Advice Note

Date: Wednesday, 4 December 2019

FAO: Paul Jerogin / Peter Flynn   **From:** Gary Graham

To: Lend Lease   **From:** Northstar Air Quality

Project Name:	Advice Note – UCO Cogen Plant – Clarification for COS
Reference:	19.1013.M6V2

Paul & Peter,

On 2nd December 2019, a meeting was convened with City of Sydney and Lendlease in regard to clarification of the scope and interpretation of the Air Quality Impact Assessment (AQIA) report (ref: 19.1013.FR1V2) prepared by Northstar Air Quality (Northstar) for the SSD 8529 Mod 3 – Co-generation Plant at Barangaroo South.

A conclusion of that meeting was that Northstar were requested to compile a summary advice note ('memo') that provided clarification of the assessment of the potential impacts at the childcare centre. This advice note seeks to provide that clarification.

Receptor Locations

The receptor locations used in the study are discussed in Section 4.1 (page 23) and presented in full in Appendix B of the AQIA. Appendix B presents a complete list and also indicates the origin of each receptor used in the AQIA. As can be seen in Appendix B, the majority of receptors are selected to promote consistency with previous assessment reports (as listed in Section 2.5 (page 16)).

Outlined in Section 4.1 and Appendix B are the 12 additional receptors used to assess the air quality risks at the childcare centre, namely R117 to R128. R117 and R118 are located at the outdoor play area and R119 to R128 are located along the façade of the facility. The locations are also illustrated in Figure 4 (page 24) of the AQIA.

Impact Assessment

A full schedule of impacts at each receptor location (R1 to R128) is presented in Appendices E, F and G. Appendix E presents the predicted discrete impact of each assessed pollutant species at each receptor, including R117 to R128 representing the childcare centre.

Appendix F provides the corresponding impact with the adopted air quality background conditions, and Appendix G provides the same with the additional impact as derived from the Barangaroo South Building R4A assessment.

For each table in Appendices E, F and G, the impacts at the childcare centre are highlighted in green to help identify those specific impacts.

Further to the above, Section 6 of the AQIA presents a 'cut-down' excerpt from the tables in Appendices E, F and G. These tables present the predicted impacts at R117 to R128 (i.e. the childcare centre receptors), and a summary of the maximum predicted impact at all receptors R1 to R128 inclusive ["max(all)"] and the maximum at just the childcare centre R117 to R128 ["max(ccc)"]. Predicted concentrations greater than the relevant criterion are highlighted in the tables.

The relevant pollutant criterion ["crit"] for each pollutant and averaging period is shown in each table, and the corresponding maximum at all receptors and childcare centre receptors as a percentage of that criterion.

By way of illustration, Table 8 of the AQIA (page 34) is reproduced below with clarification provided

Table 8   Summary of results – incremental predictions (SO_2 and NO_2)

Pollutant	SO_2	SO_2	SO_2	NO_2	NO_2	NO_2	NO_2
Ave period	1-hr	24-hr	ann	1-hr	ann	1-hr	ann
Reported[A]	inc	inc	inc	inc	inc	inc	inc
Emission[B]	meas	meas	meas	reg(450)	reg(450)	reg(250)	reg(250)
Units	µg.m⁻³	µg.m⁻³	µg.m⁻³	µg.m⁻³	µg.m⁻³	µg.m⁻³	µg.m⁻³
117	1.68E-01	4.19E-02	1.91E-02	2.08E+01	2.56E+00	1.15E+01	1.46E+00
118	1.65E-01	4.60E-02	1.91E-02	1.98E+01	2.54E+00	1.12E+01	1.45E+00
119	1.54E-01	5.12E-02	1.85E-02	1.90E+01	2.44E+00	1.13E+01	1.40E+00
120	1.58E-01	5.40E-02	1.82E-02	2.01E+01	2.40E+00	1.21E+01	1.38E+00
121	1.66E-01	5.60E-02	1.78E-02	2.11E+01	2.33E+00	1.29E+01	1.34E+00
122	2.01E-01	5.91E-02	1.73E-02	2.53E+01	2.24E+00	1.56E+01	1.29E+00
123	2.28E-01	6.25E-02	1.68E-02	2.90E+01	2.15E+00	1.74E+01	1.24E+00
124	2.36E-01	6.29E-02	1.57E-02	3.00E+01	1.99E+00	1.77E+01	1.16E+00
125	2.91E-01	7.47E-02	1.64E-02	3.45E+01	2.06E+00	2.06E+01	1.20E+00
126	3.28E-01	8.32E-02	1.71E-02	3.51E+01	2.14E+00	2.31E+01	1.25E+00
127	3.60E-01	9.10E-02	1.80E-02	3.68E+01	2.24E+00	2.54E+01	1.31E+00
128	4.00E-01	1.01E-01	1.89E-02	3.73E+01	2.34E+00	2.82E+01	1.37E+00
max(all)[C]	2.51E+00	3.49E-01	2.30E-02	1.29E+02	3.07E+00	1.15E+02	1.75E+00
max(ccc)[D]	4.00E-01	1.01E-01	1.91E-02	3.73E+01	2.56E+00	2.82E+01	1.46E+00
crit[E]	570	228	60	246	62	246	62
max(all)/crit	0.44%	0.15%	0.04%	52.58%	4.95%	46.67%	2.82%
max(ccc)/crit	0.07%	0.04%	0.03%	15.16%	4.13%	11.45%	2.36%

