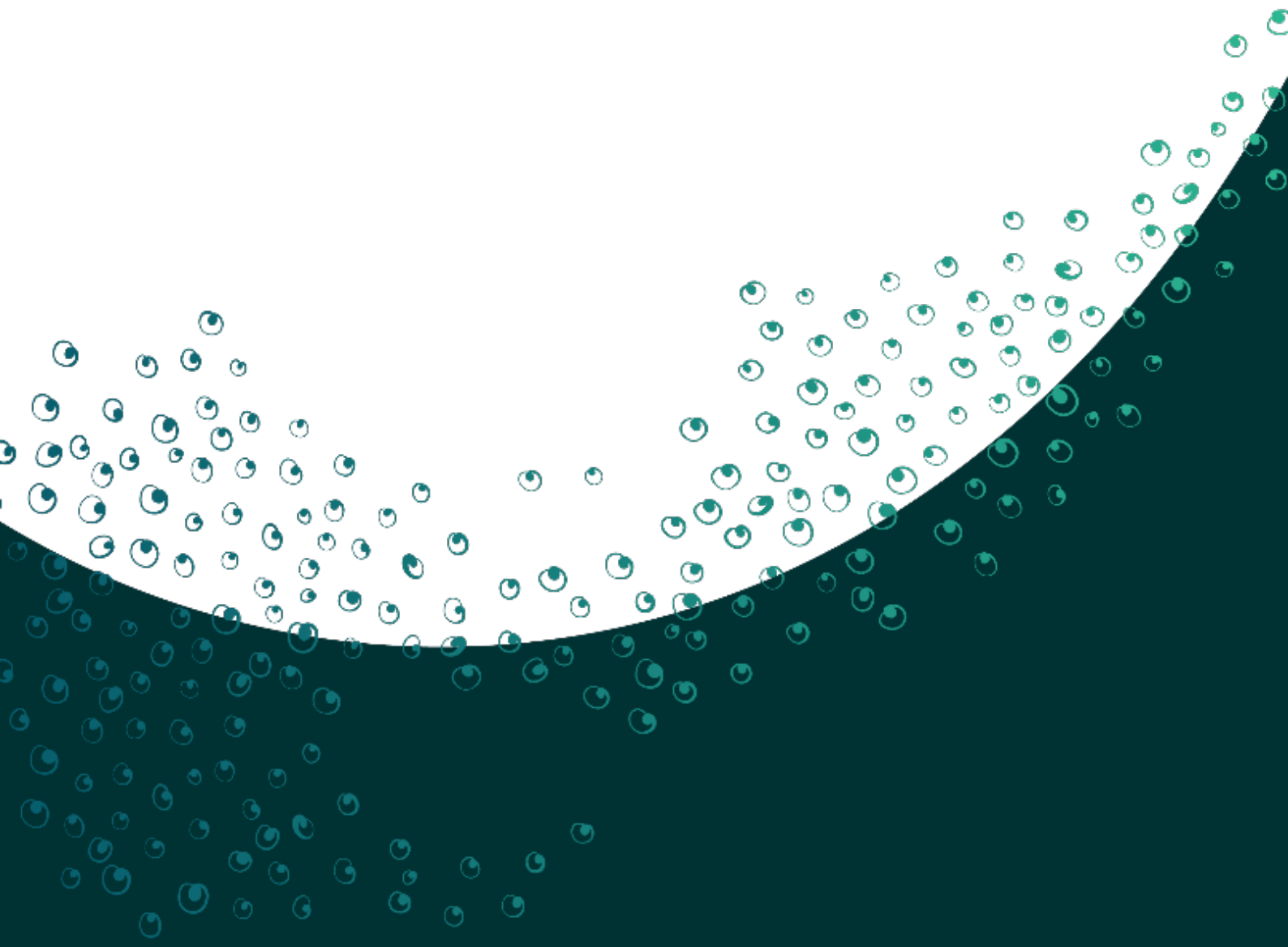

Air

EIS information guideline

Queensland Government

Prepared by: Environmental Impact Assessment, Operational Support, Department of Environment and Science

The Department of Environment and Science acknowledges Aboriginal peoples and Torres Strait Islander peoples as the Traditional Owners and custodians of the land. We recognise their connection to land, sea and community, and pay our respects to Elders past, present and emerging.

