Botanica Presentation

CYP Design & Construction Joint Venture

Tuesday 19 November 2024

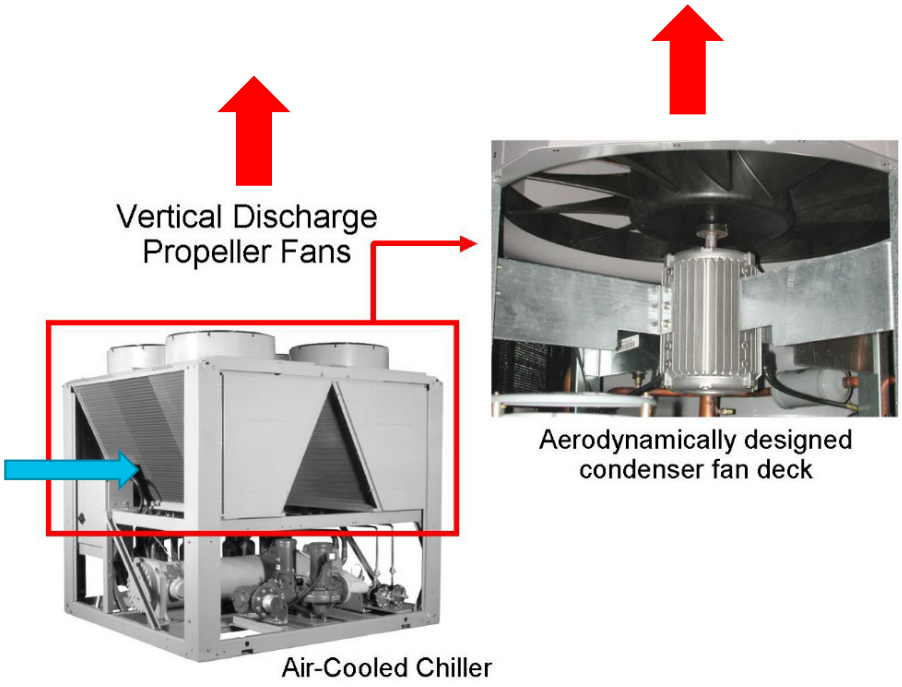
Agenda

1. Design
2. Acoustics
3. Discussion

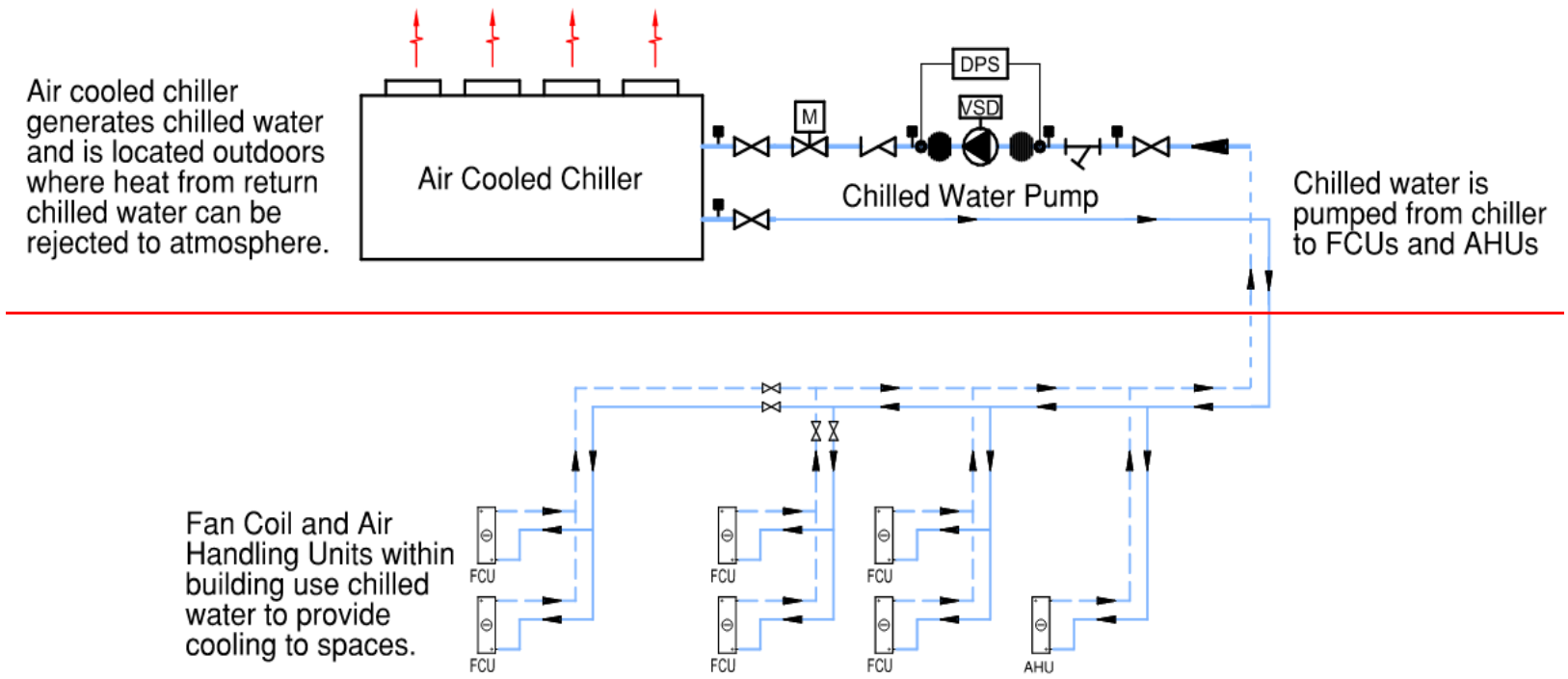
Design

The Role of Chiller Plant

- Chillers are critical infrastructure needed for station and train operation.
- They generate chilled water used for cooling the underground electrical infrastructure (Substations, Switchrooms, Traction Power) as well as platform/concourse areas.
- Air cooled chillers reject building heat from the chilled water system directly to atmosphere.
- The chillers do not use water for heat rejection and therefore no associated health and safety risks (i.e. no risk of Legionella).
- Only hot air is discharged from the unit