max(all): max prediction at all receptors R1-R128

max(ccc): max prediction at childcare centre R117-R128

max(all)/crit: max prediction at all receptors R1-R128 as % of criterion (%)

max(ccc)/crit: max prediction at childcare centre R117-R128 as % of criterion (%)

Note: (A) inc = increment, bg = background, con = concurrent
(B) meas = measured, reg = regulatory emission limit value (with the emission limit in parenthesis)
(C) max(all) maximum predicted concentration at all receptor locations
(D) max(ccc) maximum predicted concentration at the childcare centre
(E) crit: criterion

Further to the above clarification, the AQIA results tables presented in Section 6 as Tables 8 to 12 have been reproduced below, amended to hopefully assist interpretation.

Table 1 Summary of results data presented in the AQIA (19.1013.FR1V2)

Pollutant	Ave period	Derivation	Criteria	Predicted Value (µg·m⁻³)						Predicted value (% of criterion)					
				Increment		Increment + B/G		Increment + B/G + Building R4A		Increment		Increment + B/G		Increment + B/G + Building R4A	
				max (all)	max (ccc)	max (all)	max (ccc)	max (all)	max (ccc)	max (all)	max (ccc)	max (all)	max (ccc)	max (all)	max (ccc)
Sulphur dioxide	1-hr	meas	570	2.51	0.40	79.7	77.6	na(C)	na	0.44%	0.07%	14.0%	13.6%	na	na
	24-hr	meas	228	0.35	0.10	12.9	12.7	na	na	0.15%	0.04%	5.7%	5.6%	na	na
	ann	meas	60	0.02	0.02	2.5	2.5	na	na	0.04%	0.03%	4.2%	4.2%	na	na
Nitrogen dioxide	1-hr	reg(450)	246	129.00	37.30	148.00	144.00	287	na	52.58%	15.16%	58.50%	58.30%	116.8%	na
	ann	reg(450)	62	3.07	2.56	26.10	25.60	na	na	4.95%	4.13%	41.30%	36.00%	na	na
	1-hr	reg(250)	246	115.00	28.20	145.00	144.00	287	na	46.67%	11.45%	58.40%	58.30%	116.7%	na
	ann	reg(250)	62	1.75	1.46	24.80	24.50	na	na	2.82%	2.36%	39.50%	36.00%	na	na
Carbon monoxide	1-hr	meas	30	0.04	0.006	3.1	3.1	na	na	0.12%	0.02%	10.5%	10.4%	na	na
	8-hr	meas	10	0.02	0.003	2.2	2.2	na	na	0.16%	0.03%	22.2%	22.0%	na	na
Particles (as PM$_{2.5}$)	24-hr	meas(A)	25(A)	0.64	0.19	22.9	22.8	60.5	na	2.56%	0.74%	91.5%	91.1%	120.9%	na
	ann	meas(B)	8(B)	0.04	0.04	6.9	6.9	20.6	na	0.53%	0.44%	86.5%	86.4%	82.4%	na
	24-hr	reg(100)(A)	25(A)	10.80	3.14	29.30	23.50	64.2	na	43.36%	12.58%	117.20%	93.80%	128.3%	na
	ann	reg(100)(B)	8(B)	0.71	0.59	7.59	7.47	20.8	na	8.91%	7.43%	94.90%	93.40%	83.2%	na
VOCs (as benzene)	1-hr	meas	29	5.15	0.82	5.2	0.8	na	na	17.77%	2.82%	17.8%	2.8%	na	na

