MELBOURNE METRO RAIL PROJECT ENVIRONMENT EFFECTS STATEMENT INQUIRY AND ADVISORY COMMITTEE

MMRA TECHNICAL NOTE

TECHNICAL NOTE NUMBER:	054
DATE:	30 August 2016
PRECINCT:	Domain Station Precinct
EES/MAP BOOK REFERENCE:	Technical Appendix I – Noise and Vibration Impact Assessment
SUBJECT:	Response to David Anderson's Request for Further Information

NOTE:

Introduction

1. In the course of preparing his Expert Witness Statement, Mr David Anderson requested further information concerning the scope to ameliorate noise from chiller plants associated with the proposed station structures.

2. This technical note responds to that request.

Context

3. Appendix D to the Noise and Vibration Impact Assessment ("**NVIA**") assesses Airborne Noise from Fixed Infrastructure. Potential locations for fixed infrastructure, notably chiller plants associated with ventilation and air conditioning of the stations, are identified in respect of some of the precincts along the alignment (see, for instance, the Parkville Precinct at Figure D.5). Appendix D notes that potential locations are being determined in respect of other precincts.

4. EPR NV16 requires that, during operation, mechanical plant and equipment associated with the Project must comply with State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 ("**SEPP N-1**"). This requirement would apply to chiller plants associated with ventilation and air conditioning of the stations.

5. As a means of demonstrating the feasibility of achieving this outcome in the context of the Melbourne Metro, an assessment has been undertaken in respect of an indicative chiller plant situated within the Domain Precinct.

The Location

6. Appendix D to the NVIA identifies that a chiller plant may be located within the road reserve of Albert Road (see Table D.1 of the NVIA). This is consistent with the location identified by MMRA in Technical Note 015 as a potential location for service structures associated with the Domain Station (i.e. within the road reserve of Albert Road south of the station box). However, it should be noted that the final location of the chiller plant remains to be determined.

7. For the purposes of this assessment, the indicative chiller plant location is shown in Figure 1 and is located away from other fixed infrastructure associated with the Melbourne Metro.

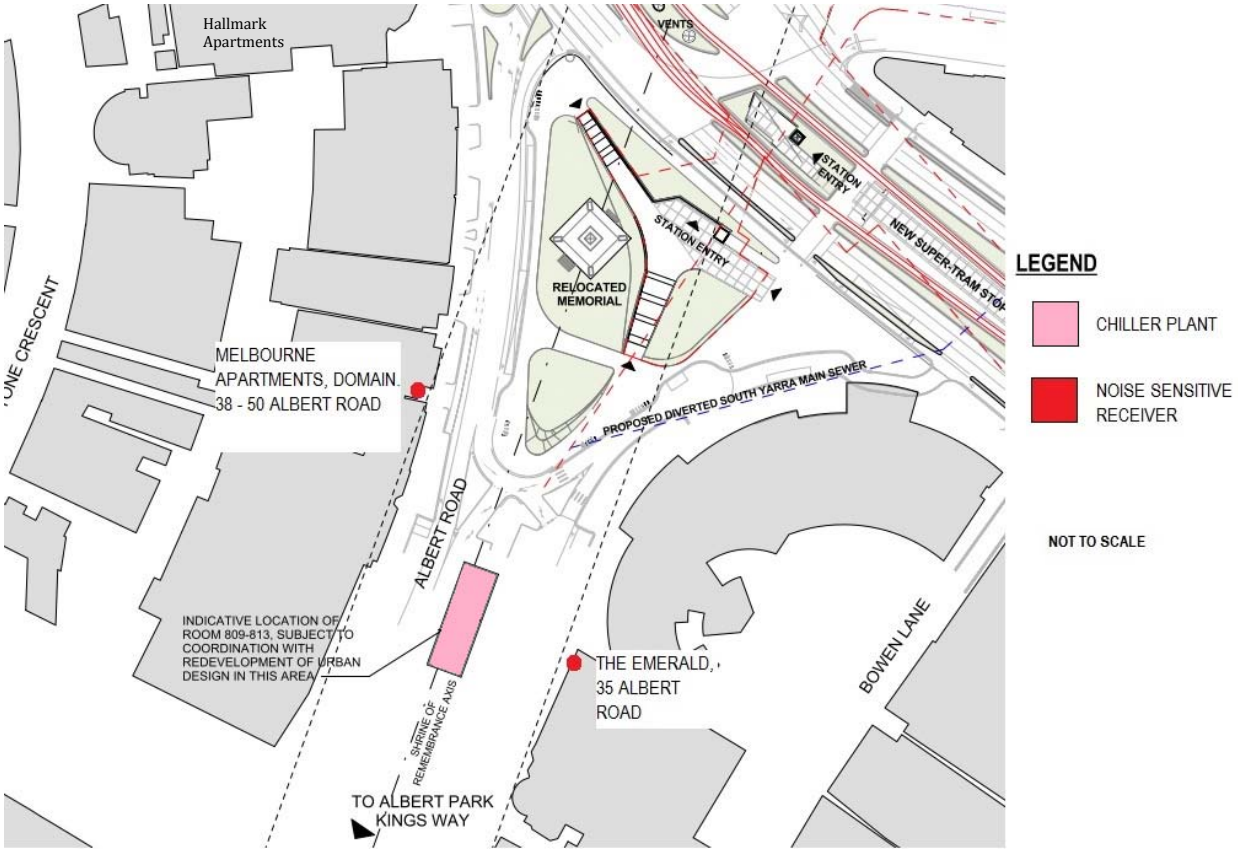

Figure 1: Indicative location of Chiller Plant and its proximity to noise sensitive receivers.

