

7 April 2015

610.14201 Air Quality Statement 20150407.docx

Meriton Apartments Pty Ltd
Level 11
528 Kent Street
SYDNEY NSW 2000

Attention: Mr Tom Hutchison

Dear Tom

234 Sussex Street, Sydney
Air Quality Statement

Please find overleaf the Air Quality Statement in relation to the impact of the Cross City Tunnel ventilation stack upon the indicative design for development proposed for 234 Sussex Street and the potential impact of the indicative design upon the dispersion of emissions from the Cross City Tunnel ventilation stack.

No dispersion modelling has been performed in the formulation of the opinions outlined in this letter. It is noted that the DCP (2012) may require dispersion modelling in some instances, and it is considered to not be required in this particular instance. We hope that the findings of this statement will be sufficient for your purposes at the current time.

If we can assist further, please do not hesitate to contact me.

Yours sincerely



MARTIN DOYLE
Principal Air Quality Consultant

1 Introduction to Development

Meriton Apartments Pty Ltd (Meriton) intend to construct a mixed use development at 234 Sussex Street, Sydney, NSW. The indicative design for the development seeks a maximum building height of 111.35 m (resulting in a building height of 117.1 m Australian Height Datum (AHD)) and will generally occupy the width of the site. It is anticipated that the development would consist of retail, serviced apartments and a recreation level from ground level to level 4, serviced apartments from levels 5 to 23 and residential apartments from level 24 to 46.

The proposed development is located approximately 294 m to the east northeast of the Cross City Tunnel ventilation stack (CCT ventilation stack). Planning instruments are in force in the area of the CCT ventilation stack to ensure that developments do not interfere with the dispersion of emissions from the CCT ventilation stack, and that users of the developments are not adversely impacted by pollutants emitted from the CCT ventilation stack.

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Meriton to provide a statement to address these issues.

The relevant Planning Instruments are outlined in detail in **Section 2**. These issues are addressed in **Section 3**

2 Planning Instruments

2.1 Local Environmental Plan 2012

The Sydney Local Environmental Plan (LEP) 2012, clause 7.24 states in reference to development near to the Cross City Tunnel ventilation stack:

(1) This clause applies to land identified on the Locality and Site Identification Map as "Land Affected by Cross City Tunnel Ventilation Stack".

(2) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:

(a) the proposed development will not adversely affect the dispersal of emissions from the Cross City Tunnel ventilation stack, and

(b) persons using the proposed development will not be unduly affected by those emissions.

2.2 Development Control Plan 2012

The Sydney Development Control Plan (DCP) December 2012, Section 3 (General Provisions) states in reference to development near to the Cross City Tunnel ventilation stack:

3.13.2 Air quality for development near the Cross City Tunnel

Objective

(a) Ensure potential air quality impacts from the Cross City Tunnel plume of emissions are considered in the assessment of a development.

Definitions

Sensitive receptor means a location where people are likely to work or reside and may include a dwelling, school, hospital, office or public recreational area. An air quality impact assessment should also consider the location of known or likely future sensitive receptors.

Provisions

(1) These following provisions apply to development that:

(a) has a building height relative to distance from the Cross City Tunnel ventilation stack as nominated in Table 3.6 Development near the Cross City Tunnel ventilation stack;

(b) may, in the opinion of the consent authority, have an adverse impact on air quality of any sensitive receptor, including neighbouring buildings and/or any area open to air due to the developments potential to disperse the plume of emissions from the Cross City Tunnel ventilation stack; or

(c) may be adversely impacted in terms of the effect of the emissions from the Cross City Tunnel ventilation stack on occupants of the development.

(2) The consent authority is to consider:

(a) the impact of the development on the occupants of other existing and future development and people using a place open to the public due to the potential of the development to disperse the plume of emissions from the Cross City Tunnel ventilation stack;

(b) the likely impact of emissions from the Cross City Tunnel ventilation stack on occupants of the proposed development;

(c) whether the concentration of emissions at any sensitive receptor exceeds the Air Quality Goal of 246 µg/m³ of NO₂ due to emissions from the Cross City Tunnel;

(d) an Air Quality Impact Assessment Report which:

(i) has been prepared by a suitably qualified person in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, published by the Department of Environment and Climate Change in 2005 and any relevant Council guideline or the Air Quality Assessment Process – Cross City Tunnel: Protocol to Address Provisions of Condition of Approval 247 (Roads and Traffic Authority 11 February 2008);

and

(ii) identifies the predicted concentration of Nitrous Oxide at all sensitive receptors; and

(iii) includes an assessment of the matters outlined in sub-clauses (a) through to (c).

Table 3.6: Development near the Cross City Tunnel Ventilation Stack

Distance of development from Cross City Tunnel ventilation stack in metres	Height of proposed development above ground level Proposed building height in metres
0 – 50	greater than 25
50 – 100	greater than 30
100 – 150	greater than 40
150 – 200	greater than 50
200 – 250	greater than 60
250 – 300	greater than 70
300 – 400	greater than 90
400 – 500	greater than 100

3 Air Quality Issues

As outlined in **Section 2**, concern surrounding the CCT ventilation stack emissions relates to two issues. Firstly, development which impacts upon the dispersion of the emission plume from the CCT ventilation stack may result in significant downwash and turbulence effects, which could in turn affect the entrainment of the emission plume, consequently increasing ground level concentrations of pollutants in the downwash zone. Secondly, emissions from the CCT ventilation stack have the potential to impact upon any nearby development under certain meteorological and emissions conditions and therefore development should be sited with consideration to these potential impacts.