Notes: **(A)** For the *Increment + B/G + Building R4A* scenario, 24-hour average PM$_{2.5}$ is assessed as 24-hour average PM$_{10}$ with a criterion of 50 µg·m⁻³, due to the limitations of the data presented in the Building R4A assessment, which is predominantly associated with construction dust **(B)** For the *Increment + B/G + Building R4A* scenario, annual average PM$_{2.5}$ is assessed as annual average PM$_{10}$ with a criterion of 25 µg·m⁻³, due to the limitations of the data presented in the Building R4A assessment, which is predominantly associated with construction dust **(C)** not assessed, as discussed in the report

Conclusions

The conclusions of the AQIA are presented in Section 7 (page 41) of the AQIA. **Importantly, the assessment does not predict any exceedance ('non-compliances') of any air quality criteria at the childcare centre**. Table 13 in Section 7 (page 44) of the AQIA presents a compliance summary table, comparing the predicted impacts against the relevant air quality assessment criteria. This table is reproduced below. Note that the non-compliance is not predicted at the childcare centre.

Table 2   Summary of compliance with NSW air quality criteria

Parameter	Emission Data Source	Averaging Period	Compliance with Air Quality Criterion		
			Increment	Increment + Background	Increment + Background + Concurrent
			Section 6.1 of the AQIA	Section 6.2 of the AQIA	Section 6.3 of the AQIA
Sulphur dioxide	Measured	15-minute	Compliance	Compliance	n/a
		1-hour	Compliance	Compliance	n/a
		24-hour	Compliance	Compliance	n/a
		annual	Compliance	Compliance	n/a
Nitrogen dioxide	Regulated (450 mg·Nm⁻³)	1-hour	Compliance	Compliance	Non-compliance
		annual	Compliance	Compliance	Compliance
	Regulated (250 mg·Nm⁻³)	1-hour	Compliance	Compliance	Non-compliance
		annual	Compliance	Compliance	Compliance
Carbon monoxide	Measured	15-minute	Compliance	Compliance	n/a
		1-hour	Compliance	Compliance	n/a
		8-hour	Compliance	Compliance	n/a
Particulates (as PM₂.₅)	Measured	24-hour	Compliance	Compliance	n/a
		Annual	Compliance	Compliance	n/a
	Regulated (100 mg·Nm⁻³)	24-hour	Compliance	Non-compliance	n/a
		Annual	Compliance	Compliance	n/a
Particulates (as PM₁₀)	Measured (PM₂.₅)	24-hour	Compliance	Compliance	Non-compliance[A]
		Annual	Compliance	Compliance	Compliance
	Regulated (100 mg·Nm⁻³)	24-hour	Compliance	Compliance	Non-compliance[A]
		Annual	Compliance	Compliance	Compliance
VOC (as benzene)	Measured	1-hour	Compliance	Compliance	n/a

Section 7.2 of the AQIA presents a detailed discussion of the predicted non compliances, as summarised above. Reference should be made to that discussion and analysis, but the following provides a very brief summary.

As required to comply with the requirements of the NSW Approved Methods guidance, the predicted concentration values are presented with the corresponding contemporaneous background. The predicted non-compliance for $PM_{2.5}$ is associated with emissions at the POEO (Clean Air) Regulation emission limit of 100 mg·Nm^{-3}. As stated in the report, the performance of the UCO engine is significantly better than this regulatory limit value, and the AQIA recommends that this the limit value is not adopted in the relevant Environmental Protection Licence (EPL) for the plant.

The predicted NO_2 non-compliances are associated with the potential NO_2 emissions from construction vehicles operating on the Building R4A construction works and the operation of the UCO engine makes no discernible difference to the environmental outcome at any receptor location.

To manage the risks associated with the above, the NSW EPA are formulating a range of conditions relating to emissions to air to be implemented through the EPL, including measures to control particulate and NO_X emissions through adoption of best practice measures, and implement a mandatory testing program to measure and control emissions to air.

Note: It is noted that following some comments from NSW EPA, a revised AQIA will be shortly issued, however this does not present any changes to the conclusions of the report. The predicted impacts associated with various emission scenarios decrease with the adopted changes.

We trust that the above provides additional clarification of the assessment at the childcare centre, however if you require any further information or clarification please do not hesitate to contact us at your convenience.

For and on behalf of
Northstar Air Quality Pty Ltd

Gary Graham
Director

Reviewed by Martin Doyle