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Centre for Applied Sciences

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| Supporting Information for Separation distance guideline and landfill buffer guideline |



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# Introduction

## Purpose of this report

The first Environment Protection Authority Victoria separation distance guideline was produced in 1977. Since then, the guideline has been amended many times, with the latest version produced in 2013. The current guidelines required review for the following reasons:

* They reflected 1970s standards and legislative frameworks
* They did not account for modern ways of operating and the advent of new industries
* They did not account for new technology and new science.

EPA has since reviewed and updated the information and invited feedback on the new draft guidelines in February 2023. Their scope applies to offsite odour and nuisance dust emissions from industrial uses and activities that have the potential to impact human health and wellbeing, local amenity and aesthetic enjoyment.

This report provides summary information on the key drivers, background information and science supporting the development of the guidance.

## Structure of this report

The structure of the report is as follows:

* Background information on:
  + odour, dust and how it impacts people
  + separation distances, their purpose, and their use in managing risk
* Key drivers for the guideline revision
* Comparison of separation distances with other jurisdictions
* EPA data and measurements:
  + How EPA measures and estimates odour and dust impacts
  + EPA data and field investigations relating to odour, including landfills
  + EPA data and field investigations relating to dust, including open cut mining
* Summary of findings.

## Intended audience

The intended audience for this report are stakeholders who may use the guidelines and seek further information on the basis for the separation distances. The proposed guidelines will support planning authorities, responsible authorities, industry, developers, the community and EPA. It is also intended that the finalised guidelines will be referenced in the Victoria Planning Provisions, which will require planning decision makers consider the guidelines as relevant.

# Background

## Odour, dust and their impacts

Odour and nuisance dust impacts to air quality are key environmental issues in Victoria and are defined in the Victorian Environment Protection Act 2017 as a form of pollution. Repeated exposure can negatively affect people’s quality of life, potentially causing frustration, stress, discomfort or annoyance. Both odour and nuisance dust can also impact health of those with pre-existing respiratory conditions such as asthma.

Odours

Unpleasant odours can come from many industrial processes such as landfilling, food processing, animal husbandry, composting, and sewage treatment. Odour from industry is one of the largest sources of complaints received by EPA.

Olfactory receptors in the nose can detect odours, leading to different sensations. Offensive odours may cause negative responses such as irritation, pain, sneezing, salivation, and vasodilation (widening of blood vessels), ultimately resulting in nasal obstruction, bronchoconstriction, mucus secretion and inflammation (Guadalupe-Fernandez et al., 2021). Exposure to nuisance levels of odour can negatively affect people’s quality of life, as it may cause frustration, stress, discomfort or annoyance. They can also lead to health problems such as headaches, nausea, vomiting and triggering of asthmatic events.

Odours can affect people differently depending on their level of sensitivity. Some people are naturally tolerant to odour, while others react significantly to the slightest concentrations. People who are affected by odours often need to adjust their day-to-day activities to avoid them. This may include reducing time outdoors, refraining from opening windows, or scheduling activities to certain times of the day.

Dust

Dust is a common air pollutant that can result in unsightly soiling of surfaces, creation of visible plumes and reduction of visibility. Examples of nuisance dust impacts include the following:

* Infiltration into homes, or preventing opening of windows
* Aggravation of asthma symptoms in vulnerable people
* Irritation to people’s eyes, or obscuring views
* interfering with a person’s capacity to work at their place of employment
* Tainting preparation of food, or damaging equipment or products at commercial premises or restaurants.
* Damage to vehicles or property
* Accumulation in gutters and on surfaces, requiring regular cleaning
* Impact on natural systems and ecology.

Dust particles vary in size from coarse (non-inhalable), to fine (inhalable), to very fine (respirable). Particles in airborne dust tend to be coarse or non-respirable, and only reach as far as the inside of the nose, mouth or throat. This can cause irritation to people’s eyes, nose and throat, but do not pose a serious long term health risk. However, coarse particles in dust can impact people with pre-existing respiratory conditions such as asthma, causing them to experience difficulties.

## Separation and buffer distances for managing odour and nuisance dust in Victoria

For many decades, EPA and regulators in other Australian jurisdictions have used separation distances to help prevent incompatible land use that might result in odour or dust affecting the community.

Separation distances are typically used between industry and sensitive land uses, such as homes, childcare centres, schools and hospitals. A buffer is land used to separate or manage incompatible land uses and may contain multiple separation distances that respond to various risks to human health and amenity. The buffer extends to the largest of the separation distances — for example, landfill buffer distances comprise of separation distances for odour, dust and landfill gas migration, and extend to the largest of the three.

Separation distances are intended to allow routine or day-to-day emissions and unintended offsite emissions from odour and dust to disperse, minimising human health and amenity risks for any nearby sensitive uses.

Where there are routine or day-to-day emissions from a premises, there may still be unintended offsite emissions at or beyond the boundary, even when an industry is operating in accordance with all relevant statutory obligations. The unintended offsite emissions that separation distances account for do not extend to those resulting from major abnormal weather conditions, major accidents or major equipment failure from activities.

Separation distances and buffers protect the continued operation of industries as well as the health and amenity of the surrounding community. In some cases, development may occur within separation or buffer distances where they are non-sensitive uses or land uses with potential sensitivity to odour and dust subject to a risk assessment

All separation distances within the guidelines can be adjusted with appropriate risk assessment. EPA recommends that the risk assessment be to the satisfaction of the decision maker, and should follow the relevant guidelines set out in EPA publications:

* For information on air standards and broader risk-based approaches to assessing and minimising air pollution in Victoria, refer to [EPA Publication 1961](https://www.epa.vic.gov.au/about-epa/publications/1961).
* For odour risk assessment, refer to Guidance for assessing odour ([EPA publication 1883](https://www.epa.vic.gov.au/about-epa/publications/1883))
* For dust risk assessment, refer to Guidance for assessing nuisance dust ([EPA publication 1943](https://www.epa.vic.gov.au/for-business/find-a-topic/dust/advice-for-businesses)).

# Key drivers for guideline revision

The revision of the guidelines is driven by several significant changes over recent years.

Recommendations from the Independent Inquiry into the EPA

In 2015, the Victorian Government initiated an independent Inquiry into the EPA (Victorian Government, c2015). There were two recommendations that led EPA to update EPA Publication 1518:

* **Recommendation 10.3:** Develop, as a priority, strengthened land use planning mechanisms that establish and maintain buffers to separate conflicting land uses, avoid encroachment problems, help manage health, safety and amenity impacts, and ensure integration with EPA regulatory requirements.
* **Recommendation 10.4:** Together, the EPA and the Department of Environment, Land, Water and Planning simplify and better integrate EPA regulatory standards and obligations that are to be applied through the planning system, including through the creation of mandatory, measurable and enforceable planning controls that land use planners can more readily understand and apply.

The introduction of the Environment Protection Act 2017 and Environment Protection Regulations (2021)

In 2021, the Environment Protection Act (EP Act 2017) came into force. This led to the replacement of the State Environment Protection Policy: Air Quality Management by the General Environmental Duty.

Recent updates to air quality, odour and nuisance dust assessment guidance

Revisions to air quality, odour and nuisance dust risk assessment guidance were made in 2022 (EPA Publications 1961, 1883, 1943 respectively). The guidelines address developments in assessing and managing risks of harm and ensure consistency with the Environment Protection Act (2017) and Environment Protection Regulations (2021). Updating the separation distance guidelines to reflect these developments is important to ensure consistency between EPA guidance and Victoria Planning Provisions.

Accounting for modern odour and dust-producing industries and operations

Many previously recommended distances are based on diffuse emissions from production and manufacturing plants operating to 1977 standards. However, operations have changed significantly since this time. In some instances, better pollution controls or operational changes have notably reduced the risk of odour and nuisance dust, resulting in a reduction of separation distances. In other cases where scale and nature of operations has increased risk, separation distances have changed to reflect this. This has led to the introduction of increased, scaled or variable separation distances and — for industries that are likely to require a risk assessment in all settings — the introduction of case-by-case assessments. In addition, some new and emerging Victorian industries are not captured in the current guidelines, and some industries covered in the guidelines are no longer operating.

New science and evidence from EPA regulatory actions and community feedback

Since their publication, in-field assessments, measurements and surveillance, and evidence-based research have increased understanding of odour and dust plume behaviour. This increased knowledge base has identified that existing recommended separation distances and landfill buffers do not reflect current understanding of the risks posed by industries and landfills. In addition, community reports provide further context for long term experiences in areas adjacent to industry.

Changes in other jurisdictions

Since the current guidelines were published, changes to separation distances have been undertaken in other jurisdictions in Australia. These changes give further information on existing risk management approaches within the country. While they are not the sole basis for any changes to separation distances, they do provide a benchmark for modern risk management of land use management conflicts.