The department is committed to respecting, protecting and promoting human rights, and our obligations under the Human Rights Act 2019.

Disclaimer

This document has been prepared with all due diligence and care, based on the best available information at the time of publication. The department holds no responsibility for any errors or omissions within this document. Any decisions made by other parties based on this document are solely the responsibility of those parties. Information contained in this document is from a number of sources and, as such, does not necessarily represent government or departmental policy.

If you need to access this document in a language other than English, please call the Translating and Interpreting Service (TIS National) on 131 450 and ask them to telephone Library Services on +61 7 3170 5470.

This publication can be made available in an alternative format (e.g. large print or audiotape) on request for people with vision impairment; phone +61 7 3170 5470 or email <library@des.qld.gov.au>.

Citation

Department of Environment and Science 2022, *Air—EIS information guideline*, ESR/2020/5294, Queensland Government, Brisbane.

ESR/2020/5294, version 1.02, last reviewed: 21 Apr 2022

Contents

Introduction

This guideline advises proponents in relation to air emissions when preparing an environmental impact statement (EIS).

Some terms that are highlighted in italics in this guideline are defined or explained in the glossary at the end of the guideline.

Legislation and policy

In Queensland, the environmental impacts of an activity involving air emissions are regulated under the *Environmental Protection Act 1994* (EP Act) and subordinate legislation, including the Environmental Protection Regulation 2019 (EP Regulation) and Environmental Protection (Air) Policy 2019 (EPP(Air)).

With regard to air emissions, a contaminant can be (s. 11, EP Act):

(a) a gas, liquid [such as a mist or vapour] or solid [including particulates, such as dust or smoke]; or
(b) an odour; or
(c) an organism (whether alive or dead), including a virus; or
(d) energy, including heat, radioactivity and electromagnetic radiation; or
(e) a combination of contaminants.

The EPP(Air) refers to a contaminant as an *indicator* of the air environment.

Noise is also a contaminant to air, but the Department of Environment and Science (the department) has published a separate guideline, Noise—EIS information guideline (DES 2022), that deals specifically with noise. That guideline's information is not repeated here.

What should be addressed in an EIS?

There are three key areas that an EIS must identify and address relating to air matters:

- environmental values of the receiving air environment and any nearby sensitive places
- potential impacts of the proposed activity on the environmental values and all associated risks
- measures to avoid, minimise and mitigate the identified impacts and risks to the environmental values.

The following sections of this guideline provide advice on how to achieve the requirements in these three areas. Greenhouse gases are addressed in a separate section.

As well as this guideline, the EIS must meet the requirements of the department's guideline Application requirements for activities with impacts to air (DES 2019) in preparing the air section of the EIS.

When this guideline requires a matter to be described, use appropriate maps, diagrams, charts and/or photographs. Multiple graphics may be needed to adequately illustrate a matter. If a particular matter is not relevant, rather than being silent, explain why it is not relevant to demonstrate that it has been considered.

Environmental values and the receiving air environment

Environmental values

Section 6 of the EPP(Air) defines the environmental values to be enhanced or protected as follows:

- the qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems
- the qualities of the air environment that are conducive to human health and wellbeing
- the qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures and other property
- the qualities of the air environment that are conducive to protecting agricultural use of the environment.

Assess the significance of each of those values with regard to the site and the surrounding area. Include any locations that may be affected by the dispersal of contaminants from the proposed development or activity.

In particular, address key environmental priority areas including any with the following features:

- remnant and regrowth ecosystems of all types
- a protected area under the *Nature Conservation Act 1992* or the *Marine Parks Act 2004* or a World Heritage Area
- all dwellings, residential allotments, mobile home or caravan parks, residential marinas or other residential premises
- a motel, hotel or hostel
- a kindergarten, school, university or other educational institution
- a medical centre or hospital
- a public park or garden
- a place used as a workplace including an office for business or commercial purposes.

