

## APPENDIX 9-2

# Operational Phase Odour Methodology: Source-Pathway-Receptor Model

**Table 9-2-1: IAQM – Source Pathway Receptor Assessment Model**

Source Odour Potential	Pathway Effectiveness	Receptor
<p>Factors affecting the source odour potential include:</p> <ul style="list-style-type: none"> <li>the magnitude of the odour release (taking into account odour-control measures);</li> <li>how inherently odorous the compounds are; and</li> <li>the unpleasantness of the odour.</li> </ul>	<p>Factors affecting the odour flux to the receptor are:</p> <ul style="list-style-type: none"> <li>distance from source to receptor;</li> <li>the frequency (%) of winds from the source to receptor (or, qualitatively, the direction of receptors from source with respect to prevailing wind);</li> <li>the effectiveness of any mitigation/control in reducing flux to the receptor;</li> <li>the effectiveness of dispersion/ dilution in reducing the odour flux to the receptor; and</li> <li>topography and terrain</li> </ul>	<ul style="list-style-type: none"> <li>For the sensitivity of people to odour, the IAQM recommends that the air quality practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:</li> </ul>
<p><b>Large Source Odour Potential</b></p> <ul style="list-style-type: none"> <li>Magnitude – Larger Permitted processes of odorous nature or large STWs; materials usage hundreds of thousands of tonnes/m<sup>3</sup> per year; area sources of thousands of m<sup>2</sup>.</li> <li>The compounds involved are very</li> </ul>	<p><b>Highly Effective Pathway for Odour Flux to Receptor</b></p> <ul style="list-style-type: none"> <li>Distance – receptor is adjacent to the source/site; distance well below any official set-back distances.</li> <li>Direction – high frequency (%) of winds from source to receptor (or, qualitatively,</li> </ul>	<p><b>High Sensitivity Receptor</b>                      Surrounding land where:</p> <ul style="list-style-type: none"> <li>users` can reasonably expect enjoyment of a high level of amenity; and</li> <li>the people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as</li> </ul>

<p>odorous (e.g. mercaptans), having very low Odour Detection Thresholds (ODTs) where known.</p> <ul style="list-style-type: none"> <li>• Unpleasantness – processes classed as “Most offensive”; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score.</li> <li>• Mitigation/control – open air operation with no containment, reliance solely on good management techniques and best practice.</li> </ul>	<p>receptors downwind of source with respect to prevailing wind).</p> <ul style="list-style-type: none"> <li>• Effectiveness of dispersion/dilution – open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes.</li> </ul>	<p>part of the normal pattern of use of the land.</p> <ul style="list-style-type: none"> <li>• Examples may include residential dwellings, hospitals, schools/education and tourist/cultural</li> </ul>
<p><b><u>Medium Source Odour Potential</u></b></p> <ul style="list-style-type: none"> <li>• Magnitude – smaller Permitted processes or small Sewage Treatment Works (STWs); materials usage thousands of tonnes/m3 per year; area sources of hundreds of m<sup>2</sup>.</li> <li>• The compounds involved are moderately odorous.</li> <li>• Unpleasantness – processes classed in H4 as “Moderately offensive”; or (where known) odours having neutral (0) to unpleasant (-2) hedonic score.</li> <li>• Mitigation/control – some mitigation measures in place, but significant residual odour remains.</li> </ul>	<p><b><u>Moderately Effective Pathway for Odour Flux to Receptor</u></b></p> <ul style="list-style-type: none"> <li>• Distance – receptor is local to the source. Where mitigation relies on dispersion/dilution – releases are elevated, but compromised by building effects.</li> </ul>	<p><b><u>Medium Sensitivity Receptor</u></b>                  Surrounding land where:</p> <ul style="list-style-type: none"> <li>• users` would expect to enjoy a reasonable level of amenity, but wouldn’t reasonably expect to enjoy the same level of amenity as in their home; or</li> <li>• people wouldn’t reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.</li> <li>• Examples may include places of work, commercial/retail premises and playing/recreation fields.</li> </ul>

<p><b><u>Small Source Odour Potential</u></b></p> <ul style="list-style-type: none"> <li>• Magnitude – falls below Part B threshold; materials usage hundreds of tonnes/m<sup>3</sup> per year; area sources of tens m<sup>2</sup>.</li> <li>• The compounds involved are only mildly odorous, having relatively high ODTs where known.</li> <li>• Unpleasantness – processes classed as “Less offensive” in H4; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score.</li> <li>• Mitigation/control – effective, tangible mitigation measures in place (e.g. BAT, BPM) leading to little or no residual odour.</li> </ul>	<p><b><u>Ineffective Pathway for Odour Flux to Receptor</u></b></p> <ul style="list-style-type: none"> <li>• Distance – receptor is remote from the source; distance exceeds any official set-back distances.</li> <li>• Direction – low frequency (%) of winds from source to receptor (or, qualitatively, receptors upwind of source with respect to prevailing wind).</li> <li>• Where mitigation relies on dispersion/dilution – releases are from high level (e.g. stacks, or roof vents &gt;3m above ridge height) and are not compromised by surrounding buildings</li> </ul>	<p><b><u>Low Sensitivity Receptor</u></b></p> <p>Surrounding land where:</p> <ul style="list-style-type: none"> <li>• the enjoyment of amenity would not reasonably be expected; or</li> <li>• there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.</li> <li>• Examples may include industrial, farms, footpaths and roads.</li> </ul>
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Using the example risk ranking presented in Table 9-2-1, the pollutant pathway from source to receptor can be categorised as ineffective, moderately effective or highly effective.

A justification is then presented for the assessment to the selected categories for Source Odour Potential and the pathway effectiveness.

The estimates of Source Odour Potential and the Pathway Effectiveness are considered together to predict the risk of odour exposure (impact) at the receptor locations.

Finally, the effect of that odour impact on the exposed receptor is calculated, taking into account its sensitivity.

**Table 9-2-2: Risk of Odour Exposure (Impact) at the Specific Receptor Location**

		Source Odour Potential		
		Small	Medium	Large
Pathway effectiveness	Highly Effective	Low Risk	Medium Risk	High Risk
	Moderately Effective	Negligible Risk	Low Risk	Medium Risk
	Ineffective Pathway	Negligible Risk	Negligible Risk	Low Risk

**Table 9-2-3: IAQM Odour Receptor Sensitivity**

Receptor Sensitivity	Example Land-uses
High sensitivity receptor	<p>Surrounding land where:</p> <ul style="list-style-type: none"> <li>• users can reasonably expect enjoyment of a high level of amenity; and</li> <li>• people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.</li> </ul> <p>Examples may include residential dwellings, hospitals, schools/education and tourist/cultural</p>
Medium sensitivity receptor	<p>Surrounding land where:</p> <ul style="list-style-type: none"> <li>• users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or</li> <li>• people wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.</li> </ul> <p>Examples may include places of work, commercial/retail premises and playing/recreation fields</p>
Low sensitivity receptor	<p>Surrounding land where:</p> <ul style="list-style-type: none"> <li>• the enjoyment of amenity would not reasonably be expected; or</li> <li>• there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.</li> </ul> <p>Examples may include industrial use, farms, footpaths and roads</p>

**Table 9-2-4: Likely Magnitude of Odour Effect at the Specific Receptor Location**

Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High Risk	Slight adverse	Moderate Adverse	Substantial Adverse
Medium Risk	Negligible Effect	Slight adverse	Moderate Adverse
Low Risk	Negligible Effect	Negligible Effect	Slight adverse
Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

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