The main changes in the new guidelines are summarised in Appendix A.

Table 1: Summary of changes to Separation Distances

|  |  |  |
| --- | --- | --- |
| Change | Basis | Industry |
| Existing industries | | |
| Consistency with other guidance or processes | There is more appropriate specific guidance available for these industries. | Odour:   * Cattle or dairy intensive farming or feedlot; dairy * Intensive sheep or goat feeding systems * Piggery, outdoors * Composting facility |
| Consistency with VPP. | Odour: Wool scouring |
| Consolidation into other categories | Changes in industry practices mean there is no need for a separate category. | Odour:   * Formaldehyde production (now ‘other organic and inorganic chemical production’) * Briquette production > 2000 t/year (now ‘hydrocarbon, coal products and derivatives production’) |
| Variable options | Greater understanding of industry types and scale of operations and/or industry that is anticipated will require a risk assessment for any proposal. | Odour:   * Metal casting * Bakery, where heat is used to clean equipment (>200 t/year) * Gas and oil extraction (case by case with expectation of reduced separation distance). * stock sale yard (>10,000 head per week; > 30,000 head per week) * Biosolids application areas * Storage of petroleum and hydrocarbon products >2000 t in total, fixed roof |
| Reduction in separation distance | Improved pollution controls or changes in production that reduces/removes risk drivers. | Odour   * Rubber, polyester and synthetic resin production (>2000 t/year) * Storage of wet-salted and unprocessed hides * Dyeing and finishing of textiles * Treatment and production of textiles using chemicals or heat * Industrial gas production (now case by case) * Rendering and casing (for some facilities based on scale/description of operations)   Odour and dust:   * Sawmill; handling, cutting and processing logs into timber including timber drying and seasoning. |
| Increased separation distance | Increase in scale, growth of industry or changes in operations that has increased the risk profile. | Odour:   * Abattoirs (size-specific distances introduced) * soil blending, conditioning and mixing for application to farms/market gardens (secondary processing) * manufacture of products using fiberglass and resin (>250 t/year) * timber preserving works (>10,000 cubic meters per year)   Odour and dust:   * Sawmill, sawing milling, chipping, debarking and hogging (larger sawmills) |
|  | Experience indicating impacts of odour or dust exceed separation distances of previous guidelines. | Odour:   * Asphalt plants (for existing plants at >100 t/week) * Paper and paper pulp production using semi-processed or recycled materials * Manufacture of wood-fibre or wood chip board * Putrescible landfills tip face ≥900m2 * Inert waste landfills   Dust:   * Quarry, without blasting * Open cut coal mine |
| New and emerging industries or industries previously overlooked | | |
| Introduced separation distances (variable – case by case to defined) | Industries with significant changes to operations or new/emerging operations. | Odour:   * Waste transfer stations that receive green/putrescible waste (for example, FOGO) * Waste to energy plants * Waste incinerators * Liquid waste facility (>1000 m3 total capacity) * Chemical blending and mixing * Bulk chemicals storage * Chemical or oil recycling >1000 m3 capacity * Container washing/tanker drum cleaning * Hot dip galvanising * Surface coating * Plastics manufacture and/or recycling (>2000 t/year) * Coke production and processing * Fish farming * Produce processing (where finished foods, such as fried fish and potato cakes, are prepared) * Beverage manufacturing (including craft breweries and distilleries) * Chicken abattoirs * Materials recovery and recycling * Alcoholic beverage manufacturing * Grain and stockfeed mill and handling facility with meat or meat by-products incorporated in feed   Dust:   * Abrasive blasting * Coal handling and storage without mining. |

# Separation distances in other jurisdictions

Using separation distances to regulate odours is standard practice in Australian jurisdictions and in many countries, including Canada, the United States, the Netherlands, Denmark, Belgium and Germany (Brancher et al., 2017).

Comparison of Australian jurisdictional approaches to odour landfill buffers and separation distances

Australian jurisdictions use a range of separation distances and landfill buffers:

* Table 2 presents examples of the landfill buffers used across Australian jurisdictions.
* Table 3 lists odour separation distances used for abattoirs, livestock sale yards, and grain and stock feed mill and handling for Victoria, South Australia and Western Australia.
* Table 4 summarises separation distances in Victoria, Western Australia, Australian Capital Territory and South Australia to address dust.

Table 2. Australian jurisdictional landfill buffer for putrescible landfills

|  |  |  |  |
| --- | --- | --- | --- |
| Jurisdiction | Odour source | Landfill buffer | Comments/ caveats |
| ACT | Landfill | 500 m |  |
| New South Wales | Putrescible landfill with >50,000 tonnes of putrescible waste per year | >1,000 m for new landfill | May be varied for an expansion of an existing landfill |
| Northern Territory | Putrescible landfill | 500 m | May be varied with risk assessment |
| Queensland | General and regulate landfill | 500 m  (>1,500 m proposed) | >500 m for inert landfill |
| South Australia | Putrescible landfill | 500 m | May be varied with risk assessment |
| Tasmania | Putrescible landfill | 500 m suggested minimum distance | May be varied with risk assessment |
| Victoria | Putrescible landfill with a tip face of ≥900m2 | 1,500 m under the new guideline (increased from 500 m) | A minimum of 1,000 m if supported by a risk assessment |
| Western Australia | Putrescible landfill | 1,000 m for EPA licence applications, 500 m otherwise |  |

Table 3. Comparison of representative odour separation distances for abattoirs, livestock sale yards, and grain and stock feed mill and handling in Victoria, South Australia and Western Australia.

|  |  |  |  |
| --- | --- | --- | --- |
| Odour source | Victoria | Western Australia | South Australia |
| Abattoirs/ meat processing works | 500 m (>200 tonnes per year) | 500 m without wastewater treatment ponds, and 1,000 m with wastewater treatment ponds (>1,000 tonnes per year) | 1,000 m (>1,000 tonnes per year)  500 m (>1,000 tonnes/year) |
| Livestock sale yard or holding pen | 1,000 m (>10,000 animals per year) | 1,000 m (>10,000 animals per year) | 200 m (25,00 – 50,000 sheep equivalent units per year). Individual assessment (>50,000 sheep equivalent units per year) |
| Grain and stock feed mill and handling | 250 m without meat or meat by-products (>20,000 tonnes per year). 500 m with meat or mean by-products (>20,000 tonnes per year) | 500 m (>1,000 tonnes per year), animal feed manufacturing | 300m (agricultural crop products) |

Dust

Table 4: Comparison of representative separation distances to manage nuisance dust in Victoria, Western Australia, Australian Capital Territory and South Australia.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dust source | Victoria | Western Australia | ACT | South Australia |
| Quarry without blasting | 500m | case-by-case |  | Case by case (extractive industries) |
| Open cut (coal) mine | 2000m | 1000 – 2000 |  | Case by case |
| Coal handling and storage | 500 - 1000m | 1000 - 2000 |  | 500 - 1000 |
| Abrasive blasting | 50/100/300/500 | Case by case | 500 (outside)  100 (enclosed) | 300 – 500 (outside)  50 – 100 (enclosed) |
| Materials recovery and recycling | 250 | 300 - 500 | 500 | 500 |
| Sawmills | 200 - 500 | 500 – 1000 | 100 | 500  100 (joineries) |

Separation distances vary between states and territories. When considering the revised Victorian guidelines, there are states with comparable separation distances for most industry activities.

For landfill buffers, the buffer between landfill and sensitive sites ranges from 500 to 1,500 metres. Queensland, like Victoria, recently reviewed and updated odour separation distances. Both jurisdictions recommend a landfill buffer for putrescible waste (Type 2) of 1,500 metres. Western Australia and New South Wales adopt a separation distance of 1,000 metres.

Separation distances for open cut mining — specifically, coal mining — varies between states. New South Wales has a separation distance of 1000 m. Western Australia applies range between 1000 and 2000 m for open cut coal mining, and 1500 m to 3000 m for other large open cut mining operations.

NT does not have coal mine separation distances identified within its guidance. However, separation distances for mineral sands at premises where mineral sands ore is mined, screened, separated or otherwise processed at quantities greater than 5,000 tonnes per annum is 2000 m. The Victorian guideline is 2000 m, with potential for adjustment with risk assessment.

# EPA data and measurements for key activities

## EPA sources of information

To understand the impacts of odour and nuisance dust in the community, EPA takes a 'multiple lines of evidence’ approach which considers a variety of information sources. These include the following:

* Community pollution reports and EPA community engagement activities
* EPA site inspections and investigations, including air, odour and dust monitoring and analysis
* EPA compliance and enforcement activities, including outcomes of VCAT proceedings
* International and national science.

The following section outlines EPAs approach and guidance on monitoring and estimating odour and dust impacts.