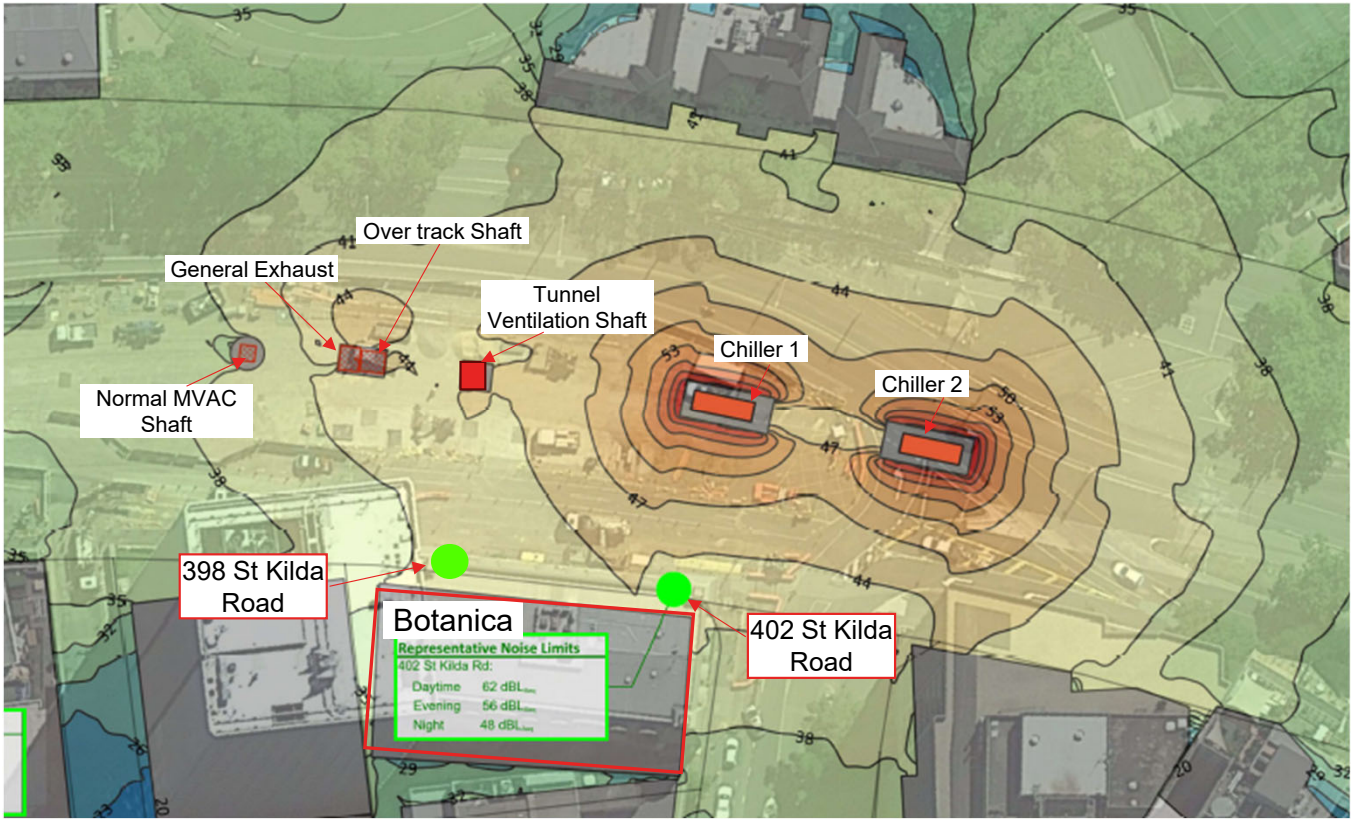


How Air Cooled Chillers Work



Acoustics

Noise model of the area

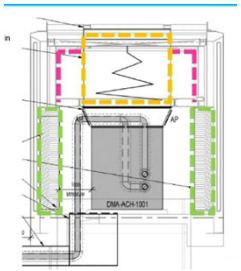


A model of the area with the impact of systems was made during design phase

Noise mitigation during Design: Acoustic Louvres & Top Discharge Attenuator for Chillers

Ventilation: Attenuations

Modes of Operation using Ventilations systems are limited on some specific situations.