Such places are referred to in this guideline as sensitive receptors. However, that does not include a workplace within the proposed project's site because the situation where an air emission is released within a workplace or dwelling (as defined under section 8 of the *Work Health and Safety Act 2011*) is regulated under the Work Health and Safety Act rather than the EP Act.

Include potential future uses of the land outlined in local or state government planning instruments including potential for rezoning or subdivision of nearby land and State development areas.

Illustrate the description with maps, diagrams, cross-sections, and photographs, including the following items:

- a scaled map showing the location of sensitive receptors in relation to the site boundary and proposed activities
- a map or maps of the regional topography and built environment, including the site boundary, and features such as hills, valleys, vegetation, roads, railways, buildings and other places where people live, work or spend time
- an aerial photograph of the site and the surrounding area.

Meteorology

Provide data and statistics of local and regional meteorology up to the airshed scale. Parameters must include air temperature, wind speed and direction, atmospheric stability, mixing depth and any other parameters that may be necessary for input to air quality models for the EIS and ongoing management of the proposed project. Illustrate the description with maps, wind roses, graphs, and charts.

Air environment—existing

Describe and illustrate the existing significant sources of contaminants at the proposed project site, and within the surrounding area and the airshed, including the following indicators:

- dust and suspended particulates (including PM_{10} and $PM_{2.5}$)
- oxides of carbon, sulfur or nitrogen
- organic compounds
- toxic metals or metalloids
- greenhouse gases
- odorous compounds
- any other relevant constituent of the air environment that may be affected by the proposed project.

For the proposed project's relevant contaminants, explain and quantify any overlap between indicators. For example, toxic metals such as lead may be present as a fraction of particulates, and methane is both an organic compound and a greenhouse gas.

Describe the existing air environment at the proposed project site, the surrounding area and the airshed, including the background/ambient levels of those air contaminants. Include all available data from any site-specific air monitoring, the National Pollutant Inventory (NPI) reporting, and/or ambient air quality monitoring undertaken by the Queensland government (see the department's website).

If the proposed project will produce significant emissions that will disperse beyond the project's boundaries, develop a model that adequately represents the current air environment, and which can be adapted to predict the air environment if the proposed project commences (see below for additional recommendations about modelling).

Assess how local and regional meteorology affects the dispersal of contaminants. Also, assess the existing airshed's capacity to assimilate additional contaminants.

Impact assessment

Contaminants

Identify and quantify the contaminants (or indicators) that would be emitted by the proposed project. Provide a process flow diagram detailing all sources of air emissions associated with the proposed project, including dust, odour, and other air contaminants. Include all point sources (e.g. chimney stacks, process flares, conveyors, transfer chutes, crushers, storage bins, hoppers, stockpiles and biological treatment lagoons), diffuse sources (e.g. dust from unsealed areas of the site) and fugitive emission (e.g. leaks from containment vessels).

Differentiate between point, diffuse and fugitive sources, and mention which emissions can be controlled and which cannot. Illustrate sources on a map. Separately address the various phases of the proposed project, including construction, commissioning, start-up, operation, shut-down, closure, maintenance, and emergencies outside of normal operating conditions (i.e. 'upset' conditions). Provide a separate air emission inventory for any off-site activities directly associated with the proposed project, including fugitive and nonpoint source emissions from such sources as rail or road transport of product or waste.

Base estimates of emission rates on actual measurements taken from similar facilities, preferably full-scale facilities operating elsewhere, or otherwise from experimental or demonstration-scale facilities. Where this is not possible, use published and referenced emission factors and/or data supplied by manufacturers of process and control equipment.

Compare the expected point source emissions against best practice national and international source emission standards, such as the NSW Protection of the Environment Operations (Clean Air) Regulation 2010. Assess whether the expected point source emissions would be within best practice standards.

Objectives

Tabulate the air quality objectives applicable to the contaminants that would be emitted by the proposed project, having regard to the relevant environmental values. Use the EPP(Air) as the primary source for air quality objectives supplemented by national and international standards, such as the National Environment Protection (Ambient Air Quality) Measure 1998, National Environment Protection (Air Toxics) Measure, World Health Organization Guidelines for Europe (WHO 2000) and publications of the United States Environmental Protection Agency.