## Measuring and estimating odour and dust impacts

### Odour

Odour character and intensity varies depending on the source. It can come from a single source such as a chimney, or from a larger area such as a landfill. They are caused by volatile organic compounds (VOCs), which are very small molecules typically found as a gas. Examples include ammonia, hydrogen sulfide, and other sulfur compounds which can cause unpleasant odours at very low concentrations (Conti et al., 2020).

The emission height (in the case of a chimney), the volume and temperature of gases emitted, the speed and direction of emissions, and the weather, including wind speed, all dictate how the odours will spread through the air. The concentration of odours decreases with increased distance from the source. Odours often form a plume, with lower odour concentrations at the edges (Spennemann et al., 2023) (Figure 1).

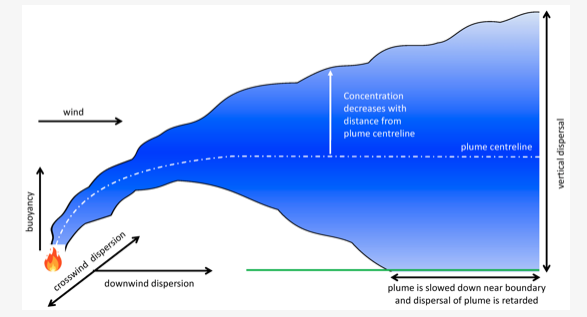


Figure 1. Wind and buoyancy influence how far odours disperse, from their source, with concentrations decreasing with increasing distance from the source as shown by the blue plume become lighter as it moves further away from the source. [https://www.mdpi.com/2076-3298/10/9/163]

Measuring odours

Methods to measure odours can be divided into human-based and instrument-based approaches. The former includes dynamic olfactometry, field inspections, and recording from residents. Instrument techniques for assessing odour include gas chromatography-mass spectrometry, identification of specific compounds, and the electronic nose (Conti et al., 2020).

Dynamic olfactometry and field inspection are the only methods developed explicitly for odour measurement that have been standardised in Europe (Bax et al., 2020). EPA has independently developed methods for field odour assessments (EPA Publication 1881), similar to those developed in Europe (EC 2016a, 2016b, 2022). These are presented in Publication 1881: Guidance for Field Odour Surveillance. Determination of odour concentration by dynamic olfactometry (Australian/New Zealand Standard AS4323.3) is used in Victoria along with further instruction in EPA Publication 1666.1.

Estimating Odour using dispersion models

Computer models that simulate meteorological, topographic and emission data can be used to investigate odour dispersion. Many studies have reported discrepancies between model predictions and field observations (Bull & Fromant, 2014; Capelli et al., 2013; Laor et al., 2014; Lucernoni et al., 2016; Sarkar & Hobbs, 2003). These studies confirm EPA observations that odour modelling does not reproduce ground-level observations (Bydder and Demetriou, 2019). As a result, EPA considers application of models alone to be insufficient to justify or determine the spread and concentrations of odour.

Odour Risk Assessment

Regardless of the odour measurement technique adopted (human- or instrument-based), the quality of the results depends strongly on the sampling method. Obtaining representative information on the typical characteristics of odour sources is one of the main challenges associated with odour characterisation and measurement (Capelli et al., 2013).

A recent review of odour measurement methods concluded that, in most cases, there is no best method for measuring odours (Bax et al. 2020). Each situation must be evaluated on a case-by-case basis, and in many situations an integrated approach combining different methods — or using multiple lines of evidence — is the best solution.

EPA has developed guidance for assessing odour. It provides information on how to assess the risk posed by odour emission sources, and how to understand the receiving environment where effects might occur (EPA Publication 1883). The guidance supports stakeholders who need to understand offensive odours associated with a development proposal, investigation or study where an odour assessment is required. It takes a tiered approach to risk assessment, with the level of investigation increasing with the scale or complexity of the scenario.

### Nuisance Dust

Nuisance dust arises when an activity generates dust that interferes with the normal enjoyment or use of the environment. It can also lead to health impacts to sensitive members of the community, damage to property, or result in cleaning and maintenance around homes or businesses.

In the context of this report, ’dust’ typically refers to terrestrial rock or soil-based material, as well as other particles that may have chemical or physical properties that cause additional damage and problems. It is sometimes referred to as fall-out.

Dust is commonly referred to by size or composition, with each smaller fraction comprising part of the larger fraction.

The nuisance posed by dust and fall-out can be difficult to assess, and often requires direct measurement techniques. This may include Beta Attenuation Monitors, Gravimetric Sampling, and Nephelometry which is primarily focused on air quality objectives and standards.

Dust Risk Assessment

A nuisance dust risk assessment involves estimating the likelihood and consequence of dust impacts from an activity, which informs what reasonably practicable measures or actions would be required to comply with the General Environmental Duty, (GED). It includes both the formation of visible airborne dust plumes, and deposition of dust onto surfaces that result in soiling.

The steps involved in characterising the sources and receiving environment impacted by nuisance dust risks are detailed in Guidance for Assessing Nuisance Dust (EPA publication 1943).

Once nuisance dust hazards are adequately characterised, an initial screening-level assessment can be carried out. This can be used to provide an initial understanding of the likely degree of risk controls.

Other methods of dust assessment can include:

* dust surveillance
* dispersion monitoring and modelling
* measurement of deposited dust
* microscopic analysis.

## EPA data and field measurements for separation distances to manage odour risk

### Odour surveillance campaigns

In-field experience and surveillance by EPA provides real-world information about the dispersion of odour plumes and their impacts on Victorian communities. Rather than rely solely on dispersion models that may not replicate actual conditions, EPA has conducted hundreds of site visits and surveillance campaigns at Victorian odour-producing sites to collect critical information on odour plume dispersal and community impacts. Bydder & Demetriou (2019) reported on data gathered from six odour surveillance campaigns conducted across metropolitan Melbourne between 2007 and 2017. The campaigns featured the following activities:

* Systematic odour surveillance at fixed points in response to complaints about a composter in the outer suburbs (2007–08)
* Surveillance in an industrial suburb around landfills, composters, rendering plants and abattoirs that generated several thousand of community odour complaints (2008–17)
* Compliance and enforcement surveillance in a large south-eastern industrial area containing landfills, composting facilities and market gardens (2010–12)
* Downwind measurements around a large municipal landfill, quarry and composting facility in the west in response to community reports of odour (2014–16)
* Downwind measurements to gather data on the extent and frequency of odour emissions from two further large municipal landfills (2017).

Figure 2 shows a summary of plume frequencies for measurements made at various distances from a variety of sources.

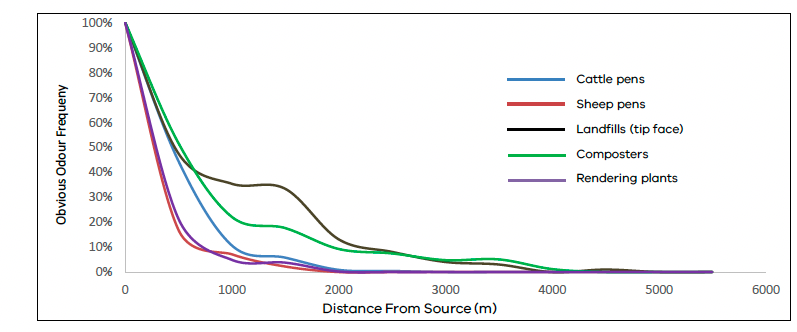


Figure 2. Plume profiles associated with different odour sources. The coloured lines show how different industries produce odours detectable at various distances, with landfills and composters responsible for odours travelling the furthest (black and green lines). Livestock and rendering plants reported odours for shorter distances (blue, red and purple lines). (Bydder & Demetriou, 2019).

These field programs and field inspections have informed the revision of the guidelines, with key updates further summarised here.

Agriculture

EPA’s new guidelines include the following agricultural activities not covered in previous versions:

* Fish farming
* Stockfeed manufacturing involving animal products
* Emerging intensive farming (sheep, goats, dairy)
* Soil blending and conditioning.

The 5,000-metre separation distance for intensive dairy farms has been replaced by a reference to Agriculture Victoria’s advice and guidelines. This is in recognition of separation distances for all intensive animal farms being highly dependent on species, farm design and size. These guides typically refer to ‘s-factor formulae’ in establishing minimum separation distances, based on the size of the farm, type of animal, land use, topography, and vegetation.

EPA accepts that these guides are useful for basic assessments. However, it is recommended that complex or cumulative odour sources from animal farming be assessed using empirical evidence and multiple lines of enquiry rather than relying solely on modelling (Bydder, 2022).

A flexible scale for saleyards based on size and standard animal units (SAU) has been adopted, with distances, of

* 1,000 metres (increased from 500 metres) for stock sale yards with more than 10,000 SAU per week and
* 2,000 metres (increased from 500 metres) for those with more than 30,000 SAU per week.