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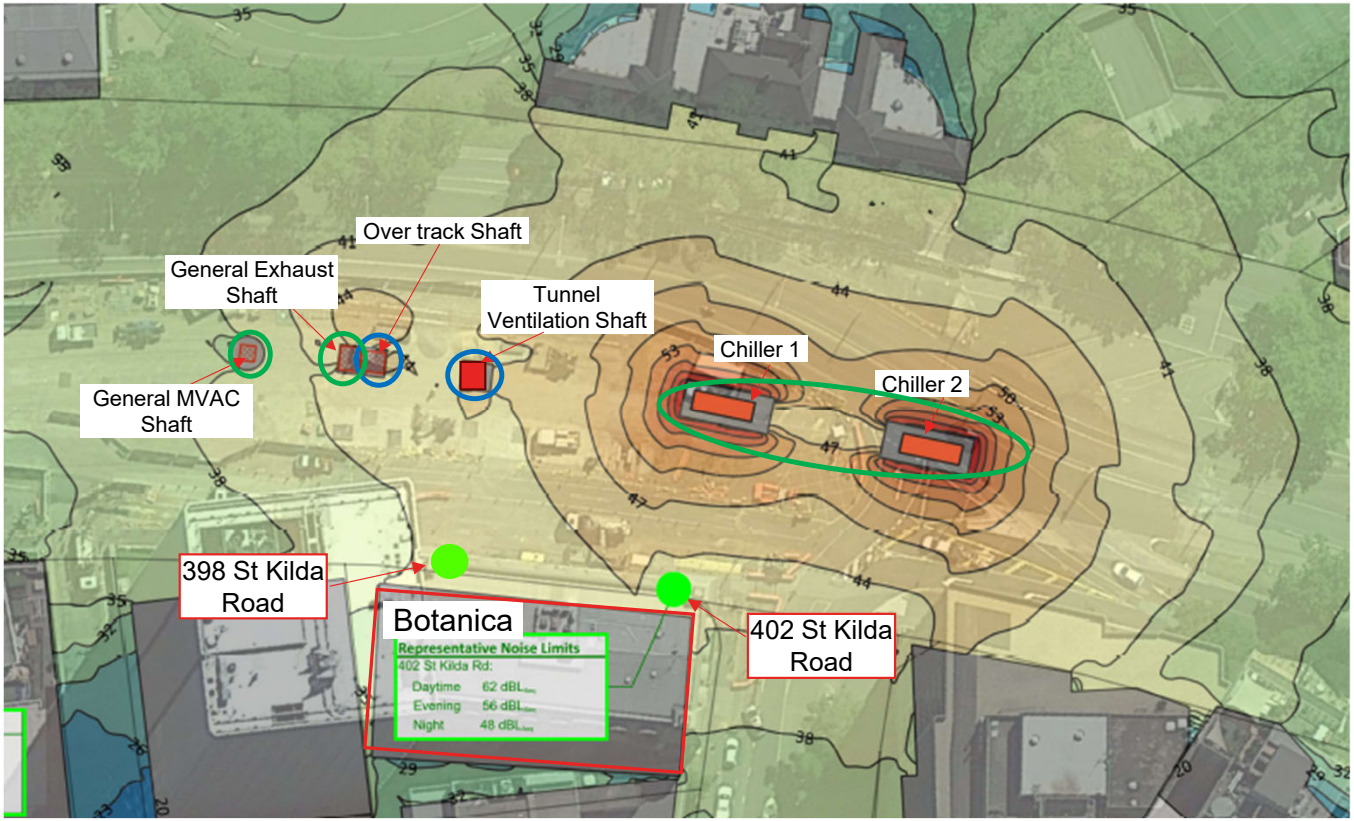
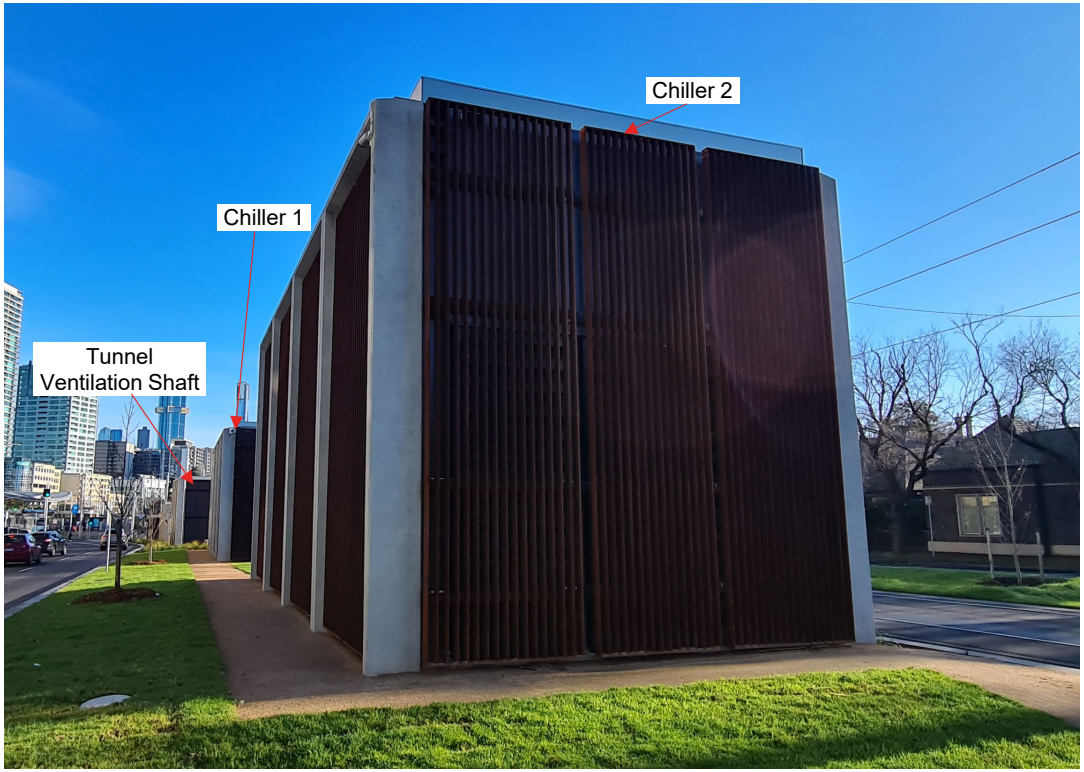


