EPA VICTORIA

Guidance for assessing **nuisance dust**

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Executive Summary

Nuisance dust can cause harm to human health and the environment, can lead to damage to property and result in increased cleaning and maintenance around homes or businesses.

Guidance for Assessing Nuisance Dust provides a framework to assess risks from nuisance dust. It is written for government, the planning sector, and air quality professionals, and will assist decision makers, planners, environmental managers, consultants and industry.

The Environment Protection Act 2017 (the Act) came into force on 1 July 2021 and heralds a new era in the way pollution and waste are to be managed to reduce their effects on public health and the environmental values all Victorians enjoy. The assessment process in these guidelines and the approach taken are determined by the provisions of the Act.

One of the new overarching provisions is the duty to eliminate or minimise the risks posed by hazards to prevent harm. This cornerstone of the Environment Protection Act is s25 "General Environmental Duty" (GED), in simple terms it requires all Victorians to take precautionary and reasonable actions to avoid creating hazards and harm before they happen. This goes beyond the previous approach which was to control actual hazards and harm once they were identified.

This new approach will require assessments of the risks of hazards and harm being created. An understanding of these risks can inform decisions made by authorities or industry to minimise the potential for future hazards or harm.

Practitioners in nuisance dust assessment can use this guide to support.

- Application processes for EPA permissions including licenses and permits.
- Planning assessments including setting buffer area overlays, planning permit applications, precinct structure planning and rezoning applications.
- Variation or assessment of separation distances.
- Evaluating the risk of harm as part of your responsibilities/obligations as a Duty Holder under the Act.
- Investigations into a specific source of dust for strategic or enforcement purposes.

The main feature of the guide is a new qualitative risk assessment tool for use in assessing the risk posed by nuisance dust based on three elements:

- The hazard potential of dust **sources**
- The exposure **pathway** between the source and receiving environment.
- The sensitivity of the **receiving environment.**

Other features of the guide include:

- How to use case studies in assessments,
- Application of meteorological assessment,
- Assessments of multiple or cumulative dust sources, and
- Reporting standards.
- A quick reference guide for dust prevention, management and control

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Glossary of terms

Best available techniques and technologies: The best combination of eco-efficient techniques, methods, processes or technologies used in an industry sector or activity that demonstrably minimises the environmental impact of odour emissions.

Development: The subject of the dust assessment**,** a new or modified industrial or commercial use that may have dust emissions, or a sensitive use proposed to be located near the former.

Exposure pathway: The means by which dust is transmitted from the source.

General environmental duty: A person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable.

Hazard potential: Source and nature of dust emissions.

Receiving environment: Nature and use of the environment where the dust is impacting.

Separation distance: The length of the space between an industrial land use and a sensitive land use.

Sensitive land use: Any land use or zone that requires a focus on protecting human health and wellbeing, local amenity and aesthetic enjoyment.

State of knowledge: All the information a person should reasonably know about managing risks specific to an industry sector or activity.

Acronyms and abbreviations

AS/NZS	Australian / New Zealand Standard
BATT	Best available techniques or technologies
EPA	Environment Protection Authority Victoria
ERS	Environmental Reference Standard
GED	General environmental duty
SPR	Source-pathway-receiving environment
USEPA	United States Environmental Protection Agency

1. Introduction

Guidance for Assessing Nuisance Dust provides a framework to assess risks associated with nuisance dust. It provides assessment tools designed for a broad audience including planners and assessors, and additional tools to consider for more complex applications or where cumulative sources are an issue.

1.1 Purpose of guidance

To provide a framework for the assessment of nuisance dust this document was created to:

- Provide methods for assessing the impacts of nuisance dust on human health and wellbeing, including site specific risk assessment methods.
- Provide guidance on what to include in any report relating to the assessment of nuisance dust in Victoria.

1.2 Intended audience

The guidance is aimed at government, the planning sector, practitioners and specialists, and will assist decision makers, planners, environmental managers, consultants and industry to understand nuisance dust and provide evidence for dust assessments. It can be used to assess the risk of harm due to nuisance dust for an application, investigation or study. It may also be of interest to other stakeholders such as resource managers, legal professionals and the public.

1.3 Scope

This document provides guidance where dust poses a nuisance or adverse effect on the amenity or property of human beings. It should be used in conjunction with the *Guidance for the Assessment and Management of Air Pollution in Victoria (Publication 1961)* in assessing compliance with the General Environmental Duty ('GED').

Generally, a nuisance dust assessment in accordance with this publication would be conducted after:

- A full assessment of particulate air pollution has been conducted in accordance with Publication 1961, which provides guidance on the assessment of pollutants found in dust such as PM_{10}, metals, and other contaminants.
- It is deemed a full assessment under EPA Publication 1961 is not required (based criteria set out in the in the publication).

It doesn't cover the assessment of other nuisance particles or "fall out" from over spray (paint), powder coating, metal grinding or shaving and other similar industry. It is assumed that processes generating these emissions will be fully contained and controlled in accordance with the GED.