If the proposal would involve the release of a chemical species that is not listed in the EPP(Air) or National Environment Protection Measures, refer to the following information:

- the design criteria prescribed by the Victorian Government's State Environment Protection Policy (Air Quality Management) (2001)
- New South Wales Government's modelling guideline Approved methods and guidance for the modelling and assessment of air pollutants in NSW (EPA 2016)
- South Australian Government's guideline Ambient air quality assessment (EPA 2016)
- the effects screening levels of the Texas Commission on Environmental Quality air quality guideline, which are specifically intended to protect human health and welfare (TCEQ 2018).

Modelling

This section applies if the proposed project would have significant air emissions that would disperse beyond the project's site boundaries.

Use a suitable and adequate model to predict the movement and concentrations in the air of contaminants from the proposed project. If there is no single atmospheric dispersion model that is able to handle the different atmospheric dispersion characteristics exhibited in the proposed project area (such as sea breezes, strong convection, terrain features, temperature inversions and contaminant re-circulation), apply a combination of acceptable models.

The department does not require the use of any particular air dispersion model and currently refers to the guidance provided in the NSW modelling guidelines Approved methods and guidance for the modelling and assessment of air pollutants in NSW (EPA 2016). The most widely used air dispersion models in Australia are CALPUFF, TAPM and AERMOD. A combination of TAPM and CALPUFF is the most advanced modelling system currently extensively used in Australia. In Queensland, there are many areas where the frequency of very light winds is high and the topography is complex. For these locations, dispersion modelling must be conducted using the CALPUFF model, which is technically better formulated for these conditions, and can be expected to provide more accurate

results than a steady-state Gaussian model. CALMET, a pre-processor modelling system, may be used with CALPUFF.

Provide model input data for all air pollutants for all the proposed project's point, diffuse and fugitive emission sources. For point sources, present concentrations at standard temperature and pressure. Include relevant information on mass emission rates, stack gas exit velocities and temperatures, stack heights, volume flow rates and oxygen content of the flue gases. State all input parameters, data sets, and assumptions used in the modelling.

The model inputs should be as detailed as possible, reflecting any variation of emissions with time and including at least a full year of representative hourly meteorological data. Where point source air emissions are proposed, provide stack parameters such as stack height, diameter, temperature, exit velocity and volume flow rate.

Estimate the typical and maximum (worst-case) ground level concentrations for each significant contaminant under the expected range of meteorological conditions. The averaging period for ground-level concentrations should be consistent with the relevant averaging periods for air quality indicators and goals in the EPP(Air) and the National Environmental Protection (Ambient Air Quality) Measure 1998. For example, sulfur dioxide must be modelled for 1-hour, 24-hour, and annual averaging periods.

Provide contour maps of predicted ground level concentrations extending at least to the locations where concentrations would be higher than background levels. Indicate the locations of sensitive receptors and the site boundary on the contour maps. Tabulate the estimated ground level concentrations at all sensitive receptors and selected locations on the site boundary.

If the proposed project would increase dust emissions, predict the monthly average dust deposition values at all sensitive receptors.

The results of modelling should be interpreted using applicable EPP(Air) air quality objectives, National Environmental Protection (Ambient Air Quality) Measure 1998 or other relevant criteria, guidelines and standards.

Potential impacts

Predict the impacts of the releases from the activity on environmental values of the receiving environment using established and accepted methods and in accordance with the EP Regulation and EPP(Air). The sensitivity and assimilative capacity of the receiving environment and the practices and procedures that would be used to avoid or minimise impacts must be considered.

Compare the predicted ground level concentrations with the air quality objectives, and identify and quantify any potential exceedences, particularly at any sensitive receptors.

Assess the risk to human health and amenity impacts associated with emissions from the proposed project for all contaminants whether or not they are covered by the National Environmental Protection (Ambient Air Quality) Measure 1998 or the EPP(Air).

If the proposed project will involve gas flaring, provide additional information, including whether flaring will be used only during the commissioning stage and/or in the event of an emergency or upset conditions. If flaring will be continuous, or a common part of normal operations, separately assess the impacts of the flare's emissions.

