871 [8974]

PORT STEPHENS COUNCIL

Dedication of Land as Public Road

Roads Act 1993

Section 10

NOTICE is hereby given that in accordance with section 10 of the *Roads Act 1993*, the land described in the Schedule below is dedicated to the public as road. W Wallis, General Manager, Port Stephens Council, PO Box 42, Raymond Terrace NSW 2324. Council files E5360-018 & A2004-1010

SCHEDULE

Lots 1 & 3 D.P. 877639 (known as Nelson Bay Road) [8975]

SHOALHAVEN CITY COUNCIL

ROADS ACT 1993

Naming of Roads

Notice is hereby given that Shoalhaven City Council, pursuant to section 162 of the *Roads Act 1993*, has officially named the road(s) as shown hereunder:

Name	**Locality**
BENDIGO CIRCUIT	Nowra
Description	
New road created as part of the subdivision of Lots 11 & 13 DP 226701 from the extension of Moresby Street to Adele Close.	

Name	**Locality**
GUNBAR WAY	Nowra
Description	
New road created as part of the subdivision of Lot 13 DP 226701 from Bendigo Circuit to Adele Close.	

Name	**Locality**
MANOORA WAY	Nowra
Description	
New road created as part of the subdivision of Lot 13 DP 226701 from Bendigo Circuit to Adele Close.	

Name	**Locality**
ADELE CLOSE	Nowra
Description	
New road created as part of the subdivision of Lots 11 & 13 DP 226701 from the extension of Moresby Street ending at a cul-de-sac.	

Name	**Locality**
MORESBY STREET	Nowra
Description	
Extension and connection of existing road.	

Name	**Locality**
VENDETTA STREET	Nowra
Description	
Extension and connection of existing road.	

RUSS PIGG, General Manager, Shoalhaven City Council, PO Box 42, NOWRA NSW 2541

GNB Ref: 0007 [8976]

TAMWORTH REGIONAL COUNCIL

ROADS ACT 1993

Naming of Roads

Notice is hereby given that Tamworth Regional Council, pursuant to section 162 of the *Roads Act 1993*, has officially named the road(s) as shown hereunder:

Name	**Locality**
DROP BEAR LANE	Moore Creek
Description	
The Council public road turns off Upper Moore Creek Road at the south western corner of Lot 532 DP 1191315. The road extends north for the length of Lot 532 in DP 1191315. A Crown public road intersects the Council public road at a right angle forming the northern boundary of Lot 532 DP 1191315.	

PAUL BENNETT, General Manager, Tamworth Regional Council, 437 Peel Street, TAMWORTH NSW 2340

GNB Ref: 0012 [8977]

TAMWORTH REGIONAL COUNCIL

ROADS ACT 1993

Naming of Roads

Notice is hereby given that Tamworth Regional Council, pursuant to section 162 of the *Roads Act 1993*, has officially named the road(s) as shown hereunder:

Name	**Locality**
SYRAH CLOSE	North Tamworth
Description	
Cul de Sac off Marsanne Street	

Name	**Locality**
ROUSANNE WAY	North Tamworth
Description	
Crescent shape from Burgundy Way to Chardonnay Drive	

Name	**Locality**
MARSANNE STREET	North Tamworth
Description	
Straight road from Rousanne Way to Chardonnay Drive	

Name	**Locality**
MALVASIA CLOSE	North Tamworth
Description	
Cul de Sac off Verdelho Drive	

Name	**Locality**
COLOMBARD DRIVE	North Tamworth
Description	
Road between Burgundy Way and Verdelho Drive	

Name	**Locality**
LAMBRUSCO WAY	North Tamworth
Description	
Crescent shape road from Chardonnary Drive to Verdelho Drive	

PAUL BENNETT, General Manager, Tamworth Regional Council, 437 Peel Street, TAMWORTH NSW 2340
GNB Ref: 0009 [8978]

THE HILLS SHIRE COUNCIL

ROADS ACT 1993

Naming of Roads

Notice is hereby given that The Hills Shire Council, pursuant to section 162 of the *Roads Act 1993*, has officially named the road(s) as shown hereunder:

Name	**Locality**
KINNICK PLACE	Kellyville
Description	
Extending east from Roland Garros Circuit for approximately 54 meters before turning in a southern direction for approximately 160 meters ending in a cul-de-sac	

Name	**Locality**
MARKETSFIELD AVENUE	Kellyville
Description	
Extending south from Withers Road into Lot A DP 404072 ending at Lords Boulevard	

Name	Locality
ECHIDNA GROVE	Glenorie
Description	
Extending west from Old Northern Road into Lots 11 and 12 DP 736796 ending in a cul-de-sac.	