Further information on the management and control of dust can be found on the EPA website (Dust advice for businesses | Environment Protection Authority Victoria (epa.vic.gov.au), which contains specific guidance for individual industry sectors in the management and control of dust (i.e., concrete batching, construction & demolition, agriculture, waste and recycling, and control of sedimentation and erosion).

Further guidance on the monitoring of air pollution including dust is to be published as, *Guide to Air Pollution Source Monitoring* and *Guide to Ambient Air Monitoring*.

There is also a quick reference guide for odour controls in the appendix of this document.

2. Regulatory and policy context

2.1 Nuisance Dust

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

Examples of nuisance dust;

- infiltrating into homes or preventing windows being opened,
- may exacerbate asthma symptoms in vulnerable people
- irritating to people's eyes, or obscuring views,
- interfering with a person's capacity to work at their place of employment,
- tainting the preparation of food or damaging equipment or products at commercial premises or restaurants.
- causing damage to vehicles or property
- accumulating in gutters and on surfaces requiring regular cleaning.
- Impact on natural systems and ecology.

2.2 The Environment Protection Act

Nuisance dust also poses an amenity issue that can adversely impact on three environmental values specified in the Environment Reference Statement

- Local amenity and aesthetic enjoyment.
- Visibility.
- The useful life and aesthetic appearance of buildings, structures, property and materials.

3. Assessment of nuisance dust

Nuisance dust assessment may be conducted for the following reasons:

- Application processes for EPA permissions including licenses and permits.
- Planning assessments including buffer area overlay applications, planning permit applications, precinct structure planning and rezoning applications.
- Where a separation distance is to be varied or assessed (EPA Publication 1949 Separation Distance Guidelines, 2021).
- Evaluating the risk of harm as part of your responsibilities/obligations as a Duty Holder under the Act.
- An investigation into a specific source of dust for strategic or enforcement purposes.

Publication 1949 provides the framework where dust assessments may be triggered and acts as a screening assessment for applications. However, the *Guidance for Assessing Nuisance Dust* is also intended for broader application.

The overall objective regardless of the reason for the assessment is to determine the risk of harm from the dust hazard in the area(s) of interest.

The following process is a qualitative risk assessment tool intended for use in assessing the risk posed by nuisance dust. It is applicable to a single source or site that poses a risk on creating nuisance dust. For multiple sources of dust, the tool could be applied to each source individually but may need to consider cumulative sources (Section 4).

The risk assessment consists of four steps (Figure 1):

- Step 1: Determine the hazard potential of the **source.**
- Step 2: Determine the effectiveness of the exposure **pathway** between the source and receiving environment.
- Step 3: Determine the sensitivity of the **receiving environment** at the receptor.
- Step 4: Determine the overall risk of nuisance dust impact occurring based on the risk of the exposure and the sensitivity of the receiving environment. A checklist that may assist in conducting an assessment is in Appendix A.

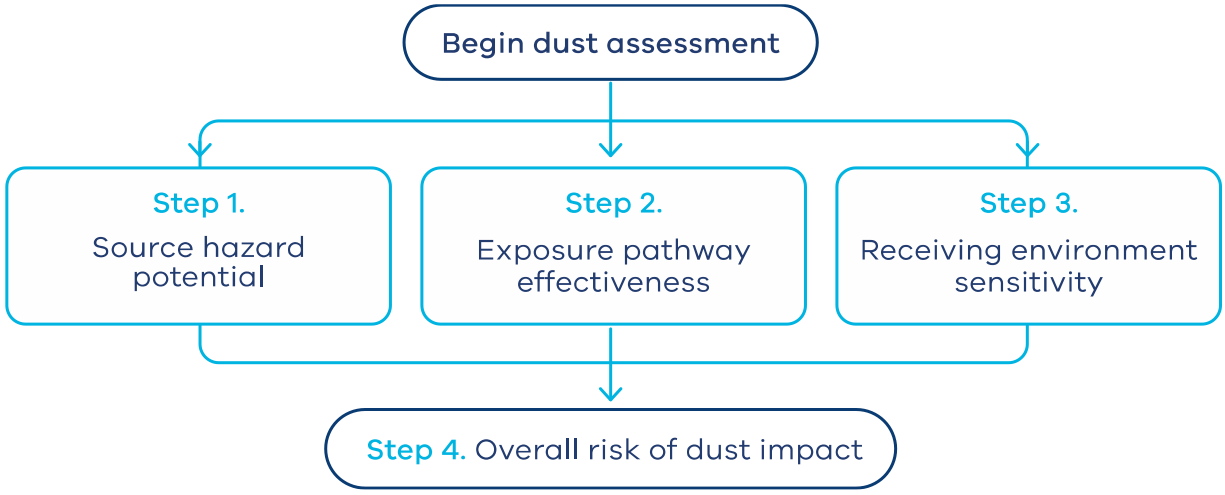

Figure 1: Nuisance dust – risk assessment process

In some cases, the risk assessment process may provide insight to where there may be changes, reconfigurations or engineering solutions that could be applied at the source, pathway or receiving environment that could result in the mitigation of risk.

The onus for conducting the risk assessment and employing any recommended mitigation measures targeted at reducing risk is on the agent of change.

