

The convergence of workplace and ambient air quality criteria: impacts on AQIA practice

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CASANZ Clear Air Conference 2026

Introduction

- Background:
 - Two types of air in Australia
 - WHS regulations protect workplace employees (Safe Work Australia) – avoid unsafe peak exposures
 - Ambient air regulations protect the public (NEPM or state regulators) – longer term standard (+ short peaks)
 - Operate independently, different objectives, no overlap in AQIA
 - Historically, WHS criteria has been orders of magnitude higher than ambient
 - From December 2026, transition WES → WEL, includes reduction in criteria
- Study:
 - If the gap between WHS and ambient criteria continues to narrow, what effect *could* it have on AQIA practice if workplace receptors were required to be assessed against WHS criteria?
- How:
 - Dispersion modelling exercise to gauge relative compliance impacts at a distance from a pollution source

Why This Matters



WHS criteria updated due to more recent health data showing impacts at lower levels than previously assumed safe, even in the less sensitive working population.

AQIAs often focus on impacts at residential receptors (high sensitivity) while excluding or assigning a lower importance to industrial workplaces (lower sensitivity).

Updated WEL criteria reduces the gap between workplace and ambient criteria, hard to ignore.

WES to WEL Changes

- WES → WEL: New pollutants, some significant reductions
- Study focused on pollutants and averaging periods common to WHS and NEPM

Pollutant	Avg.pd.	NEPM	WES	WEL	Reduction
CO (mg/m ³)	TWA/ 8-hr	10	34	23	32%
SO ₂ (µg/m ³)	STEL/ 1-hr	215	13,100	650	95%
NO ₂ (µg/m ³)	TWA/ 1-hr	164	6,158	410**	93%**

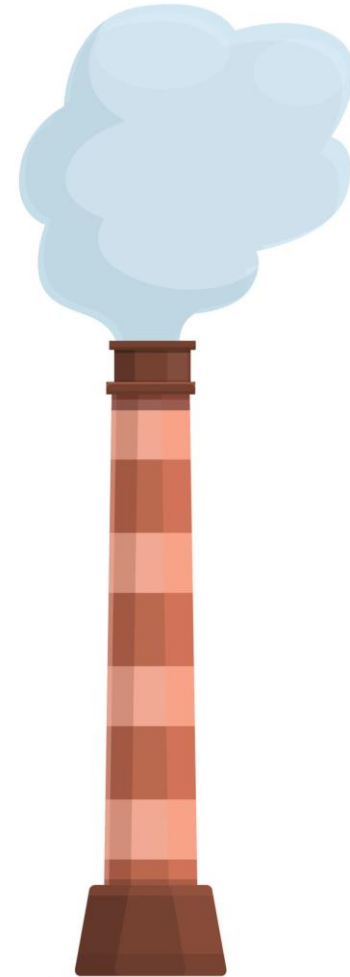
Receptor definitions

- NSW: A location where people are likely to work or reside... = ambient criteria
- VIC/NZ: Where it is plausible for humans to be exposed over durations greater than 24 hours... = potentially excluded
- QLD: A place used as a workplace, including an office for business or commercial purposes... = potentially excluded
- WA: Places where people live or regularly spend time, and which are therefore sensitive to emissions from industry with implications for human health or to amenity. Commercial, industrial and institutional land uses that require high levels of amenity, or are sensitive to particular emissions, may also be considered sensitive land uses = potentially excluded
- Converging criteria could influence more consistent inclusion of workplace / industrial receptors in future AQIAs