These distances reflect both field experience and alignment with other jurisdictions, including extensive discussions with Agriculture Victoria.

Biosolids

Stakeholder feedback highlighted that the separation distance for biosolids in the current guidelines did not accurately represent the variation between different categories of biosolids. After investigating this issue, EPA agreed that T1 biosolids are dry, fully processed and have a similar odour profile as soil. The level of processing falls off from T2 down to T3 with increased liquid content. The updated guidelines have now applied treatment categories for biosolids in the new separation distance guideline.

Commercial composting

The potential for odour at composting facilities is based on feedstock, technology used, and the amount of material processed annually. The updated separation distances are informed by site visits and odour field assessments conducted at the composting sites underpinning the information in Figure 2 above, and also reflect the change and evolution in composting technology.

All composting feedstocks are included in an additional appendix that aligns the recommended technology type, volume and composition of waste received. Recommended separation distances are based on the commensurate technology being used to treat the wastes, 400–2,200 metres for low-risk wastes in open windrows to 200–600 metres for the highest-risk wastes processed in fully enclosed facilities. For all categories, the separation distances for large plants producing over 5,0000 tonnes/year are to be assessed on a case-by-case basis.

Wood, wood products and furniture

Field surveys reveal odour from milling and stockpiles persists for some distance. Therefore, separation distances for medium-density fiberboard facilities have increased from 250 to 1,000 metres.

The separation distance has increased for larger sawmills (250 to 500 metres) but decreased for smaller sawmills (250 to 200 metres). For timber preserving works, separation distance has increased from 100 to 250 metres due to the use of more odorous treatment agents, such as creosote, in modern facilities.

### Landfill buffer distances

The buffer distance for putrescible (Type 2) landfills has increased from 500 metres to 1,500 metres for those with a tip face equal to or greater than 900 square metres. Analysis of odour surveillance data shows that operating landfills of this size require a larger human health and amenity buffer than the 500 metres specified in the 2013 guidelines. The extent of the odour plume is proportional to the area of the tip face: the larger the tip face, the greater the resulting odour plume (Bydder, 2022).

The landfill separation distance can be varied to a minimum of 1,000 metres, with an appropriate risk assessment that demonstrates that an alternative buffer/separation distance is acceptable. At greater than 1,500 metres, the human health and amenity risk is low, so all uses are allowed. The new guideline also increases the odour human health and amenity buffer distance for landfills accepting solid industrial waste (Type 3) from 200 metres to 500 metres.

EPA field investigations

EPA’s position on landfill separation distances and landfill buffers has evolved since the previous guideline due to extensive in-field experience (Bydder and Demetriou, 2019 and Bydder, 2022) as well as national and international findings. The in-field surveillance, experience, community reports and recent papers show that the previous buffer of 500 metres is inadequate to address human health and amenity impacts from odour emissions.

Bydder & Demetriou (2019) found that landfills with a tipping face between 1,250 and 1,800 square metres taking on average 500,000 tonnes per year of municipal waste have odour plumes extending up to 1,500 metres. Plumes of strong odour persisted to 1,500 metres from the tipping face for at least one-third of recorded occurrences. The researchers concluded that the area within 1,500 metres of a large municipal landfill has a high risk of strong odour.

This conclusion is supported by site visits and odour surveillance from 2020 to 2023, which found that operating landfills with a tip face of greater than 500 square metres require a larger human health and amenity buffer than the 500 metres specified in the previous guideline (EPA Publication 788.3) (Figure 3). Consequently, sensitive use development should not be encouraged in this area.

There are 35 licenced landfills that receive municipal (putrescible) waste in Victoria, with 23 operating a tip face of 900 square metres or greater.

EPA applied the recently developed field odour surveillance guidelines described in EPA Publication 1881 to undertake comprehensive measurements in 2023 around a fourth major putrescible landfill. The approach involved an adaptation of the plume tracing method. EPA assessors continuously traced the odour from close to the source to a distance in a zigzag pattern, completing 46 plume traces at different times and in various weather conditions (Bydder et al., 2024). Assessors were screened in accordance with Australian Standard 4323.3 Determination of Odour Concentration by Dynamic Olfactometry (Standards Australia/Standards New Zealand, 2014).

The frequency of odour reduced significantly 1,500 metres from the landfill. This is the minimum distance recommended for sensitive uses within an active putrescible landfill, as stated in the EPA Publication 1950, *New guidelines for industry separation distances and landfill buffers* (EPA Victoria, 2022).

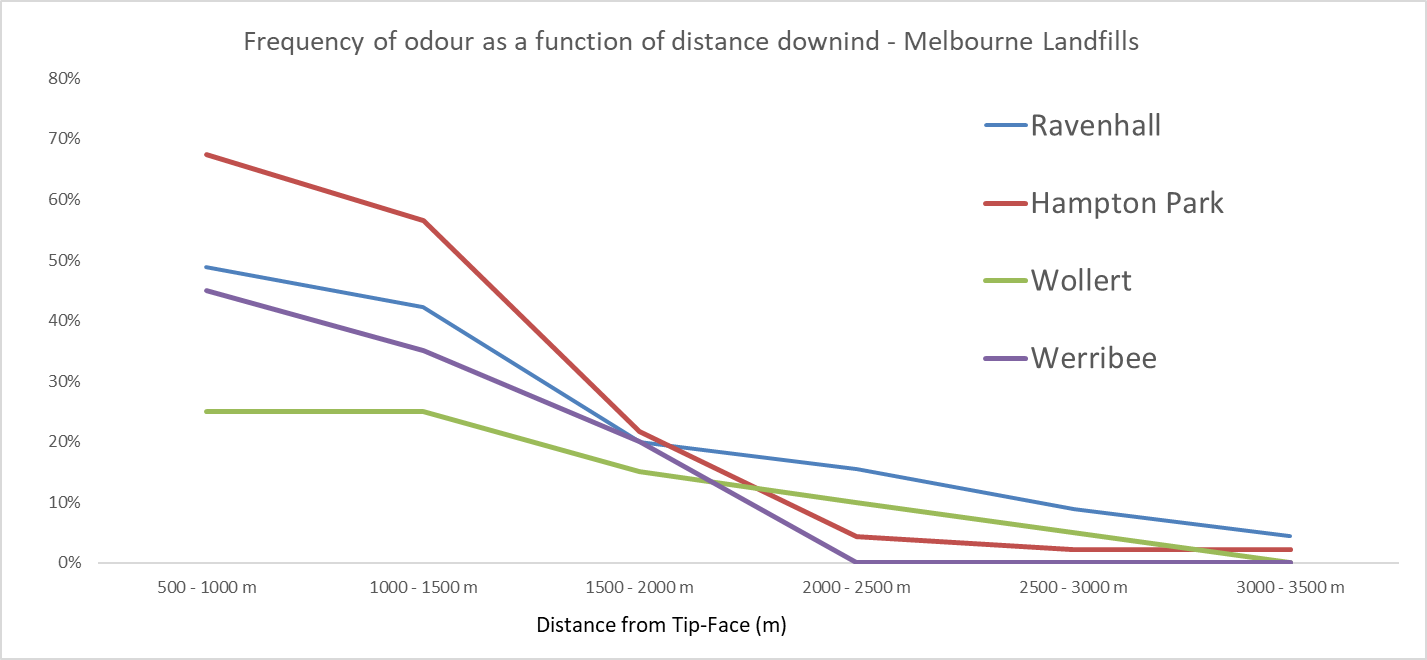
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Figure 3: Odour frequency distributions for obvious odour for the four landfills at 500 m bands from the tipping face, the blue line represents Ravenhall, red represents Hampton Park, green represents Wollert and purple line represent Werribee. Odour was reported downwind of all four landfills at distances of 1500 m (Source Bydder, C., Misquita, K., & Fedele, R. (2024).

The results reinforce previous EPA findings (Bydder & Demetriou, 2019) that the 500-metre buffer to sensitive uses for large putrescible landfills (with tip faces greater than 500 square metres) stipulated in EPA Publication 788.3 is inadequate to protect the community from offensive odour.

For larger landfills, 1,500 metres should be the minimum recommended default buffer distance. A range of factors need to be considered for smaller landfills, with EPA recommending a separation distance of at least 1,000 metres.

Pollution reports from community

Pollution reports to EPA are an important source of information on when an industry’s operation may need further investigation. Where there are significant and repeated reports to EPA from a large number of community members, it can provide information on the timing, frequency and extent of an impact.

There is significant variation in the number of pollution reports notified to EPA for different landfills. This can be for a variety of reasons, including the following:

* Size and nature of the facility
* Proximity to sensitive receptors
* Topography and prevailing wind direction
* Demographic of the area.

Another reason for variation may be that there are no sensitive uses within the buffer of a landfill. This means that although there are offsite emissions, they may not be captured by pollution reports when there are no residents within the buffer.