The agent of change principle requires any person or entity proposing a new development or expansion of existing development that may give rise to conflicting land uses, to provide evidence to the decision maker that variation from a specified separation distance is appropriate.

The agent of change has the responsibility to:

- consider their obligations under the GED including the implications of the proposal on human health and amenity,
- avoid land use conflict, and
- ensure potential impacts on nearby land uses are appropriately mitigated and managed.

3.1 Step one - dust source hazard potential

When assessing the dust source, we are examining the potential for a site or activity to generate nuisance dust emissions, and the characteristics of the dust emissions. We are not considering point sources or stacks in this assessment as they are covered in Publication 1961.

Key Considerations:

- Size of source
- Type of emission
- Level of control over dust emissions

Please note that for residential areas encroaching on existing industry, the industrial sources will be the subject of the assessment. For new greenfield industrial sites comparison with an existing reference sites or case studies should be used (see section 5 for more detail on this), but it is encouraged to plan these sites using BATT and locate them outside the recommended separation distances.

Use **Table 1** to assign a score for each category. The hazard potential of the source is determined based by adding scores from each category. The total score will range between four and 12.

Table 1: Hazard potential effectiveness weighting.

Score	Size of dust emitting source	Activities being undertaken	Type of dust emission	Level of Control
1	**Small:** materials usage in the order of hundreds of tonnes/m^3 per year; area sources of tens m^2	**Low potential for dust emissions:** Dust not generated by activity per-se (car yards, auto recyclers, washing and cleaning leads to sediments. Sites with exposed areas without activity (typically vacant yards, lots etc).	**Coarse:** only larger stony materials on site, very coarse sand, blue metal	**Full control or containment:** Fully sealed areas and/or highly effective, tangible measures in place leading to little or no residual dust. Releases only due to plant failure. Good housekeeping, enclosed operation with extraction and treatment equipment
2	**Medium:** materials usage in the order of thousands of tonnes/m^3 per year; area sources of hundreds of m^2.	**Moderate potential for dust emissions:** activities on unsealed sites, i.e., container parks, or other access roads, leading to track-out onto external roads. Cement and building products manufacturing.	**Intermediate:** crushed rock, beach and builders' sands, or fine stone, aggregates**.**	**Partial Control or containment:** Some areas of the site may be controlled or sealed but there are areas not addressed (e.g., haul roads or car parks). Reliance on management and housekeeping (i.e., water carts, keeping tip-faces small, wheel washes etc.).
3	**Large:** Materials usage in the order of hundreds of thousands of tonnes/m3 per year; area sources of thousands of m2.	**High potential for dust emissions:** grinding, blasting, material handling in open air, crushing, screening, haul roads for heavy vehicles, agricultural activities (ploughing fields)	**Fine:** Very fine dusts that can readily become airborne (i.e., silt clay, coal dust, dried tracked out mud, gypsum, cement etc.)	**No effective control or containment:** Large exposed stockpiles or unsealed areas, specifically dry conditions, open air operation with no containment, management controls not maintained.

3.2 Step two - pathway effectiveness

Use this part of the assessment to evaluate the effectiveness of the dust transmission from the dust generating hazard to the receiving environment.

Use Table 2 to assign a score for each category. The pathway effectiveness is determined based by adding scores from each category. The total score will range between four and 12.

Key Considerations:
- Distance
- Meteorology
- Terrain
- Intervening land use

Table 2: Dust exposure pathway effectiveness weighting

Score	Distance	Orientation of receptors relative to the prevailing wind direction	Terrain	Intervening land use
1	• Receptors are hundreds of metres or kilometres from source or • Separation distance has been met easily.	• Winds rarely (<10%) blow from source to receptor or • Source is upwind, winds are of low speed	• Source located in a valley or quarry hole, downslope from receptor or highly undulating terrain between source and receptor	• High vegetation, i.e., densely forested or, • Highly built-up or intervening zone with multiple non-sensitive uses that have no dust emissions of their own
2	• Receptors are tens or hundreds of metres from source or • Separation distance has not been met or met but only just at the threshold distances	• Even distribution of winds (10-20%) from source to receptor or • source is upwind, winds are of moderate speed • High frequency (>10%) of stable weather conditions with low dispersion.	• Source is on same altitude as receiving environment, generally flat land.	• Moderate vegetation and/or • Intervening land use zone contains other non-sensitive industry or smaller businesses.
3	• Receptors are adjacent to the source/site or • Distance well below (less than half) separation distances.	• High frequency (>20%) of winds from source to receptor or • source is upwind, winds are of high speed	• Source is upslope of receiving environment and/or located in the same valley	• Open land and cleared of obstacles and/or • Isolated dwellings or structures in pathway

3.3 Step three: Receiving environment sensitivity

The sensitivity of the receiving environment is determined in this section, has two categories and should be determined based on the highest sensitive use in the area under assessment. The categories are:

Key Considerations:

- Sensitivity of receptor (existing receptors and or proposed land uses)
- Historical context

1. the compliance history, social or **historical context** experienced by people in the receiving environment.
2. the overall **land use** proposed or existing in the receiving environment.