Used in every scenario

Used only during emergency and congested scenario

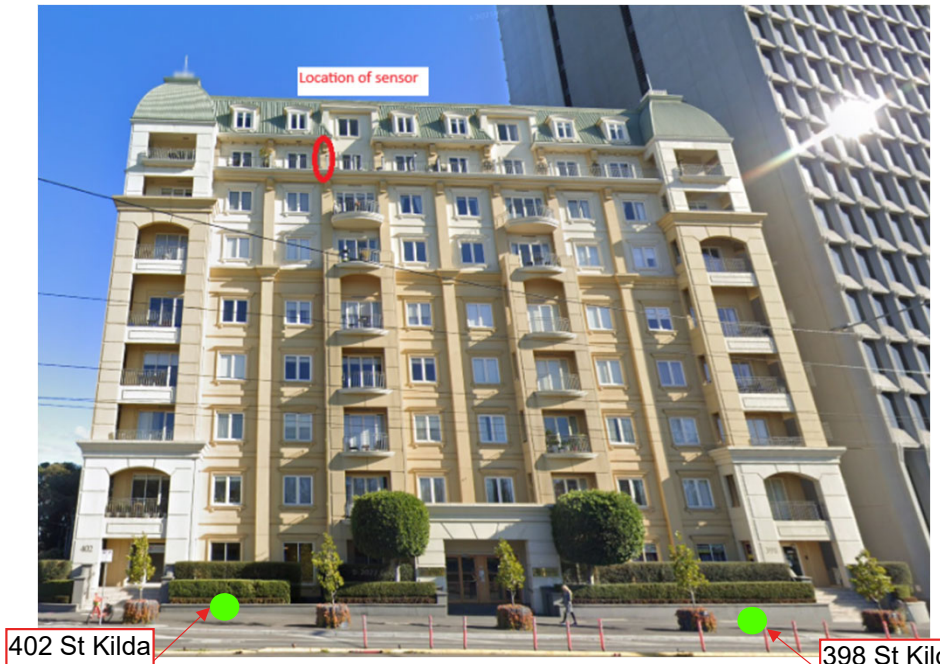
N.B.: Only one chiller runs at a time

Mitigation installations for chillers



Acoustic insulation installation built around chillers

Locations of measurements



Mode selection

Normal mode

- Used Most of the time
- We ran 2 chillers instead of 1 for our tests

Congested Mode

- Used when a train is stopped in the tunnel (occasionally at peak hours, incidents, ...)
- This mode activated Tunnel Ventilation Systems and Overtrack Exhaust
- Worst congested modes were chosen to do our tests

Fire Mode

- Used in case of fire emergencies
- This mode activated Tunnel Ventilation Systems and Overtrack Exhaust
- Worst fire modes were chosen to do our tests

Conditions of the environmental test

Criteria

3.12.2 SEPP N-1 Noise Limits

Noise limits for representative receiver locations established previously for the EES phase are reproduced for reference in Table 3.12.

Table 3.12 SEPP N-1 Noise Limits (External) for Representative Receivers near each Station/Portal

Site	Representative Receiver Locations	SEPP N-1 Noise Limit, dB $L_{Aeq,30min}$		
		Day	Evening	Night
Domain Station	29 Albert Road, Melbourne	62	56	50
	2-14 Albert Road, Melbourne	62	56	48
	402 St Kilda Road, Melbourne	62	56	48

Most stringent criteria was chosen

Modes

Mode	Systems	Frequency
Normal	Chillers : Both activated[1] Tunnel Ventilation : Off	Most of the time
Congested	Chillers : Both activated[1] Tunnel Ventilation : On	Occasionally
Fire	Chillers : Both activated[1] Tunnel Ventilation : On	Emergency

[1] Even though in reality only one is running at a time

A very conservative approach has been chosen: most stringent criteria with worst case scenario

↳ Congested mode during nighttime

Congested mode during nighttime results

Results from Acoustic Logic external consultants

Testing Location	Measured Noise Level dB(A) L_{eq}	Project Noise Level Criteria dB(A) L_{eq}		Complies
398 St Kilda Rd	48	Night	=<48	Yes
Level 7 Balcony - 400 St Kilda Rd	48	Night	=<48	Yes
402 St Kilda Rd	47	Night	=<48	Yes

For reference background noise with traffic is 58 dB(A) L_{eq}

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