Assess potential impacts of emissions on ecosystems or agricultural uses of the environment. For example, fluoride emissions can impact on vegetation at levels lower by orders of magnitude than would impact on human health; or dust may impact on cotton crops.

If odour could be an issue, conduct odour impact assessment according to the department's guideline Odour impact assessment from developments (EHP 2013).

Identify worst-case emissions that may occur at start-up, commissioning, start-up, shut-down and/or maintenance and emergencies outside of normal operating conditions. Consider the range and frequency of potential upset condition scenarios, and the specific air emissions that may be generated as a result. If worst-case emissions are likely to be significantly higher than those for normal operations, conduct additional modelling specifically to evaluate the worst-case impact of emissions.

Assess the cumulative impact of the proposed project's proposed emissions with other known emissions of contaminants, materials or wastes associated with existing and possible future development. For all significant emissions, assess the potential cumulative impacts across a range of scales from local to the whole airshed, and assess both acute and chronic impacts. Also, assess the potential cumulative impacts of emissions holistically rather than only for individual contaminants—for example, assess whether two or more contaminants that have a similar toxic effect on organisms would synergistically impact on the health of the organisms even though their individual amounts might be below objectives.

Assess how the proposed project would affect the airshed's capacity for assimilation and dispersion of emissions in regard to existing and possible future uses of the airshed.

Assess any residual impacts that cannot be avoided or mitigated.

Avoidance and mitigation measures

Describe the proposed mitigation measures in practical terms. Describe the features of the proposed project that are designed to avoid, suppress or minimise emissions, including dusts and odours. Provide details of the pollution control equipment and pollution control processes to be employed on the premises. Also, describe the backup measures and contingency plans that would be activated to minimise the likelihood of plant upsets and adverse air impacts if primary measures fail.

Assess how the proposed emission control measures would accord with the management hierarchy for air emissions in the EPP(Air)—that is, in order of preference: avoid, recycle, minimise, or manage. Also, assess how consistent the proposed mitigation measures would be with best practice environmental management.

Assess the effectiveness of the proposed mitigation measures in relation to managing current and future airshed capacity.

Demonstrate that the proposed project can meet the environmental objectives and performance outcomes for air in Schedule 8 of the EP Regulation. Describe how air quality would be monitored and audited, and how corrective action would be taken when needed.

If any proposed mitigation measure is novel or unproven, describe it in detail and assess how it compares to current global best practice environmental management.

Greenhouse gases

Provide an inventory of projected annual Scope 1 and Scope 2 emissions for each relevant greenhouse gas (GHG), with emissions expressed in carbon dioxide equivalent terms. Briefly describe the methods used to make the estimates. The Australian Department of Climate Change and Energy Efficiency's National Greenhouse Accounts (NGA) Factors can be used as a reference source for emission estimates, supplemented by other sources. Also, if sufficient information is available, estimate the Scope 3 GHG emissions.

The EIS should also:

- assess the potential impacts of the proposed project on the state and national GHG inventories and propose GHG abatement measures
- describe the proposed measures (preferred and alternatives) to avoid and/or minimise Scope 1 and Scope 2 GHG emissions of the proposed project (and Scope 3, if possible)
- assess how the preferred mitigation measures minimise emissions and achieve energy efficiency
- compare the preferred measures for emission controls and energy consumption with best practice environmental management in the relevant sector of industry
- describe any opportunities for further offsetting GHG emissions through indirect means.
- The means of reducing GHG emissions could include measures such as:
- minimising clearing at the site (which also has other advantages besides reducing GHG emissions)
- using less carbon-emitting transport modes or fuels
- integrating transport for the proposed project with other local industries such that GHG emissions from the construction and running of transport infrastructure are minimised
- maximising the use of renewable energy sources
- using vented coal seam methane for energy production
- carbon sequestration at nearby or remote locations.
- In the proposed project's environmental management plan, provide a specific module for GHGs that addresses the following matters:
- commitments to abate GHG emissions from the proposed project, with details of the intended objectives, measures and performance standards to avoid, minimise and control emissions
- periodic energy audits that measure progress towards improving energy efficiency
- a process for regularly reviewing new technologies to identify opportunities to reduce GHG emissions and use energy efficiently, consistent with best practice environmental management
- any voluntary initiatives, such as projects undertaken as a component of the national Greenhouse Challenge Plus program, or research into reducing the lifecycle and embodied energy carbon intensity of the proposed project's processes or products

- opportunities for offsetting GHG emissions by renewable energy uses
- commitments to monitor, audit and report on GHG emissions from all relevant activities and the success of offset measures.