Using Table 3: Receiving environment sensitivity weighting, the sensitivity is determined based by adding scores from each category. As there are only two categories, scores are allocated two, four or six, giving a score between four and 12.

Table 3: Receiving environment sensitivity weighting.

Score	Historical context	Land use
2	**No previous history** no incidents or non-compliance. Only single isolated reports. Generally, the public is unconcerned.	**Low general expectation of amenity** • exposure can be easily avoided. • Dust doesn't have an impact in any lasting way on. appearance, aesthetics or value of property by soiling or, locations where human exposure is transient or, areas of low ecological value • E.g., footpaths, walking or bike trails, farmland (unless sensitive horticultural land,) short term car parks, roads, no nearby waterways, dry arid areas, or waste land (abandoned paddocks etc.).
4	**Some history** Occasional complaints, history of the industry causing problems elsewhere. Some concern in immediate area but not widespread.	**Moderate general expectation of amenity** • people can move on, can potentially avoid exposure. • Dust could impact on appearance, aesthetics or value of property, locations where people are occupationally exposed over a full working day but not in a home setting or, areas of moderate ecological value • E.g., enjoyment of the outdoors, recreational activities, playing sport, offices, warehouses and industrial units, playgrounds, shopping areas, longer term vehicle storage, peri-urban or outer suburban nature areas, somewhat modified water ways.
6	**Significant history** Community has had regular impacts of dust and is highly sensitised. Regular or repeated non-compliance, past enforcement activity	**High general expectation of amenity** • exposure cannot be avoided. • Dust is likely to impact on damage to property, clothes, vehicles, affects food preparation, etc. or, individuals may be exposed for over eight hours or more in a day, areas of high ecological value • E.g., residential properties with backyards and open living areas, rural living zones, hospitals, schools, prisons, accommodation, residential care homes, car parks associated with workplace or residential parking

3.4 Step 4: Overall risk of dust impact

The overall risk of dust impacts likely to occur is then determined by adding up the scores for each category as per Table 4. To reduce risk as you move up the scale the level of control and intervention required increases.

Table 4: Overall risk of dust impact

Score	Descriptor	Comment
32-36	**very high**	Dust impacts almost certain
27-31	**high**	Dust impacts highly likely to occur
22-26	**medium**	Dust impacts likely
17-21	**moderate**	Dust impacts only likely to occur on rare occasions
12-16	**Low**	Dust impacts are not likely

Very high risk indicates that nuisance dust will occur. Any interventions to reduce risk in either the source, pathway or receiving environment are unlikely to be practical so effective mitigation is doubtful.

High risk indicates that you can expect significant nuisance dust to occur, and impacts are highly likely. There may be some interventions that can be applied to reduce the risk, but it is likely that significant re-engineering or redesign will be required.

Medium risk indicates that you can expect some nuisance dust to occur and without careful and considered application of mitigation measures it is likely to cause impacts. The focus should be what can be done to break the source-pathway-receiving environment chain.

Moderate risk although there may be some residual risk of nuisance dust, but it is possible it can be practically and effectively managed.

Low risk indicates the risk of nuisance dust is likely to be minimal.

3.5 Case Study

An illustrated example is presented in this system to show how the assessment process is applied and scored. In this case study a new residential development is proposed in a former industrial area (Figure 2). The following are features of the application:

- A construction and demolition waste recycling business that process 60,000 tonnes of construction and demolition (C&D) waste per year is located 450 m from the development.
- The recommended separation distance for C&D facilities of this type is 500 m.
- Dust generated from the site is typically coarse terrestrial dust from crushing and screening of concrete, stone and brick.
- The screening and crushing plant have screens and covers, but many roads and surfaces unsealed and there are exposed stockpiles and despite the existence of a wheel wash there is still visible track-out.
- There has been no regulatory activity, or any complaints made relating to the business.
- The surrounding land-use is moderately built-up mixed uses (offices, warehouses etc.) with the new residential estate being planned behind the mixed-use area.
- Area is a flat urban suburban environment.

Figure 2 : Cumulative Impacts Example (not to scale)

Scores are assigned to each criteria in Table 5, following the steps laid out in sections 3.1 to 3.4. a final overal risk score is then obtained.

Table 5: Example of dust risk assessment (single source)

	Criteria	Score	Comments
Hazard potential of the sources	Size of dust emitting source	2	Materials puts usage in 10s of thousands.
	Activities being undertaken	3	High potential of dust generation
	Type of dust emission	2	Intermediate dust emission type.
	Level of Control	2	Some control over emissions but not BATT
Effectiveness of exposure pathway	Distance	2	Sites are close to meeting the separation distance (medium distance)
	Prevailing wind direction	2	Site is downwind 10% of the time
	Terrain	2	Flat land neutral terrain
	Intervening land use	2	Intervening land use zone contains other industry or smaller businesses
Sensitivity of receiving environment	Land use.	6	Residential estate, highest sensitivity
	Historical context	2	No history of issues in the area
Overall score		**25**	Medium risk of dust impacts occurring

3.6 Interpretation of the risk assessment results.

To lower the risk of nuisance dust dependent on the agent of change, tables 1-3 could be revisited and determine what elements in the source, pathway or receptor could be changed, controlled or mitigated, i.e.:

- Invest in dust control technology at the C&D site.
- Place less-sensitive uses at the interface of the development closest to the C&D site, leaving sensitive use area outside the 500 m separation distance.
- Look at planting and or bunding to decrease the pathway effectiveness.