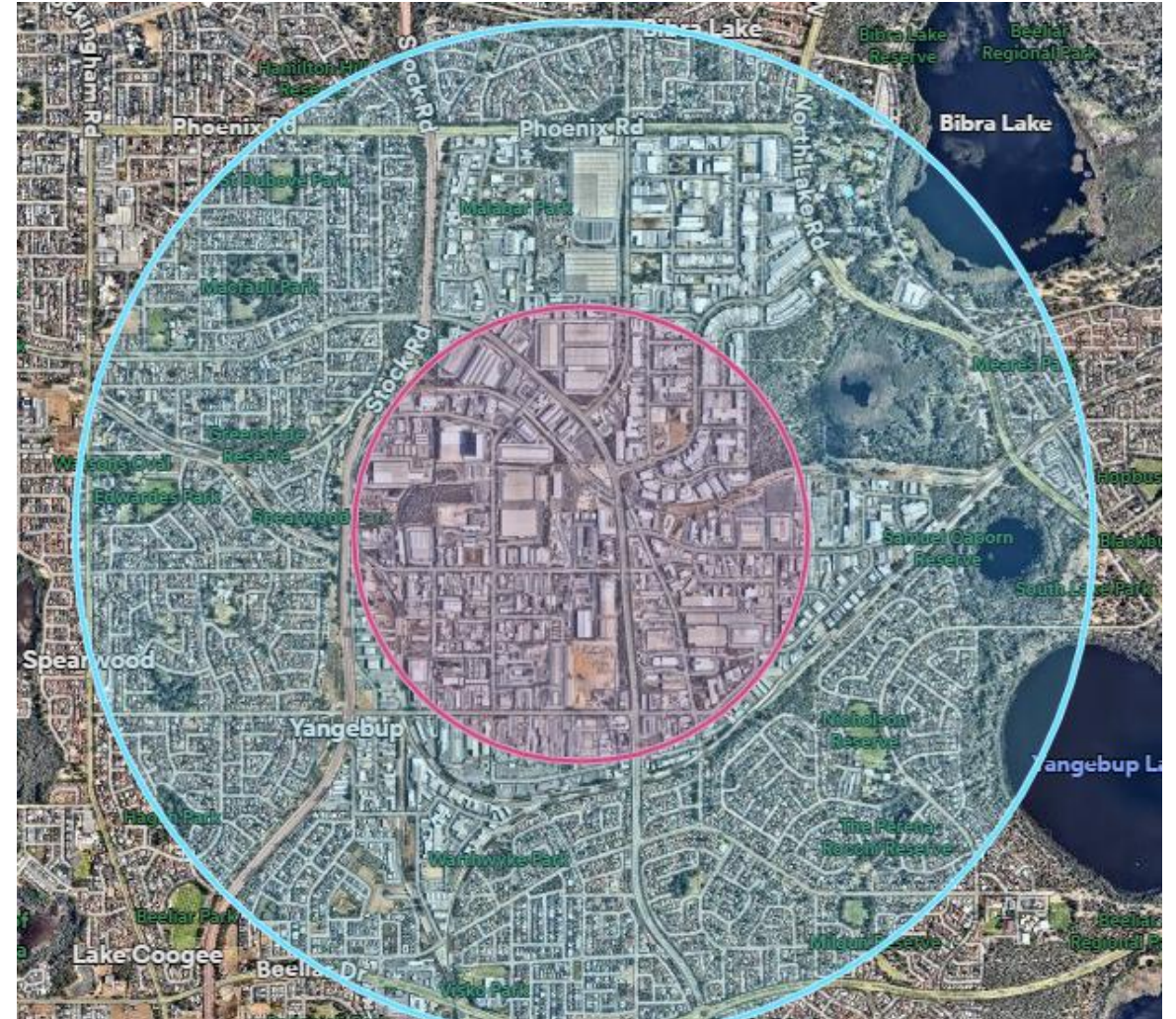
Modelling methodology

- WRF, CALMET and CALPUFF models.
- Generic mixed use industrial area (2x2 km) surrounded by residential receptors.
- Single 'typical' well designed stack that would simulate good dispersion characteristics:
 - 1m diameter
 - 10m height
 - 100°C exit temperature
 - 15 m/s exit velocity
 - 1 g/s emission rate (scaled in post to suit study design)
- CO & SO₂