Noise Monitoring and Noise Limits

8. The relevant SEPP N-1 time periods are set out in Table 1.

Table 1: SEPP N-1 time periods

Time Period	Time
Day	7 am - 6 pm Monday to Friday 7 am - 1 pm Saturday
Evening	6 pm - 10 pm Monday to Friday 1 pm - 10 pm Saturday 7 am - 10 pm Sunday and Public Holidays
Night	10 pm - 7 am All Days

9. The Noise Sensitive Areas (residential buildings) nearest to the indicative chiller plant location are:

   a. Melbourne Apartments, 38 – 50 Albert Road

   b. The Emerald Apartments, 35 Albert Road

10. Noise monitoring was undertaken and noise limits determined in accordance with SEPP N-1 as part of Appendix D to the NVIA.

11. The applicable noise limits are set out in Table 2 and have been determined based on the most representative noise measurement in the Domain Precinct and the relevant zoning plan.

Table 2: SEPP N-1 Noise Limits

Location	Period	Noise Limit, $dBL_{Aeq,30minutes}$
Melbourne Apartments, 38 – 50 Albert Road	Day	62
	Evening	56
	Night	48
The Emerald Apartments, 35 Albert Road	Day	62
	Evening	56
	Night	48

Assumed Operating Parameters

12. Source noise levels for the equipment comprising the indicative chiller plant location are detailed in Table 3.

Table 3: Equipment Sound Power Levels

Equipment	Sound Power Level, dB(A) Octave Band centre Frequency, Hz						
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Chiller	67	74	79	86	85	79	69
4 kW pump	40	51	60	66	72	70	66
7.5 kW pump	43	54	63	69	75	73	69
11 kW pump	44	55	65	70	76	75	70
30 kW pump	49	60	69	75	81	79	75

13. It has been assumed for the purposes of the assessment that the following operating parameters apply to the indicative chiller plant:

    a. Two chillers operating at the same time;

    b. Two 4 kW pumps operating at the same time;

    c. Two 7.5 kW chiller pumps operating at the same time;

    d. One 11 kW boiler secondary pump operating; and

    e. One 30 kW chiller secondary pump operating.

14. It is also been assumed that:

    a. the chillers are 3 m in height;

    b. the chiller plant is located at ground level; and

    c. the chiller plant will operate over 24 hours.

Predicted Noise Levels

15. Predicted noise levels based on the parameters identified above have been calculated in respect of the indicative chiller plant *without* additional mitigation and are set out below:

Table 4: Predicted noise levels without amelioration

Location	Predicted Sound Pressure Level dB(A)	Night Noise Limit $dBL_{Aeq(30\ mins)}$	Compliance with SEPP
Melbourne Apartments 38 – 50 Albert Road	55	48	No – night time exceedance
The Emerald, 35 Albert Road	59	48	No – night time exceedance

16. The levels predicted would comply with the day period noise limit but exceed the night period noise limit (limits as shown in Table 2).

17. Mitigation measures would accordingly be required in order to achieve compliance with SEPP N-1 (and with EPR NV16).

18. In this case suitable measures would comprise acoustic louvres (600mm in depth) to enclose the entire plant (eg for surrounding walls and over the top forming a roof) to prevent any direct line of sight between the chillers and the noise sensitive areas (high rise residential towers).

19. The acoustic louvre would be designed to comply with the following performance criteria.

Table 5: Acoustic Louvre – Minimum Insertion loss for the acoustic louvre (600mm deep)

Minimum Insertion Loss, dB						
63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
5	10	14	22	27	25	21

20. Upon the installation of these louvres, the predicted noise levels at the residential receivers (Table 6) attributable to the indicative chiller plant would comply with all relevant noise limits.

Table 6: Predicted noise levels with mitigation

Location	Predicted Sound Pressure Level dB(A)	Night Noise Limit $dBL_{Aeq(30\ mins)}$	Compliance with SEPP
Melbourne Apartments 38 – 50 Albert Road	34	48	Yes
The Emerald, 35 Albert Road	37	48	Yes

Conclusion

21. The assessment demonstrates that, with the adoption of conventional mitigation measures, the predicted noise levels attributable to the indicative chiller plant in the Domain Precinct would comply with the applicable noise limits for all time periods.

22. The assessment undertaken may be conservative because it has been assumed that the chiller plant would operate at the same levels (and generate the same level of noise) during the night period as it does during the day period.

23. The proposed use of acoustic louvres for surrounding walls and roof of the chiller plant would allow sufficient airflow around the chiller plant for the plant to operate efficiently. The footprint of the proposed design allows for the louvres to be located a sufficient distance from the chiller plant to allow appropriate circulation around the chiller plant.

24. The proposed design of the chiller plant is still at an early (feasibility) stage of design. It is expected that the Contractor would redesign the chiller plant systems to align with the final station design and it may differ from the form and exact location shown in this technical note.

CORRESPONDENCE:

No correspondence.

ATTACHMENTS:

No attachments.