4. Assessment of multiple dust sources

With dust risk assessment, cumulative impacts need to be considered including;

- more than one dust source is subject to assessment, or
- a new potential dust source is proposed where there are existing sources.

Below is the recommended approach in considering cumulative impacts.

A. Apply the source pathway assessment process for each dust producing site under consideration.

B. Determine in which manner sources may accumulate (Table 6).

C. Determine an overall risk score for the area(s) under assessment based on these cumulative impacts.

Table 6: Consideration of cumulative aspects of an assessment

Category	How the categories can add to increase risk
Size of dust emitting source	The degree of risk is increased based on either the area of the dust emitting activity, or the mass of materials processed when combined increase the size of the source.
Activities being undertaken	If the activities are of the same or similar risk level, then they can be considered together. If they are different the overall risk of each site needs to be determined separately.
Type of dust emission	The type of dust emission is the same or similar risk level, then they can be considered together. If they are different the overall risk of each site needs to be determined separately.
Level of Control	The level of control is the same or at a similar risk level, then they can be considered together. If they are different the overall risk of each site needs to be determined separately.
Distance	If there is substantial difference for the different sources the risk will need to be assessed separately.
Orientation of receptors relative to the prevailing wind direction	The degree of risk is increased provided the dust sources are located at different bearings from each other, if they are largely located in the same direction as the sensitive uses then the combined size is the main issue.
Terrain	If there is substantial difference for the different sources the risk will need to be assessed separately.
Intervening land use	If there is substantial difference for the different sources the risk will need to be assessed separately.
Sensitive Land use	This will generally be the same for both sites in a cumulative assessment.
Historical context	The highest score of the two sites is taken in the risk assessment.

4.1 Cumulative Sources Case Study

Expanding on the example in Section 3.4, in this scenario there is an additional dust source in the area under assessment (Figure 3):

- A material transfer station that receives 50,000 tonnes per year of waste is located 200 m from the development
- Separation distance for the C&D recycler is 500 m, for the Transfer station it is 250 m
- Dust generated from this site is typically coarse terrestrial dust
- Some operations are enclosed but it has unsealed roadways and some stockpiles outside
- There has been no regulatory activity, or any complaints made relating to this business.