EPA commissioned an independent analysis of pollution reports near several large putrescible Victorian landfills. It concluded that there were odour amenity impacts beyond 500 metre distance, and that a 1,500-metre buffer for large putrescible landfills would likely result in a reduction in odour amenity impacts. This would provide benefits to existing and future communities. For smaller regional landfills, there were less significant odour amenity impacts, which means risk assessment could be used to reduce the buffer to 1,000 m.

Table 5: Examples of community odour report data for putrescible landfills in Victoria

|  |  |  |  |
| --- | --- | --- | --- |
| Landfill | Years | Number of complaints | Extent of complaints |
| Melbourne Regional Landfill | 2013 - 2018 | 1944 | >1500m |
| Melbourne Regional Landfill | 2021 - 2024 | 43 | All > 1500 m |
| Suez Hallam Road | 2019 – 2021 | 676 | Majority within 1500m |
| Veolia Hallam Road | 2021 - 2024 | 1515 | Majority within 1500m |
| Greater Bendigo City | 2019 – 2021 | 9 | Within 500m |
| Bendigo City Council | 2021-2024 | 5 | 4 within 500 m one 2.3 km away |
| Mount Alexander Shire Council, Castlemaine | 2019 – 2021 | 2 | Within 500m |
| Mildura Rural City Council | 2019 – 2021 | 2 | Within 500m |
| Ballarat City Council | 2021 - 2024 | 9 | 3 Outside 1500m |
| Stawell Landfill | 2021 – 2024 | 11 | All within 1000m |
| Hume City Council | 2021-2024 | 15 | All but 1 outside 1500m |
| Latrobe City Council | 2021-2024 | 2 | All over 2km away |
| Mornington Peninsula Shire Council | 2021-2024 | 4 | All within 1500 m and > 1000m |
| South Gippsland Shire Council | 2021-2024 | 33 | All within 1500 and > 1000m |

## EPA data and field measurements for separation distances to manage dust impacts

Dust has its own section in the guidelines to provide clarity on the basis for separation distances. The key industries with updates include the following:

* Open cut coal mining
* Quarrying without blasting
* Coal handling and storage without mining
* Abrasive blasting
* Materials recovery and recycling
* Sawmills (differentiation between smaller and larger facilities)

Changes to existing dust separation distances are as follows:

* Increased distances for open cut coal mines (1,000 to 2,000 metres)
* Quarries without blasting (250 to 500 meters)
* The addition of distances for materials recovery and recycling (250 metres)
* Abrasive blasting (50/100/300/500 metres depending on type and throughput).

The background to these changes is addressed further in the following sections.

### Open cut coal mining, coal handling and production

The key producers of coal in Australia are Victoria, Queensland and New South Wales. Nearly all of Australia’s recoverable brown coal EDR is in Victoria, with more than 90% in the Gippsland Basin (Latrobe Valley).

Generation of dust from open cut mining operations can come from many different sources and may not be best captured by considering stack emissions alone. Operational sources of dust include blasting, drilling, ore transportation, processing, crushing, screening and materials handling ([NSW EPA 2019](https://www.epa.nsw.gov.au/your-environment/air/regional-air-quality/tackling-coal-mine-dust)).

Studies into operational contributions to dust fall out indicate that a significant proportion of dust can come from transport (haul road > transport road > communication road), followed by screening plant and overburden removal ([Masto et al 2013](https://www.sciencedirect.com/science/article/abs/pii/S0375674214001356); [Katestone Environmental 2011](https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/air/ke1006953volumei.pdf)) . Coal extraction, drilling and blasting were smaller contributions at less than 5%.

The spatial distribution of dust from open cut mining activities is influenced by a wide range of factors, including:

* distance from the highest risk mine activities
* topography
* climate.

Studies from a gold mine region in semi-arid agricultural districts of central NSW identified that, at a distance of 8km, average dust deposition was only slightly greater than upwind gauges. Although average dust deposition rates were only low to moderate, the mine exerted a discernible influence on dust deposition rates at locations at least 4 km downwind ([Cattle et al, 2012](https://www.sciencedirect.com/science/article/abs/pii/S1875963712000274)). In 2009, the NSW Department of Planning commissioned expert reports in relation to cumulative impacts on air quality and other issues. This was in response to public concern over the potential impacts at Camberwell posed by existing and proposed future coal mining. Following this work, best practice management and guidance were developed — along with special operations — to target dust at Hunter Valley coal mines ([NSW EPA 2020](https://www.epa.nsw.gov.au/your-environment/air/regional-air-quality/tackling-coal-mine-dust)).

To consider an appropriate separation distance for open cut coal mining in Victoria, EPA considered various lines of evidence from existing industries within the Latrobe Valley. These included the following:

* Community reports
* Field investigations
* A preliminary particle analysis assessment of dust deposition in the area.

A review of 65 community reports in the Latrobe Valley region that include reference or description of dust associated with coal mining are mapped in Figure 4. These reports were conducted between 2017 and 2023.



Figure 4: Location of community reports (presented in blue dots) that identified coal ash as 'coal' 'soot' or 'black ash/dust' impacts, 2017 – 2023. The yellow line presents the 2km buffer distance around Yallourn mine, many reports are located outside the 2km separation distance.

Community reports include descriptors such as coal dust, char and soot, with references to both fine and larger ‘chunks’, or coarse dust. The key common concerns associated with coal dust raised included:

* residents’ properties, cars, clothes, and even food and water being covered by coal dust.
* health concerns, with some people reporting respiratory problems such as asthma, shortness of breath, and metallic taste in the mouth.

The complaints vary in the frequency, duration, and intensity of the coal dust problem. However, many indicate that it has been ongoing for years or months, with two reports noting that it has particularly worsened after the closure of Hazelwood power station. All reports contained information relating to one or more of the defined examples of nuisance dust as described in specify sections. Many of the reports were located at distances in excess of 2000m of both Yallourn and Hazelwood mines.

To validate the dust reports, EPA commissioned VA Sciences to undertake an explorative assessment of deposited particulate at 27 residential locations associated with pollution reports. These ranged in distance from 2.2 km to 9.8 km from the Yallourn Power plant and Hazelwood Mine (south of Yallourn) shown in Figure 2.



Figure 5: Sampling locations for the VA Sciences Fallout Sampling and Laboratory Analysis program presented in yellow dots.

The assessment was limited in nature, with the intention of determining if reported dust is associated with coal mining activities, and — if possible — distinguish between source sites. Samples were analysed using microscopic analysis to identify particle types, undertake semi-quantitative analysis of loading (obscuration) and quantitative analysis of number of particles greater than 100 µm. Particle types identified included:

* stack-associated fly-ash
* agglomerated fly-ash from handling of material in emission control devices
* clinker from fire-box waste or lignite particles associated with fuel-handling operations.

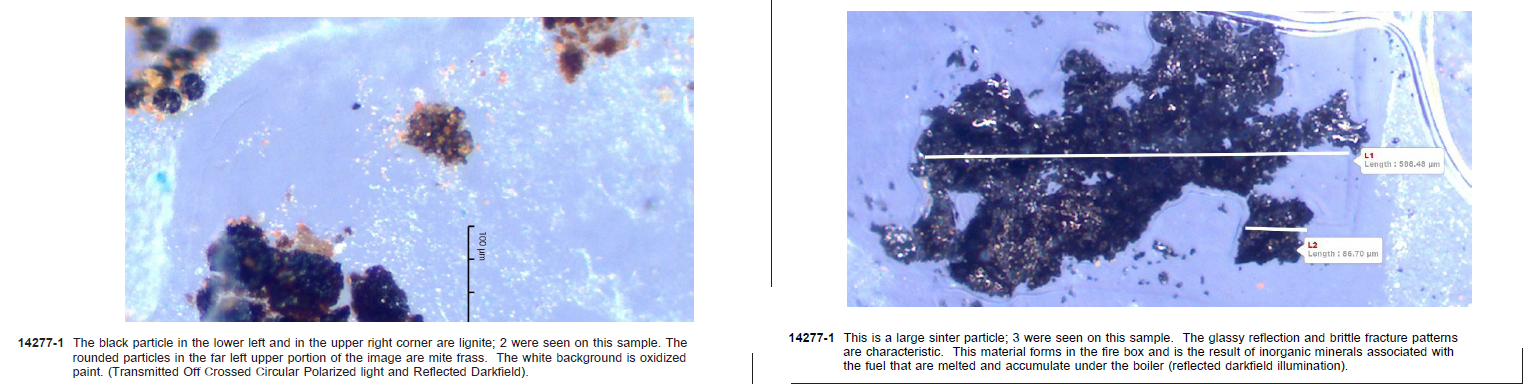


Figure 6: Example of lignite as seen under microscope, collected from a property located at a distance greater than 2000m from either Yallourn or Hazelwood

Based on the limited data set, the assessment concluded that the power station is a significant source of both visible and non-visible particulate matter.