Commitments and conditions

Provide a consolidated description of commitments relating to air impacts. Propose conditions for air that may be placed on an environmental authority based on the department's existing model conditions and eligibility criteria, and/or modified or developed to suit site and project specific matters.

Glossary

Carbon dioxide equivalent (CO_2e) is a measure used to compare the emissions of a particular greenhouse gas to carbon dioxide based on its global warming potential over a specified timescale. For example, the global warming potential for methane compared to carbon dioxide over 100 years is 21, so the carbon dioxide equivalent of 1 tonne of methane is 21 tonnes (CO_2e).

Indicator as defined in the EPP(Air) means a contaminant that may be present in the air environment.

Scope 1 greenhouse gas emissions are emissions from sources that are owned or directly controlled by the organisation. Scope 1 emissions for coal mining projects will include fugitive coal seam methane vented or released during mining, as well as emissions directly resulting from the project's activities such as transportation of products and consumables.

Scope 2 greenhouse gas emissions are emissions from the consumption of purchased electricity, steam, or other sources of energy (e.g. chilled water) generated upstream from the organisation. Scope 2 emissions for any type of project will include energy (e.g. electricity) used by the project but generated by other entities.

Scope 3 greenhouse gas emissions are a consequence of the operations of an organisation, but are not directly owned or controlled by the organization. Scope 3 emissions will include indirect sources such as employee commuting, business travel, third-party distribution and logistics, and the production of purchased goods.

References

Note: These references were correct at the time of publication. Where more recent versions are available, these must be used. For all Department of Environment and Science publications, the latest version of a publication can be found by using the publication number as a search term at the Queensland Government website <www.qld.gov.au>.

Department of Environment and Heritage Protection 2013, *Odour impact assessment from developments*, Brisbane, Queensland Government, viewed April 2020, <https://environment.des.qld.gov.au/licences-permits/business-industry/pdf/guide-odour-impact-assess-developments.pdf>.

Department of Environment and Science 2022, *Noise and vibration—EIS information guidelines*, ESR/2020/5305, Queensland Government, Brisbane, viewed April 2022, <https://www.qld.gov.au/environment/pollution/management/eis-process/about-the-eis-process/developing-an-eis>.

Department of Environment and Science 2019, *Application requirements for activities with impacts to air*, ESR/2015/1840, Department of Environment and Science, Brisbane, viewed April 2020, <https://environment.des.qld.gov.au/assets/documents/regulation/era-gl-air-impacts.pdf>.

Environmental Protection Authority 2016, *Approved methods for modelling and assessment of air pollutants in New South Wales*, Sydney, Environmental Protection Authority, New South Wales government, viewed April 2020, <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/air/approved-methods-for-modelling-and-assessment-of-air-pollutants-in-nsw-160666.pdf>.

Environment Protection Authority 2016*, Ambient air quality assessment*, Adelaide, Environment Protection Authority, South Australian government.

National Environmental Protection Council 1998, *National Environmental Protection (Air Quality) Measure*, viewed June 2019, <http://www.nepc.gov.au/nepms/ambient-air-quality>.

National Environmental Protection Council 1998, *National Environmental Protection (Air Toxics) Measure*, viewed June 2019, <http://www.nepc.gov.au/nepms/air-toxics>.

Texas Commission on Environmental Quality 2018, Texas Commission on Environmental Quality, viewed June 2019, <https://www.tceq.texas.gov/toxicology/esl/list_main.html>.

World Health Organization 2000, *Air quality guidelines for Europe*, Copenhagen, World Health Organization.