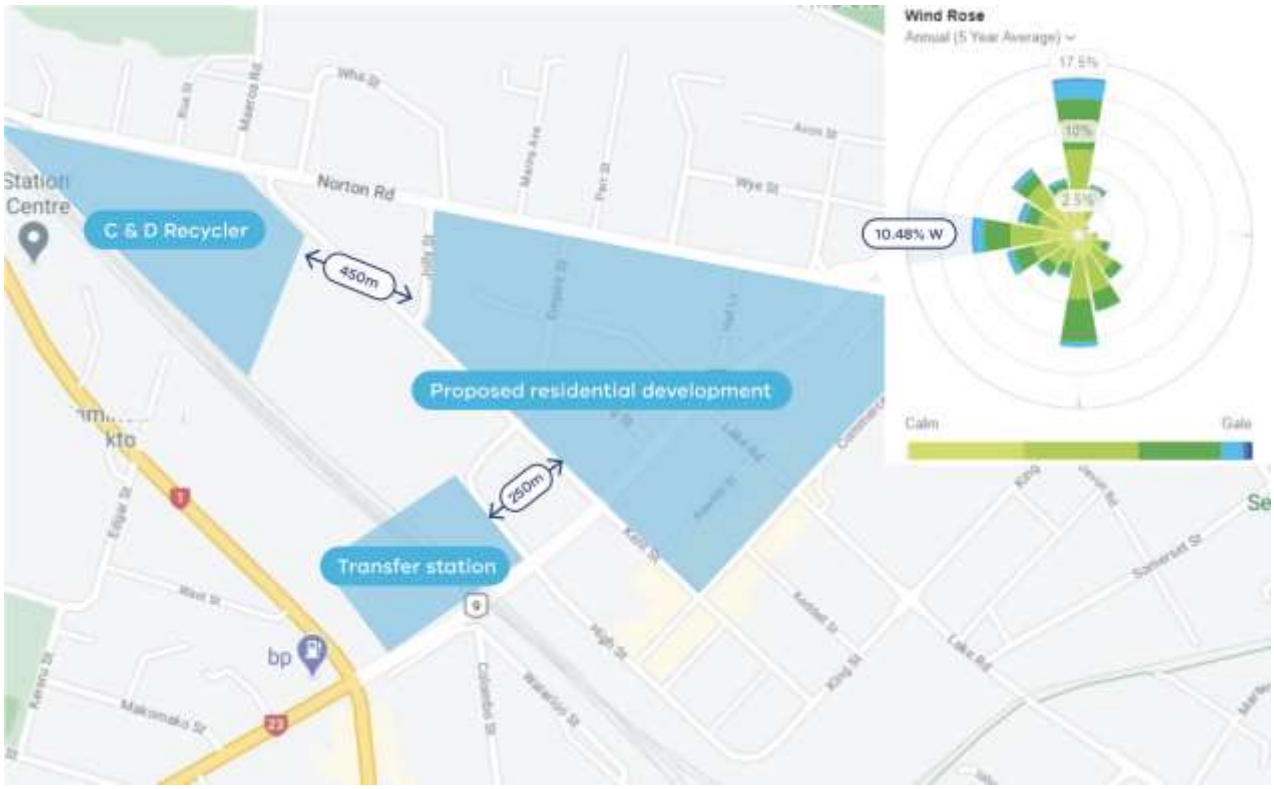

Figure 3: Cumulative Impacts Example (not to scale)

In the previous example the overall risk where there was just the single source (the C&D recycling site), the risk was medium with a score of 25. Below is a table where the transfer station (TS) is considered. The assessment is inTable 7.

Table 7: Example of dust risk assessment (cumulative sources)

	Criteria	C&D	TS	Both	Comments
Hazard potential of the sources	Size of dust emitting source	2	2	3	Materials puts usage combined > 100,000 t/yr.
	Activities being undertaken	3	3	3	High potential of dust generation
	Type of dust emission	2	2	2	Intermediate dust emission type.
	Level of Control	2	2	2	Some control over emissions but not BATT
Effectiveness of exposure pathway	Distance	2	2	2	Sites are close to meeting the separation distance
	Prevailing wind direction	2	2	3	Either of the sites downwind > 25% of the time
	Terrain	2	2	2	Flat land neutral terrain
	Intervening land use	2	2	2	Intervening land contains industry or small businesses
Sensitivity of receiving environment	Land use.	6	6	6	Residential estate, highest sensitivity
	Historical context	2	2	2	No history of issues in the area
Overall score		**25**	**25**	**27**	Combined risk pushes this application into the high-risk category.

Interpretation of the risk assessment results.

The development is considerably more constrained as it can expect a higher frequency and volume of dust and would need substantial replanning and consideration of design at the receiving environment to reduce the risk as mitigation measures are now directed at two dust sites presenting two interfaces with the subject site.

5. Further Dust Assessment Tools

5.1 Comparison with Similar Operations

Information from comparable sites can be used to help assess potential nuisance dust from a planned facility. It involves gathering information on the extent of impact and source characteristics of a similar operation. The outputs of this tool may be incorporated into the risk assessment process set out in section 3**.** Points for consideration when comparing case studies or similar operations include:

- size and throughput
- similarity of the surrounding topography
- similarity of the local meteorology
- common emission sources and dust control technology and practices
- seasonal or other temporal factors that affect dust emissions are common
- previous dust risk assessment information
- complaints history

5.2 Monitoring & Modelling and Dust Assessment

EPA generally advises against traditional monitoring techniques such as fall-out gauges and directional dust gauges as they don't provide the data in enough granularity to inform on risk, as they are primarily a set limit that is based on monthly averages.

EPA also encourages applicants to engage with EPA when considering modelling due to the high levels of uncertainty in modelling nuisance dust emission rates from sources due to (for example);

- The typically random nature of activities at the sites
- The main drivers of emissions being highly diverse in nature both temporally and physically
- The variation and location of stockpiles, traffic movements
- Nuisance dust not neatly falling into an air quality criterion, (PM_{10}, and $PM_{2.5}$ risk assessment should have already been considered under Publication 1961).

The difficulty with emission modelling is having adequate emission data for fugitive dust emissions. Very often the fugitive emission data is not accurate and is difficult to measure, resulting in considerable uncertainty in modelling results. Further, dust criteria such as fallout (g/m^2/month) doesn't provide enough data to form on odour risk as it is a broad monthly average and will not identify significant dust events.

Further guidance on air pollution monitoring is to be published as *Guide to Air Pollution Source Monitoring* and *Guide to Ambient Air Monitoring*.

USEPA Compilation of Air Pollutant Emissions Factors (AP42) or National Pollution Inventory (NPI based on USEPA AP42) use emission factors for fugitive dust modelling but they are not suitable for quantitative risk assessments.

Typically, with nuisance dust we are mainly concerned with coarser material coming from area sources, roads, stockpiles etc.

Some tools that may be of use are;

- indicative monitoring systems (such as dust sensors or continuous dust monitoring equipment) to determine sources and frequencies of dust emissions.

- meteorological modelling to assist in predicting dust impacts from sites under assessment

If undertaken, advice should be sought from EPA before using monitoring and modelling in dust risk assessment. Please see *Guide to Air Pollution Modelling* (*EPA Publication 1957)* for recommended modelling and meteorological tools.

Modelling may provide a framework where relative changes to emissions can be compared. This approach is referred to as 'comparative' modelling, if modelling indicates an increase in ground-level impacts and current air quality monitoring indicates criteria are already being exceeded, this suggests that unless greater effort is placed into improving mitigation of dust emissions then exceedances will continue, potentially at an increased rate overall.