3.1 Impact of Development on Cross City Tunnel Pollutant Dispersion

Buildings can influence the dispersion of emissions from pollutant sources by affecting the wind flow characteristics of plume dispersion by potentially entraining pollutants into cavity regions in the leeward side of buildings. This can be of concern as pollutants can be trapped and recirculated in these regions and concentrations can increase.

Good engineering practice (e.g. NCDENR 2014, USEPA 1993) states that a building can influence plume dispersion (the region of influence) when it is located within a distance of five times the lesser of the projected height or width of a building (5L). In the case of the Sussex St development, the development could occupy a maximum width of up to approximately 58.8 m before impacts on the dispersion of the CCT ventilation stack would be experienced. Any lesser width would reduce the region of influence of the proposed development, based on the principles of good engineering practice. It is anticipated that the maximum width of the indicative design would be less than 58.8 m.

3.2 Impact of Cross City Tunnel Emissions on the Development

The potential impact of air pollutant emissions from the CCT ventilation stack was examined in detail as part of the Environmental Impact Statement (EIS) process for the Cross City Tunnel. The findings of the EIS have subsequently informed the Development Control Plan and Sydney Local Environmental Plan for the Sydney CBD. Specifically, the findings of the Air Quality Impact Assessment (AQIA) (Holmes Air Sciences 2002) were used to assist in the determination of "*Land Affected by the Cross City Tunnel Ventilation Stack*" which is included on the Sydney LEP 2012 Locality and Site Identification Maps (7200_COM_CL1_008_005_20140121.pdf and 7200_COM_CL1_015_005_20120814.pdf). The zone of influence extends to a radius of approximately 600 m from the CCT ventilation stack from Jones St, Ultimo to the west and Pitt St, Sydney to the east.

The AQIA also included an assessment of pollutant concentrations at varying heights and distances from the CCT ventilation stack and it is assumed that these findings of the AQIA were used in the derivation of Table 3.6 of the Sydney LEP 2012, Section 3.13.2 (reproduced in **Section 2.2**).

The AQIA for the Cross City Tunnel estimated the potential emissions from the CCT ventilation stack based on a number of assumptions, mainly related to the proposed traffic volumes using the tunnel during operation. Holmes Air Sciences (2002) performed the AQIA on the basis of assumed 2006 traffic volumes of 101,700 vehicles per day and a ventilation stack height of 65 m (modified from the originally approved 49 m stack height and assumed traffic volumes of 86,300 vehicles per day).

Actual traffic volumes through the tunnel were approximately 34,000 in May 2006 (The Audit Office, 2006) and are currently understood to be similar, which represents a third of the volume assumed during the EIS process. Given that the relationship between traffic volumes, pollutant emissions and ultimately predicted pollutant concentrations should be approximately linear, it may therefore be assumed that the concentrations of pollutants presented in the AQIA represent a significant (66%) overestimation of actual conditions.

The results of the AQIA predicted that maximum 1 hour concentrations of NO₂ at an elevated receptor at 14 m AHD of Darling Park Tower 3 (approximately 100 m closer to the CCT ventilation stack than the proposed Sussex St development) was 45.1 µg/m³. Regarding the assessment of impacts of emissions on elevated receptors provided in the AQIA, the maximum concentration was predicted as 113.8 µg/m³ at 70 m AHD at the Millennium Towers (approximately 60 m closer to the CCT ventilation stack than the proposed Sussex St development). These values are compared to goal of 245 µg/m³.

Given the significant overestimation in traffic volumes using the Cross City Tunnel, it may be assumed that the adjusted predicted concentrations would be approximately 33% of those presented in the AQIA (i.e. 15 µg/m³ at Darling Park Tower 3 and 37.9 µg/m³ at Millennium Towers). Concentrations at distances further from the CCT ventilations stack (i.e. at 234 Sussex St) may be assumed to be lower still, and significantly below the guideline concentration of 245 µg/m³ for NO₂.

In addition, as the predictions in the AQIA have been used to determine the "*Land Affected by the Cross City Tunnel Ventilation Stack*" as outlined in the Sydney LEP (2012) it could also be considered that a more realistic radius of influence of the CCT ventilation stack would be of the order of 200 m (33% of 600 m) which would result in the proposed development lying 94 m outside this radius.

4 Conclusion

Based on the above discussion it is concluded that the proposed indicative design for the development at 234 Sussex St would not affect the dispersion of emissions from the Cross City Tunnel ventilation stack and that people using the proposed development would not be likely to be adversely impacted by these emissions.

This conclusion assumes that traffic volumes do not increase significantly in the future. However, even with significant traffic growth up to the traffic volumes modelled in Holmes (2002), concentrations are still predicted to be below criteria values at receptor locations closer to the CCT ventilation stack than the proposed development.

5 References

Holmes Air Sciences. *Air Quality Assessment of Proposed Modifications to the Cross City Tunnel*. July 2002.

North Carolina Department of Environment and Natural Resources, Division of Air Quality Permitting Section, Air Quality Analysis Branch. *Guidelines for Evaluating the Air Quality Impacts of Toxic Pollutants in North Carolina*. February 2014.

The Audit Office of New South Wales (2006) "Performance audit: the Cross City Tunnel Project", p.32

United States Environmental Protection Agency, Office of Air Quality Planning and Standards, Technical Support Division. *User's Guide to the Building Profile Input Program*. October 1993.