There were several limitations to this preliminary study. In addition to the small number of samples, weather conditions not conducive to accumulation of dust deposition could under-represent conditions. For this reason, EPA has used the study as information to confirm rather than quantify dust loading. The confirmation of fly-ash, lignite and clinker particles at significant distances supports both community reports and EPA field inspections more generally.

When investigating the mining operations, EPA noted that these activities have not always operated effectively. Sites do not have real-time monitoring of dust triggering these actions, or forecasting adverse weather events that would require wetting down activities.

If operating efficiently, mitigation measures contribute to reducing dust risk. However, existing monitoring and reporting data demonstrates that 1,000m is inadequate to address human health and amenity impacts —particularly those involving dust — even when a site is operating at best practice.

For this reason, a separation distance of 2000m was identified, noting that:

* there may be times where dust deposition occurs beyond this distance, though the risk (that is, frequency and magnitude) will reduce
* there will be areas where dust deposition does not occur at distances up to 2000m, in which case adjustment of the separation distance can be supported through risk assessment.

It is noted that many sources of dust from coal mining are associated with operational processes such as storage and handling activities. For this reason, variable separation distances for coal handling and storage have been developed, depending on throughput of the operation.

### Quarries without blasting

Quarrying operations can generate dust from excavation areas, haul roads, stockpiles, processing and screening plants, blasting, rock crushers, crushing, grinding and milling. Blasting presents only a fraction of the impacts from quarries, as this activity occurs very infrequently and can be managed through meteorology and modern blasting techniques.

The nature of material also impacts the risk profile. For example, sand quarries may have a lower risk of dust impacts than rock quarry operations. Mitigation measures contribute to reducing dust risk and that obligations under the GED target all risks from site activities. However, monitoring and reporting data demonstrates that 250m is often inadequate to address human health and amenity impacts—particularly those involving dust — even when a site is operating at best practice. This is consistent with observations from other jurisdictions both nationally and internationally ([IAQM, 2016](http://www.iaqm.co.uk/text/guidance/mineralsguidance_2016.pdf)).

The 500m distance can be varied with an appropriate supporting risk assessment that considers each site on its merits (sand vs rock, nature of the proposed activities, type of processing), with agent of change principles applying.

### Material recycling and handling

EPA have conducted site visits and measurements around the Brooklyn material recycling and handling precinct, which have shown dust impacts from the crushing of bricks and stones one kilometre from the source. The previous guideline recommended a case-by-case separation distance for this industry. However, monitoring between 2009-10 and 2023-24 (see Figure 5) has shown that the number of days exceeding the PM10 daily standard each year at Brooklyn is significantly above that of similar areas, such as Footscray, that are not exposed to those facilities. The air quality risks from dust measured at the Brooklyn precinct support the need to include a specified separation distance in the new guideline for material recycling and handling industries and associated activities. Based on a recent assessment at Manor Quarry in Melbourne’s West — as well as the fact that all quarries perform similar activities — a separation distance of 500 m was adopted for all quarries, regardless of whether or not blasting was occurring.

#### A chart showing the number of days exceeding the daily PM10 standard at the Brooklyn air monitoring station and the Footscray air monitoring station. Each year from the 2009-10 calendar year to the 2023-24 calendar year is are shown.

Figure 7: The number of days at Brooklyn (dark blue columns) and Footscray (light blue columns) that exceed the PM10 daily standard each year between 2009–10 and 2023–24.

Table 6: The number of days at Brooklyn (dark blue columns) and Footscray (light blue columns) that exceed the PM10 daily standard each year between 2009–10 and 2023–24.

|  |  |  |
| --- | --- | --- |
|  | **Number of exceedances of daily PM10 standard.** | |
| Year | Brooklyn | Footscray |
| 2009-2010 | 40 | 5 |
| 2010-2011 | 19 | 1 |
| 2011-2012 | 20 | 3 |
| 2012-2013 | 33 | 1 |
| 2013-2014 | 29 | 6 |
| 2014-2015 | 17 | 2 |
| 2015-2016 | 10 | 2 |
| 2016-2017 | 13 | 0 |
| 2017-2018 | 16 | 1 |
| 2018-2019 | 22 | 6 |
| 2019-2020 | 30 | 1 |
| 2020-2021 | 10 | 1 |
| 2021-2022 | 3 | 1 |
| 2022-2023 | 9 | 1 |
| 2023-2024 | 8 | 0 |

# Summary

Odour and nuisance dust impacts to air quality are key environmental issues in Victoria. Repeated exposure to nuisance levels of odour and dust can negatively affect people’s quality of life as it may cause frustration, stress, discomfort or annoyance. Both odour and nuisance dust can also impact health of those with pre-existing respiratory conditions such as asthma.

Separation distances are intended to allow routine or day-to-day emissions and unintended offsite emissions from odour and dust to disperse, minimising human health and amenity risks for any nearby sensitive uses. Where there are routine or day-to-day emissions from a premises, there may still be unintended offsite emissions at or beyond the boundary even when an industry is operating in accordance with all relevant statutory obligations.

Separation distances and buffers are an important tool to protect the continued operation of industries as well as the health and amenity of the surrounding community. In some cases, development may occur within separation or buffer distances where they are non-sensitive uses or land uses with potential sensitivity to odour and dust, subject to a risk assessment. All separation distances can be adjusted with appropriate risk assessment.

Key drivers for updating EPA Victoria separation guidelines were as follows:

* Recommendations from the Independent Inquiry into the EPA
* The introduction of the Environment Protection Act 2017 and Environment Protection Regulations (2021)
* Recent updates to air quality, odour and nuisance dust assessment guidance
* Accounting for changes in modern odour and dust-producing industries and operations
* New science and evidence from EPA regulatory actions and community feedback
* Changes to managing risks from odour and nuisance dust in other jurisdictions.

The separation distances specified in the guidelines were updated in accordance with the following broad reasoning:

* Consistency with other relevant guidance or processes, including industry-specific guidance by other government departments such as Agriculture Victoria, as well as consistency with Victorian Planning Provisions.
* Consolidation of categories where changes in operations mean there is no longer a need for a separate category.
* Changes to more variable options based on greater understanding of the type, scale or growth of industry that indicates significant differences within a given activity, such as throughput.
* Improvements to pollution controls or changes in practices that substantially remove risk of odour or dust generation.
* The need to address operations where the scale, growth of the industry or changes in operations have increased the risk profile for odour or dust.
* The need to include new and emerging industries, or industries that have previously been overlooked.

Though a review of separation distances across Australia identified that there is variation, some — like Victoria — some had not been updated for some time. When considering the revised Victorian guidelines, there are states with broadly comparable separation distances for most industry activities, noting that all allow for adjustment with risk assessment.

Several separation distances involved a significant change, particularly putrescible landfills and open cut coal mining. These separation distances were established based on the aforementioned key drivers, as well as a review of the following:

* Experiences in Victorian and other jurisdictions that inform our understanding of the consequence and behaviour of odour and dust in the environment for these industries.
* Review of community reports to determine impact from existing activities.
* Additional scientific assessment where relevant.

These reviews identified scenarios where a larger separation distance would provide greater protection for both community and industry alike. Furthermore, in some cases the extended separation distance would not be protective all of the time. There are also circumstances where the risk profile may indicate that a smaller separation distance would be appropriate. It is for this reason that separation distances may be adjusted with risk assessment.

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# Appendix A – Guide to separation distance and landfill buffer changes

The following tables outline changes to recommended separation distances and landfill buffers in the proposed *Separation distance guideline* (EPA Publication 1949) and *Landfill buffer guidelines* (EPA Publication 1950), compared with current guidance. The tables include only information on proposed separation distances and landfill buffers that have increased, reduced, been introduced or been removed.

Note that EPA Publication 1949 sets out separate separation distances for odour and dust, unlike EPA Publication 1518.

**Bold text** indicates where a separation distance/landfill buffer for a sub-section of industry or landfills has been introduced or changed.