Name	Locality
GECKO PLACE	Glenorie
Description	
Extending south from proposed road 'Echidna Grove' veering to the west ending in a cul-de-sac	

DAVE WALKER, General Manager, The Hills Shire Council, 3 Columbia Court, BAULKHAM HILLS NSW 2153
GNB Ref: 0010 [8979]

THE HILLS SHIRE COUNCIL

ROADS ACT 1993

Naming of Roads

Notice is hereby given that The Hills Shire Council, pursuant to section 162 of the *Roads Act 1993*, has officially named the road(s) as shown hereunder:

Name	Locality
BARLOW BOULEVARD	Box Hill
Description	
Off Fontana Drive	

Name	Locality
BOOROOLA ROAD	Box Hill
Description	
Off Triumph Road	

Name	Locality
COOLABEE STREET	Box Hill
Description	
Off Gromark Terrace	

Name	Locality
CORMO WAY	Box Hill
Description	
Off Sundowner Parkway	

Name	Locality
FORELLE STREET	Box Hill
Description	
Off Fontana Drive	

Name	Locality
FUJI LANE	Box Hill
Description	
Off Fontana Drive	

Name	Locality
GALA STREET	Box Hill
Description	
Off Celestino Drive	

Name	Locality
GROMARK TERRACE	Box Hill
Description	
Off Barlow Boulevard	

Name	Locality
HOLSTEIN ROAD	Box Hill
Description	
Off Sundowner Parkway	

Name	Locality
JAZZ STREET	Box Hill
Description	
'Jazz Street' off Sundowner Parkway. Suffix has been amended from Place to Street to be more in line with the actual extent of the road.	

Name	Locality
JONAGOLD TERRACE	Box Hill
Description	
Off Barlow Boulevard	

Name	Locality
MARIPOSA ROAD	Box Hill
Description	
Off Celestino Drive	

Name	Locality
NAVELINA STREET	Box Hill
Description	
Off Sundowner Parkway	

Name	Locality
NELIS STREET	Box Hill
Description	
Off Sundowner Parkway	

Name	Locality
PLUMCOTT STREET	Box Hill
Description	
Off Fontana Drive	

Name	Locality
POLL LANE	Box Hill
Description	
Off Barlow Boulevard	

Name	Locality
POLWARTH STREET	Box Hill
Description	
Off Barlow Boulevard	

Name	Locality
SATIN WAY	Box Hill
Description	
Off Celestino Drive	

Name	Locality
SUNDOWNER PARKWAY	Box Hill
Description	
Off Fontana Drive	

Name	Locality
TRIUMPH ROAD	Box Hill
Description	
Off Fontana Drive	

Name	Locality
KIEWA GROVE	Box Hill
Description	
Off Barlow Boulevard	

Name	Locality
KALINDA AVENUE	Box Hill
Description	
Off Barlow Boulevard	

Name	Locality
BUNYARRA PARADE	Box Hill
Description	
Off Celestino Drive	

Name	Locality
BLOOMSDALE CIRCUIT	Box Hill
Description	
Off Cataract Road	

Name	Locality
TYEE STREET	Box Hill
Description	
Off Fontana Drive	

Name	Locality
TETON STREET	Box Hill
Description	
Off Cataract Road	

Name	Locality
SPACE ROAD	Box Hill
Description	
Off Celestino Drive	

Name	Locality
CAVALO WAY	Box Hill
Description	
Off Fontana Drive	

Name	Locality
SCOTCH WAY	Box Hill
Description	
Off Celestino Drive	

Name	Locality
BORECOLE STREET	Box Hill
Description	
Off Cataract Road	

Name	Locality
VALLETTA AVENUE	Box Hill
Description	
Feeder Road	

Name	Locality
FONTANA DRIVE	Box Hill
Description	
Feeder Road	

DAVE WALKER, General Manager, The Hills Shire Council, 3 Columbia Court, BAULKHAM HILLS NSW 2153
GNB Ref: 0011 [8980]

TWEED SHIRE COUNCIL

ROADS ACT 1993

NAMING OF PUBLIC ROAD

NOTICE is hereby given that the Tweed Shire Council, in pursuance of Section 162 of the *Roads Act 1993*, has named the road that runs off Seaview Street at Tweed Heads South as;

Herb Lane

Authorised by resolution of the Council on 15 December 2016, General Manager, Tweed Shire Council, Civic Centre, Tumbulgum Road, Murwillumbah NSW 2484. [8981]

By Authority
Government Printer

ISSN 2201-7534