6. Reporting

Reporting recommendations in assessments

It is recommended to develop a standard reporting methodology and format to ensure all relevant information is included in a risk assessment. Although each assessment will have specific requirements, and will vary with the scope and size of the assessment, any report should contain the following features:

- **Executive summary:** A brief of the basic assessment outcome. This may be the only part of the report that some users read, so it should be succinct and clear.
- **Scope:** Reasons why this assessment been undertaken including the intended outcomes.
- **Introduction:** Background to the issues and relevance of any existing or previous work, credentials of the company / author undertaking the assessment.
- **Site description:** Area or location being assessed, including maps with all relevant features (and photos if available). Show any sensitive locations (e.g., dwellings, hospitals and schools) in relation to the proposal.
- **Proposed development or activity:** Description of the activity being assessed and any changes to existing activities. This section should include adequate information to characterise the dust sources.
- **Legislative and policy requirements:** Include details of any existing requirements and the level of compliance with these requirements. This should include Federal, State, and Local government requirements. This should also include reference to any permissions or permits required by EPA or any other agencies.
- **Receiving environment:** Description of the receiving environment potentially affected.
- **Cumulative effects:** Which types of cumulative effects have been included or excluded from the assessment and why.
- **Consultation:** Summary of any consultation undertaken, either with neighbours, local councils or other affected parties. Discuss how the outcomes of this consultation have informed the development of the proposed project or activity.
- **Methodology:** Description of the processes used, any models employed, assumptions made, any statistics or analysis used and reasons behind the selection of tools used
- **Data used:** Sources and validity of all input data, including emissions and process data, meteorology, existing concentrations and all assumptions made.
- **Assessment of effects:** Outcomes of the assessment, and all options assessed, as much as possible in summary tabular and graphic form. The emphasis should be on key results that can inform decision-making. Detailed results should be given in an appendix.
- **Risk assessment:** Description of the risk assessment undertaken, with any conservative assumptions made and the results.
- **Mitigation**: Address any mitigation options available and considered, the feasibility of these measures and justification on what measures were adopted. This section can include an analysis of the best available technology and techniques.

- **Discussion:** Implications, uncertainties and reliance on assumptions. Include discussion of possible mitigation options and associated emissions reduction. This section can include cost-benefit analyses and sensitivity analyses if required.
- **Conclusion:** Summary of the scope, method, results, limitations and implications.
- **References:** All material used should be referenced explicitly and should include web-based links where appropriate.
- **Appendices:** Any detailed calculations or results that are used.

The size and nature of each of these sections will depend on the size of the project, the activity and the associated risks. For some simpler assessments not all the sections may be relevant.

When reviewing an assessment report to determine risk, EPA may consider a range of additional factors such as complaints recorded by EPA, compliance history and annual monitoring results reported to EPA. EPA may also require additional analysis to be undertaken.

7. EPA Dust Publications

EPA General Guidance

1961: Guidance for the Assessment and Management of Air Pollution in Victoria

1741.1: Industry guidance: supporting you to comply with the general environmental duty

1695.1: Assessing and controlling risk: A guide for business

1812.1: Self-assessment tool for small business

Specific guidance on dust management and control

EPA Dust Guidance for Business (https://www.epa.vic.gov.au/for-business/find-a-topic/dust/advice-for-businesses/)

Publications on air pollution (including particulate) monitoring

Guide to Air Pollution Source Monitoring (forth coming)

1955: Guide to Ambient Air Monitoring (forthcoming)

Publications on dust management and control

480: Environmental Guidelines for Major Construction Sites

1806: Reducing risk in the premixed concrete industry.

1834: Civil Construction, building and demolition guide

1893: Erosion, sediment and dust: treatment train

1894: Managing soil disturbance

1895: Managing stockpiles

1897: Managing truck and other vehicle movement

Appendix A: Dust Assessment Template

Environment Protection Authority Victoria	Template
Application type	
Type of source (or premises)	
Address	
Assessor	
Reference no:	

Description of proposal

Relevant matters to consideration of dust impacts	
Site location and area {Insert map}	
Zoning	
Zoning and land use {Insert map}	
Nearest sensitive uses {Insert map}	

Scoring

Category assessment	Criteria	Comment	Score
Hazard potential of the source	Size of dust emitting source		
	Activities being undertaken		
	Type of dust emission		
	Level of Control		
Comments on overall hazard potential of the source			
Effectiveness of exposure pathway	Distance		
	Prevailing wind direction		
	Terrain		
	Intervening land use		
Comment on overall effectiveness of pathway			
Sensitivity of the receiving environment	Land uses/receptors		
	Historical context		
Comments on overall sensitivity of receiving environment			
Overall risk of dust impacts occurring			
Comment –			

Appendix B: Common dust controls

The following section details some common dust controls. The control used is dependent on the dust source, but the list below includes controls ranging from management measures such as speed limits, dust monitoring systems and watering to engineered controls such as clovers, enclosures and wheel washes.