Table A1. Recommended default **odour** **separation distances** (*Separation distance guideline*). These may be varied with a supporting risk assessment.

| **Industry type** | **Current distance** (EPA pub. 1518) | **Updated distance**  (EPA pub. 1949) | **Reason/more information** |
| --- | --- | --- | --- |
| **Agriculture** | | | | |
| Cattle feedlot | See further guidelines | See further guidelines | Consistency with other guidance, as per current Agriculture Victoria Advice and Guidance. |
| Fish farming | N/A | 100/150/200 metres  (depending on type) | Introduced to account for odour from fish farming. |
| Animal feed manufacturing  Grain and stockfeed mill and handling facility; **with meat or meat by-products incorporated in feed** (> 20,000 t/year) | 250 metres | 500 metres | Industry type renamed as ‘Animal feed manufacturing’.  ‘Grain and stockfeed mill and handling’ relocated to Table 4 in the new guidelines. Dust with a 250-metre distance. |
| Intensive animal production (including meat and dairy) |  | See further guidelines | Consistency with other guidance, as per current Agriculture Victoria Advice and Guidance.  Recognising that separation distances for all intensive animal farms are highly dependent on species, farm design and size.  These guides typically refer to ‘s-factor formulae’ in establishing minimum separation distances, based on the size of the farm, type of animal, land use, topography, and vegetation. | |
| Intensive dairy (cattle) | 5,000 metres | See further guidelines | As per current Agriculture Victoria Advice and Guidance.  Recognising that separation distances for all intensive animal farms are highly dependent on species, farm design and size.  These guides typically refer to ‘s-factor formulae’ in establishing minimum separation distances, based on the size of the farm, type of animal, land use, topography, and vegetation. | |
| Intensive sheep feedlot | N/A | See further guidelines | Introduced to account for odour from emerging intensive farming.  Consistency with other odour guidance, *National procedure and guidelines for intensive sheep and lamb feeding systems (2020) or as amended.* |
| Pig farm  **Indoor**  **Rotational outdoor**  **Low-density mobile outdoor** | See further guidelines  N/A  N/A | See further guidelines  See further guidelines  See further guidelines | As per the current National Guidelines.  Introduced to account for odour from outdoor piggeries.  Consistency with other guidance including the National and Victorian Guidelines. |
| Soil blending, conditioning and mixing applied to farms or market gardens | N/A | 500 metres | Introduced to account for the rise in application of manures, biosolids etc. to farms and market gardens.  Type and definition amended to apply to secondary processing industries and not the application to land for gardening or farming purposes. |
| Stock sale yard  **> 10,000 head per week** | 500 metres | 1,000 metres | Includes industry definition and scale/ description changes.  This distance reflects both field experience and alignment with other jurisdictions including extensive discussions with Agriculture Victoria. |
| Stock sale yard  **> 30,000 head per week** | 500 metres | 2,000 metres | Includes industry definition and scale/ description changes.  This distance reflects both field experience and alignment with other jurisdictions including extensive discussions with Agriculture Victoria. |
| **Basic metal products** | | | | |
| Metal casting | Various | 100/500/1,000 metres (depending on type and scale) | Greater understanding of the industry, separation distances introduced depending on type of metal casting and scale of operations. Large scale smelters are not expected to be developed in Victoria in the future. Should any such development occur, a full risk assessment would be implemented.  Basic metal products category changed to take into account odour from more common metal casting and foundries using sand and die casting. |
| **Chemical, petroleum and coal products** | | | | |
| Briquette (coal) production (> 2,000 t/year) | 250 metres | N/A  (500 metres under ‘hydrocarbon and coal products and derivatives production’) | Briquette (coal) production no longer requires a separate category based on current knowledge of the sector. Instead, it is included in ‘hydrocarbon and coal products and derivatives production’. |
| Coke production, (> 100 t/year) | N/A | Case by case | Introduced to account for odour from premises on which coke is produced, quenched, cut, crushed or graded from coal or petroleum. |
| Chemical blending or mixing | N/A | 300/500 metres (depending on type  and scale) | Introduced to account for odour from premises that blend or mix chemicals. |
| Cosmetic and toiletries production, (> 2,000 t/year) | 100 | 300 | Distance increased based on recent field experience for these types of facilities and peer review from technical experts within EPA. |
| Formaldehyde production  (> 2,000 t/year) | 250 metres | N/A (Case by case under ‘other organic and inorganic chemical production’) | Formaldehyde production no longer requires a separate category based on current knowledge of the sector. Instead, it is included in ‘other organic and inorganic chemical production’. |
| Industrial gas production  (> 2,000 t/year) | 1,000 metres | Case by case | Modified to a ‘case by case’ basis as these facilities are typically fully enclosed, and 1,000 metres is considered excessive for odour emissions. |
| Plastics manufacture and/ or recycling (> 2,000 t/year) | N/A | 200 metres | Introduced to account for odour from manufacture of plastic products from raw or recycled plastic material, distinct from synthesis and production of plastic precursors (polymers and resins). |
| Rubber, polyester and synthetic resins production  (> 2,000 t/year) | 1,000 metres | 500 metres | Distance reduced to reflect available modern pollution control equipment. |
| **Food, beverages and manufacturing** | | | | |
| Abattoir – no rendering  **> 6,000 head/day** | 500 metres | 500/1,000 metres | Increased size-specific separation distances adopted for abattoirs.  Includes industry definition and scale/ description changes consistent with Agriculture Victoria reforms. |
| Alcoholic beverage manufacturing | N/A | 250/500 metres (depending on throughput) | Introduced to account for the growth in the alcoholic beverage manufacturing industry in Victoria. |
| Bakery **where heat is used to clean baking equipment**  (> 200 t/year) | 100 metres | Case by case | Greater understanding of industry, variable options.  New sub-section introduced to account for odour from bakeries where heat is used to clean baking equipment, as this is a more odorous activity. |
| Produce processing works (> 200 t/year) | N/A | 500 metres | Introduced to account for odour from production of finished foods and the recent development of manufacturing-only restaurants. |
| Rendering and casing works | NA/1,000 metres | 500/1,000 metres | Reduction in separation distances for some facilities based on changes to industry definition, distance and scale/ description. |
| **Mining and extractive industry** | | | | |
| Gas and oil extraction | 250 metres | Case by case | Modified to a ‘case by case’ basis, as it is anticipated that a risk assessment would be required for any proposal of this type. |
| **Miscellaneous manufacturing** | | | | |
| Hot dip galvanising | N/A | 400 metres | Introduced to account for odour from hot dip galvanising operations. |
| Manufacture of products using fibreglass and resin  (> 250 t/year) | 250 metres | 500 metres | Distance increased based on experience that these operations are highly odorous and establishing at larger scales. |
| Skin and hide processing | N/A | Removed from guidelines | After additional consideration, EPA will develop its understanding of this activity further. A separation distance will not be introduced at this time. |
| Spray painting | N/A | Removed from guidelines | After additional consideration, EPA will develop its understanding of this activity further. A separation distance will not be introduced at this time. |
| Storage of wet-salted and unprocessed hides | 250 metres | 100 metres | Distance reduced to reflect current experience with these premises. |
| Surface coating (including drum coating) | N/A | 200 metres | Introduced to account for odour from surface coating operations. |
| **Non-metallic mineral products** | | | | |
| Asphalt plant  **> 100 tonnes per week, existing plant** | 500 metres | 1,000 metres | Experience indicates that impacts of odour exceed separation distances of previous guidelines and consistency with other jurisdictions. The two throughput-based distances have been replaced with a single 1,000 m distance. Different distances have not been used for existing and new technology, as the distinction is not considered to be clear in practice. |
| **Paper and paper products** | | | | |
| Paper or paper pulp production; **using semi-processed or recycled materials** | 100 metres | 500 metres | Distance increased based on recent experiences in this sector in Victoria, where odour plumes have been recorded multiple times at long distances from the sources. |
| **Storage and transport** | | | | |
| Bulk storage of chemicals etc. | N/A | 1,000 metres | Introduced to account for odour from bulk chemicals storage. |
| Chemical storage and warehousing facilities | N/A | Removed from guidelines | After additional consideration, EPA will develop its understanding of this activity further. A separation distance will not be introduced at this time. |
| Storage of petroleum and hydrocarbon products; > 2,000 t in total, **fixed roof** | 250 metres | Case by case | Greater understanding of industry, odour types and scale and industry that is anticipated will require a risk assessment for any proposal. |
| **Textiles** | | | | |
| Dyeing or finishing of cotton, linen and woollen yarns and textiles | 250 metres | 100 metres | Distance reduced as technology has evolved in expectation of odour control. |
| Treatment and production of textiles – using chemicals or heat | 500 metres | 250 metres | Carbon disulphide removed from title and distance reduced, owing to carbon disulphide no longer being used in textile manufacturing in Victoria. |
| Wool scouring | 250 metres | 200 metres | Distance reduced to be consistent with clause 53.10 of the Victoria Planning Provisions. |
| **Waste management** | | | | |
| Biosolids application areas | N/A | NA/500 metres/1,000 metres/case by case (depending on biosolids grade) | Introduced to account for odour from biosolids application areas.  Greater understanding of industry, variable options. Stakeholder feedback from the guideline consultation process highlighted that the separation distance for biosolids in the current guidelines did not accurately represent the variation between different categories of biosolids.  After investigating this issue, EPA agreed that T1 biosolids are dry, fully processed and have a similar odour profile as soil. The level of processing falls off from T2 down to T3 with increased liquid content and a lower level of processing. The updated guidelines have now applied treatment categories for biosolids in the new separation distance guideline. |
| Chemical or oil recycling (> 1,000 m3±total capacity) | N/A | 500 metres | Introduced to account for odour from chemical or oil recycling. |
| Composting facility | See further guidelines (superseded) | See further guidelines | Updated to reference current guidance (EPA Publication 1588) and Appendix C of the proposed *Separation distance guideline*, which includes a broader range of separation distances covering a wider range of composting technologies.  The updated separation distances are informed by site visits and odour field assessments conducted at composting sites, and reflect the change and evolution in composting technology. |
| Container, tanker, or drum washing /reconditioning | N/A | 500 metres | Introduced to account for odour from container, tanker, or drum washing/reconditioning. |
| Incineration | N/A | 150 | Introduced to account for odour from incineration. 500 metre distance for ‘complete destruction of wastes by high temperature incineration’ removed from guidelines.  The incineration of wastes, other than for cremation, has been removed from the guideline. It is noted that few dedicated incinerators exist and are unlikely to be expanding, noting the trend to waste-to-energy plants. |
| Landfill | See further guidelines (Landfill BPEM) | See further guidelines (Landfill buffer guideline) | Updated to refer to new guidance on landfill buffers.  *For more information about changes to landfill buffers in the Landfill buffer guideline, see Table A3.* |
| Liquid waste facility  (> 1,000 m3±total capacity) | N/A | 500 metres | Introduced to account for odour from liquid waste facilities. |
| Materials recovery and recycling; **accepting scrap metal** | Case by case | 500 metres | Distance adjusted to only reflect scrap metal materials recovery and recycling processes.  Other materials recovery and recycling only requires a separation distance for dust.  EPA experience including site visits and air monitoring analysis. |
| Transfer station  **accepting green waste/putrescible waste (e.g.,** **FOGO)** | 250 metres | 500 metres | Distance increased and only applied to transfer stations accepting green waste or putrescible waste.  250-metre separation distance for nuisance dust still applied to all transfer stations.  Industry with significant changes to operations and new/emerging operations. |
| Waste to energy plant | N/A | Case by case | Introduced to account for the odour from waste to energy plants that may generated as part of this emerging industry. |
| **Wood, wood products and furniture** | | | | |
| Manufacture of wood-fibre or wood-chip board | 250 metres | 1,000 metres | Distance increased based on in-field experience with odour from milling and stockpiles.  Field surveys reveal odour from milling and stockpiles persists for some distance, so the separation distances for medium-density fiberboard facilities have increased from 250 to 1,000 metres.  Additionally, recent investigations have shown that these facilities issues with fall-out of wood fibres that the 1000 metre distance also allows for. |
| Sawmill; **sawing, milling, chipping, debarking and hogging** | 250 metres | 500 metres | Distance increased for these typically larger sawmills. |
| Sawmill; **handling, cutting and processing logs into timber, including timber drying/seasoning** | 250 metres | 200 metres | Distance reduced for these typically smaller sawmills. |
| Timber preserving works  (> 10,000 cubic metres of timber per year) | 100 metres | 250 metres | Distance increased based on more odorous treatment agents used, (such as creosote) compared with older facilities. |