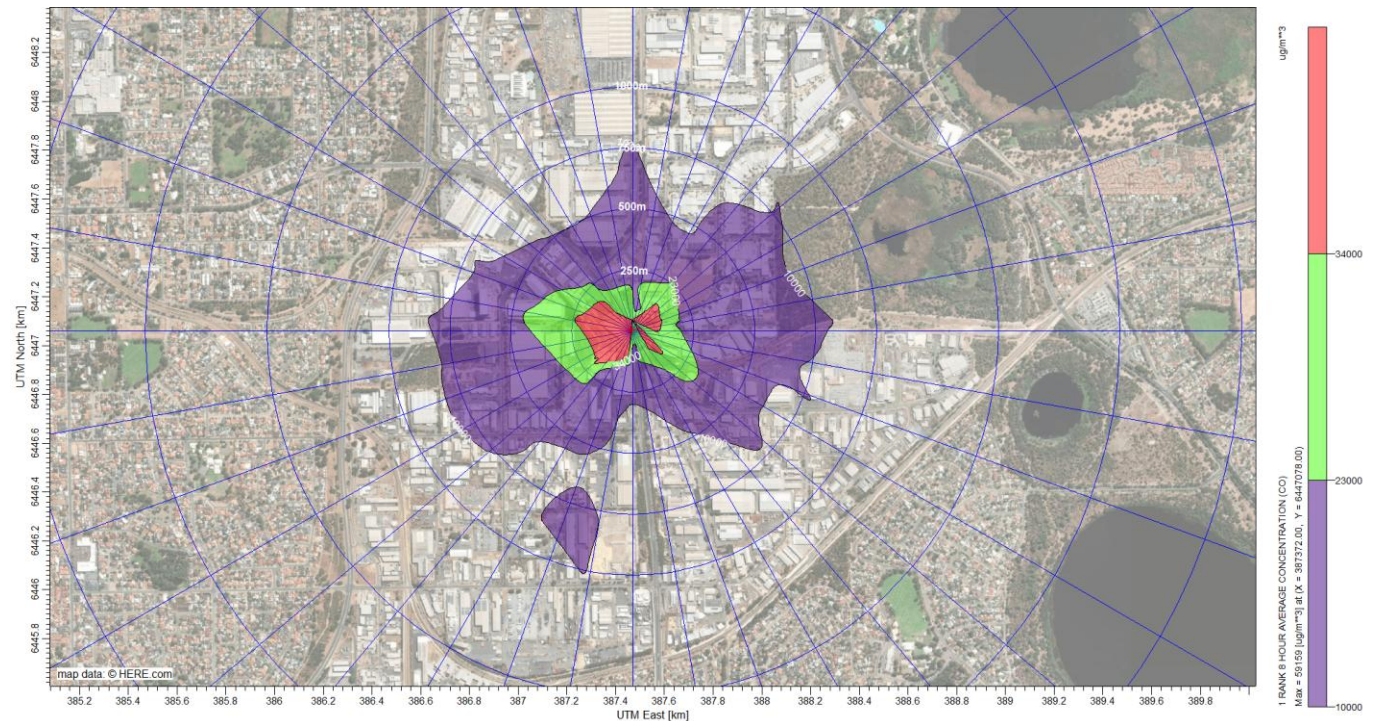
Assessment methodology

- Scaled the emission rate to approximate compliance with NEPM at surrounding residential area “**Complying AQIA**”
- Results presented with:
 - Contour level at NEPM criteria
 - Contour level at WES criteria
 - Contour level at WEL criteria
- Gauge the relative compliance impact due to reduced WEL criteria