Engineered Controls (permanent capital improvements)

1. Construct driveways and crossovers with an impervious material, such as reinforced concrete, that can withstand heavy vehicle movements and is of adequate size to prevent vehicles leaving the site from driving over nature strips or verges.
2. Seal internal roads and surfaces with a suitably durable material such as reinforced concrete to prevent the generation of dust from vehicle movements
3. Rumble grid and/or wheel wash to remove materials from vehicle wheels and undersides prior to them exiting the premises (properly maintained and fit for purpose).
4. Dousing bars so that incoming truck loads are wetted down.
5. Sprays or sprinklers at key high risk transfer points.
6. Keep stockpile heights at a minimum (at least 3 m lower than protective fences, bunds or barriers).
7. Use variable height conveyors for stockpiling operations.
8. Install landscaping, or bund walls and plant appropriate trees and bushes to act as screens around site boundaries
9. Design plant equipment so that it is covered and or minimises dust distribution
10. Fully enclose high risk areas of operation.
11. Use fixed plant wherever possible to reduce vehicle movements on site.
12. Appropriate design for hoppers and materials storage areas to prevent exposure to the elements.

Management controls (rely on human intervention, and are reactive in nature)

1. Environmental Management Plans (see https://www.epa.vic.gov.au/for-business/find-a-topic/dust/advice-for-businesses/controls) for more detail on this.
   - a maintenance and cleaning plan for all trafficked surfaces
   - a description of environmental aspects, impacts and risks and the mitigation measures for each risk
   - a set of actions to be taken to minimise the impacts and risks identified Above; and
   - a process to ensure that the Environmental Management Plan is fully implemented and regularly reviewed
2. Introduce and enforce speed limits on sites (<10 kph on unsealed roadways).
3. Cease operations in high-risk areas where dust control measures are unable to be implemented or there are extreme weather condition
4. Keep materials moist during transfer and handling, cover loads.
5. Install a dust monitoring system at key points around the perimeter of the premises to help identify problems when they occur and have appropriate mitigation plans in place in the event of high dust being generated.
6. Include appropriate response triggers and set alerts for intervention

Example

The Environmental Reference Standard (ERS) for PM_{10} for 24-hours is 50 µg/m^3. The indicator for poor air quality used in EPA Air Watch is an hourly average of 80 µg/m^3. These averaging times are too long for reactive monitoring, so in setting alert levels for shorter time periods EPA analysed a typical exceedance of the hourly average of 80 µg/m^3 at Brooklyn Air Monitoring Station (Figure 4). This revealed that the ½ hour rolling average peaked at 120, the 15 min average peaked at 150 and the 10-minute average peaked at 166 µg/m^3. Which could be used a short-term alerts in reactive monitoring.

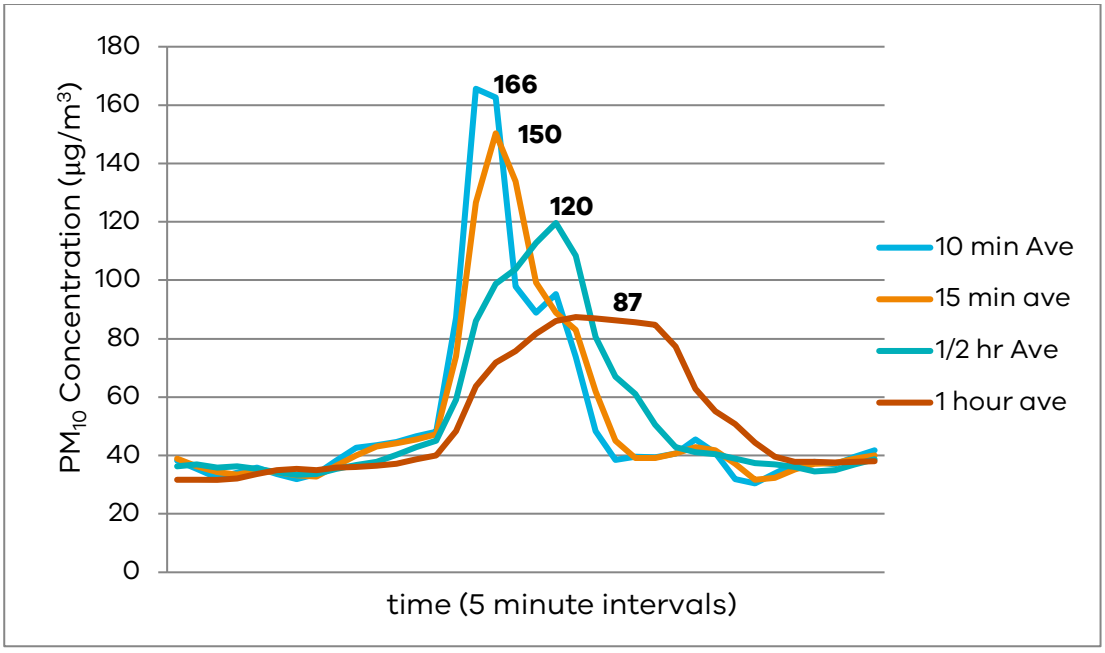

Figure 4: Averaging periods for PM_{10} (particles smaller than 10 microns)