Table A2. Recommended default **dust** **separation distances** (*Separation distance guideline*). These may be varied with a supporting risk assessment.

| **Industry type** | **Current distance** (EPA pub. 1518) | **Updated distance** (EPA pub. 1949) | **Reason / more information** |
| --- | --- | --- | --- |
| **Mining and extractive industry** | | | |
| Open cut coal mine | 1,000 metres | 2,000 metres | Distance increased based on evidence of dust impacts on health from open cut mining in Victoria and other jurisdictions.  EPA considered modern approaches to separation distances in other jurisdictions, as well as community reports, field investigations and a preliminary particle analysis assessment of dust deposition in the Latrobe Valley.  There is evidence — both directly from Victoria as well as other jurisdictions — that significant mining activities can result in nuisance dust beyond 2km. These risks reduce with distance.  On the basis of decreasing risk, EPA limited the separation distance to 2km, with an option to further reduce it with a supporting risk assessment. |
| Coal handling and storage without mining | N/A | 500/1,000 metres (depending on throughput) | Introduced to account for dust from coal handling and storage without mining. Coal can easily be broken down into finer particles during handling and in transit, posing a risk of dust emissions. |
| Quarry; **without blasting** | 250 metres | 500 metres | Monitoring and reporting data demonstrates that 250m is often inadequate to address human health and amenity impacts, in particular dust, even when a site is operating at best practice. This is consistent with observations from other jurisdictions both nationally and internationally ([IAQM, 2016](http://www.iaqm.co.uk/text/guidance/mineralsguidance_2016.pdf)).  The 500m distance can be varied with an appropriate supporting risk assessment that considers each site on its merits (for example, sand vs rock, nature of the proposed activities, type of processing), with agent of change principles applying |
| **Miscellaneous manufacturing** | | | |
| Abrasive blasting | N/A | 50/100/300/500 metres (depending on type and throughput) | Introduced to account for dust from abrasive blasting. |
| **Waste management** | | | |
| Landfill | See further guidelines  (Landfill Best Practice Environmental Management) | See further guidelines  (*Landfill buffer guideline*) | Updated to refer to new guidance on landfill buffers.  For more information about changes to landfill buffers in the Landfill buffer guideline, see Table A3. |
| Materials recovery and recycling; **accepting scrap metal** | Case by case | 250 metres | Distance adjusted to reflect processes used, which are largely similar to those used at quarries (without blasting).  Distance aligns with current 250 metre separation distance for quarries (without blasting).  EPA experience including site visits and air monitoring analysis. |
| **Wood, wood products and furniture** | | | |
| Sawmill; **sawing, milling, chipping, debarking and hogging** | 250 metres | 500 metres | Distance increased for these typically larger sawmills. |
| Sawmill; **handling, cutting and processing logs into timber, including timber drying/seasoning** | 250 metres | 200 metres | Distance reduced for these typically smaller sawmills. |

Table A3. Recommended default **buffer distances** (*Landfill buffer guideline*). These may be varied with a supporting risk assessment.

| Industry type | Buffer type | Measured from | Current distance (EPA pub. 788.3) | Updated distance (EPA pub. 1950) | Reason |
| --- | --- | --- | --- | --- | --- |
| Landfill accepting municipal (putrescible) waste (Type 2); tip face less than 900 m2 | Landfill gas | Buildings or structures | 500 metres | 500 metres | No change from current guidelines |
| Human health and amenity impacts (odour and dust) | Sensitive land uses | 500 metres | 500 metres |
| Water quality | Surface waters | 100 metres | 100 metres |
| Bird strike | An aerodrome for piston engine propeller-driven aircraft | 1,500 metres | 1,500 metres |
| An aerodrome for jet aircraft | 3,000 metres | 3,000 metres |
| Landfill accepting municipal (putrescible) waste (Type 2); tip face greater than  900 m2 | Landfill gas | Buildings or structures | 500 metres | 500 m | .  Extensive in-field experience and surveillance, independent analysis of pollution reports and recent national and international papers show that the previous landfill buffer of 500 metres is inadequate to address human health and amenity impacts from odour emissions.  Research concluded that the area within 1,500 metres of a large municipal landfill has a high risk of strong odour. This conclusion is supported by site visits and odour surveillance from 2020 to 2023, which found that operating landfills with a tip face of greater than 500 square metres require a larger human health and amenity buffer than the 500 metres specified in the previous guideline (EPA Publication 788.3)  The landfill separation distance can be varied to a minimum of 1,000 metres with an appropriate risk assessment that demonstrates that an alternative buffer/separation distance is acceptable. |
| Human health and amenity impacts (odour and dust) | Sensitive land uses | 500 metres | 1,500 metres |
| Water quality | Surface waters | 100 metres | 100 metres |
| Bird strike | An aerodrome for piston engine propeller-driven aircraft | 1,500 metres | 1,500 metres |
| An aerodrome for jet aircraft | 3,000 metres | 3,000 metres |
| Landfill accepting solid inert waste (type 3) | Landfill gas | Buildings or structures | 200 metres | 200 metres | Recent experience has shown that subsurface hotspots and landfill gas generation in leachate can develop in operating solid inert landfills. This can generate odour that can be detected up to and beyond 500 metres from the landfill. |
| Human health and amenity impacts | Uses sensitive to odour | 200 metres | 500 metres |
| Uses sensitive to dust | 200 metres | 200 metres |
| Water quality | Surface waters | 100 metres | 100 metres |
| Bird strike | An aerodrome for piston engine propeller-driven aircraft | 1,500 metres | 1,500 metres |
| An aerodrome for jet aircraft | 3,000 metres | 3,000 metres |

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