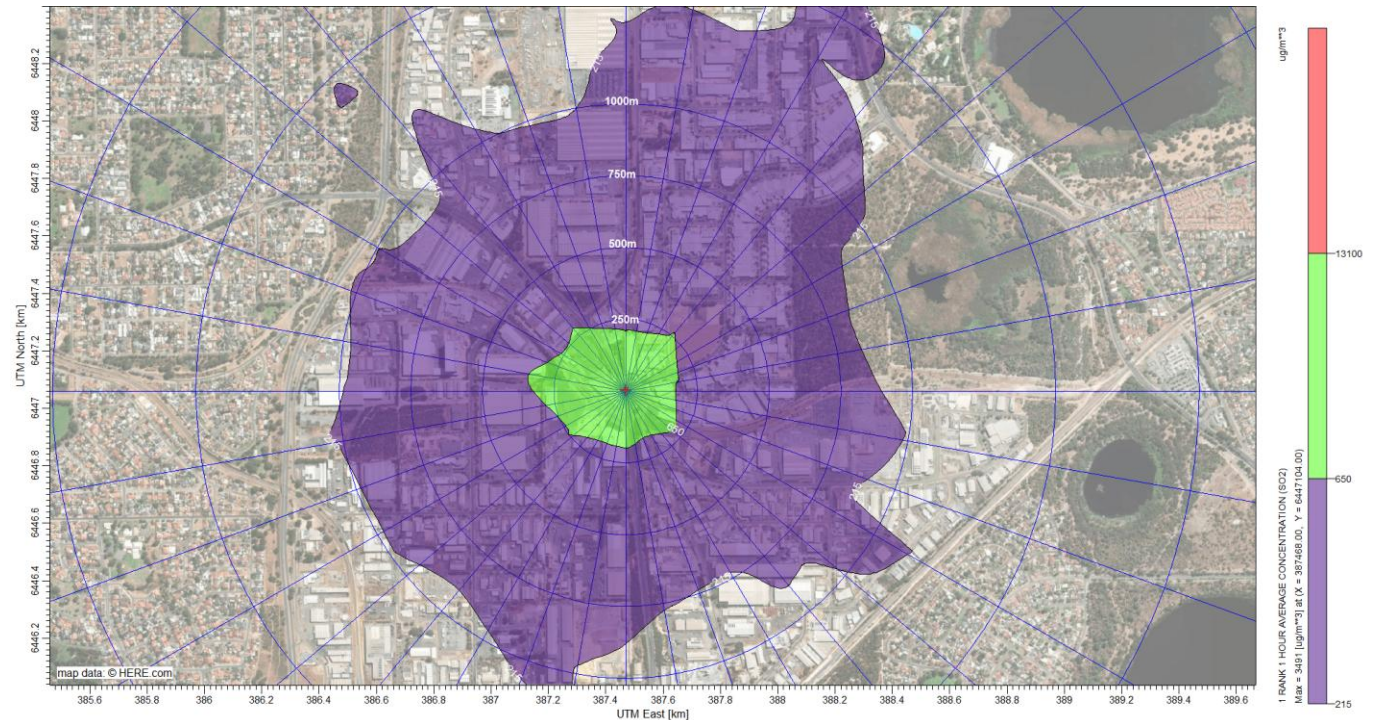
Results - CO

- CO emission rate scaled to 1,000 g/s
- NEPM contour, 10 mg/m³ (purple), 1,000 m from the source.
- WES contour, 34 mg/m³ (red), 250 m from the source.
- WEL contour, 23 mg/m³ (green), 500 m from the source.
- The WHS criteria change resulted in exceedances increasing by around twice the distance from the source, which would have the potential to encompass additional neighbouring industrial receptors.



Results – SO₂

- SO₂ emission rate scaled to 15 g/s
- NEPM contour, 215 µg/m³ (purple), 1,000 m from the source (1,500 m to the north-east)
- WES contour, 13,100 µg/m³ (red), not visible
- WEL contour, 650 µg/m³ (green), 250 m from the source.
- The WHS criteria change resulted in exceedances to 250 m from the source, whereas when assessed against the older WES criteria there were no exceedances anywhere in the domain.



Results summary

- If WHS criteria was used in AQIA, the reduced criteria could materially influence compliance at neighbouring workplaces
- SO₂:
 - Compliant everywhere (WES)
 - 250m (WEL)
- CO:
 - 250m (WES)
 - 500m (WEL) ~double
- Neighbouring industry could suddenly become non-compliant outcome

Discussion

- Should assessing against WHS criteria become a requirement?
 - For completeness
 - How? Vic/NZ, criteria based on land use and avg. period, flexibility in assessment
 - Partnership
- Future WHS criteria
 - Likely to reduce further
- Land use planning
 - Current mixed use, many sources



Conclusion

- Workplace receptors assessed against WHS criteria, could materially influence compliance outcomes for AQIAs and could become the controlling compliance points in AQIA.
- Highlights the importance of carefully considering the implications of applying evolving WHS criteria in land use transition zones.



Thank you

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