Penshurst Public School

Return Brief for Mechanical Services

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CONTENTS

Document Control Sheet

Title	Mechanical Services Return Brief
Project	Penshurst Public School
Description	Reverse Brief Report
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Katherine Longhurst	**REV**	A							
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1. EXECUTIVE SUMMARY

The brief is a document formalised to provide a reference to agreements between JHA and that of the Client and/or their representatives.

JHA in developing the brief will endeavour to provide value added advice, providing suitable solutions to cost benefits and build-ability.

The brief is designed to achieve a summarized, succinct and coherent written description of the scope of the services to be designed. The document is not intended as a Specification or Bill of Materials. Nor is it intended to provide detail of the equipment selection in the main. The document provides for a description of the end outcome of services to be provided within the building.

It is the intent of this document to represent a sign-off of the projects Mechanical Services to be provided for the client by JHA Consulting Engineers.

2. PROJECT SCOPE OF WORK

2.1 Project Description

The Penshurst Public School site is bounded by Forest Road and Arcadia Street, Penshurst.

Penshurst PS Google map

3. MECHANICAL SREVICES

3.1 General

The proposed mechanical systems will include, but not limited to;

- Natural Ventilation for Passive Cooling
- Mechanical ventilation where cross ventilation or natural ventilation is not possible
- Mechanical ventilation system to Toilets/Cleaner room/Store room
- Air conditioning to COMMS room

3.2 Standards and Regulations

Australian Standards	The Use of Ventilation and Air Conditioning in Buildings – Ventilation Design for indoor air contaminant control.	**AS 1668.2:2012**
	The Use of Ventilation and Air Conditioning in Buildings – Fire and smoke control in multi compartment buildings.	**AS 1668.1:2015**
	Air-handling and water systems of Buildings.	**AS 3666**
	Other relevant and referenced Australian Standards	
Authorities	National Construction Code (NCC)	***2016***
	Educational Facilities Standards and Guidelines (EFSG)	***2016***
	Fire Engineering Report	***TBA***
	BCA Report	***TBA***
	Acoustic Report	***TBA***
	DA Condition	***TBA***

3.3 Design Criteria

3.3.1 External /Internal Design Conditions

Location: Penshurst, NSW, Climate Zone 5

	Summer	Winter
External Condition	34.8 ^{o}C DB / 24.7 ^{o}C WB Full Solar Load	3.1 ^{o}C DB No Solar Load
Internal Condition		
COMMS Room	24 $\pm$ 1.0 ^{o}C DB	

Notes:
1) No humidity control will be provided. The relative humidity range is generally achieved as a result of mechanical cooling.
2) The external design conditions are in accordance with AIRAH Design Manual DA9.
3) The internal design conditions are in accordance with EFSG requirement.
4) Peak load calculations are to be based on all external windows having fully open internal blinds.

3.3.2 Design Conditions for Ventilation Systems

The Ventilation System shall be designed in accordance with BCA F4.5, AS1668.2 and ESFG design guide as follows:

Room	Ventilation Parameters
Toilet Area	10 l/s/m^2 or 25 l/s per fixture (whichever is the greater), or natural ventilation where appropriate
Cleaner Room	5 l/s/m2 or 50 L/s minimum
Store Room	As pre EFSG Requirement
Habitable Spaces, where people will occupy for a time longer than 20 minutes, including teaching spaces, libraries and office	Provide natural ventilation by way of building openings allowing cross ventilation and induced by thermal currents created via high level vents while considering the impact of opening windows on internal noise levels. Where Cross ventilation or natural ventilation is not possible, mechanical assisted cross ventilation will be provided to spaces as nominated in the ESFG design guide.

3.3.3 Fabric Performance

The building fabric is required to be designed in compliance with BCA section J requirement and ESD Report.

3.3.4 Noise Levels

All areas shall be designed in accordance with AS/NZS 2017, EFSG requirements and Acoustic Report.

3.4 Air Conditioning System to COMMS room

The air conditioning system will be designed to COMMS room provide cooling only unit throughout the year. The system will be air cooled split cooling only unit comprising indoor units and outdoor condensers.

Sample of Split Type Air Conditioning Unit

3.5 Heating to all Habitable Spaces

Gas heaters will be considered for winter heating as per EFSG requirement.

Documenting the Gas Heaters: JHA will do mark-up sketch showing the gas heaters quantity and model type required for rooms where heating is required and this information will assist Hydraulics Design team in documenting the gas heaters and flue design.

3.6 Toilet Exhaust System

Toilet exhaust system will be provided to the new toilets & cleaner room to comply with AS 1668.2 requirement.

The system will comprise ceiling ducted exhaust fan(s) connected to ductwork and grille. Exhaust air will be discharged to the ambient through facade louvre or roof cowl.

3.7 Natural Ventilation

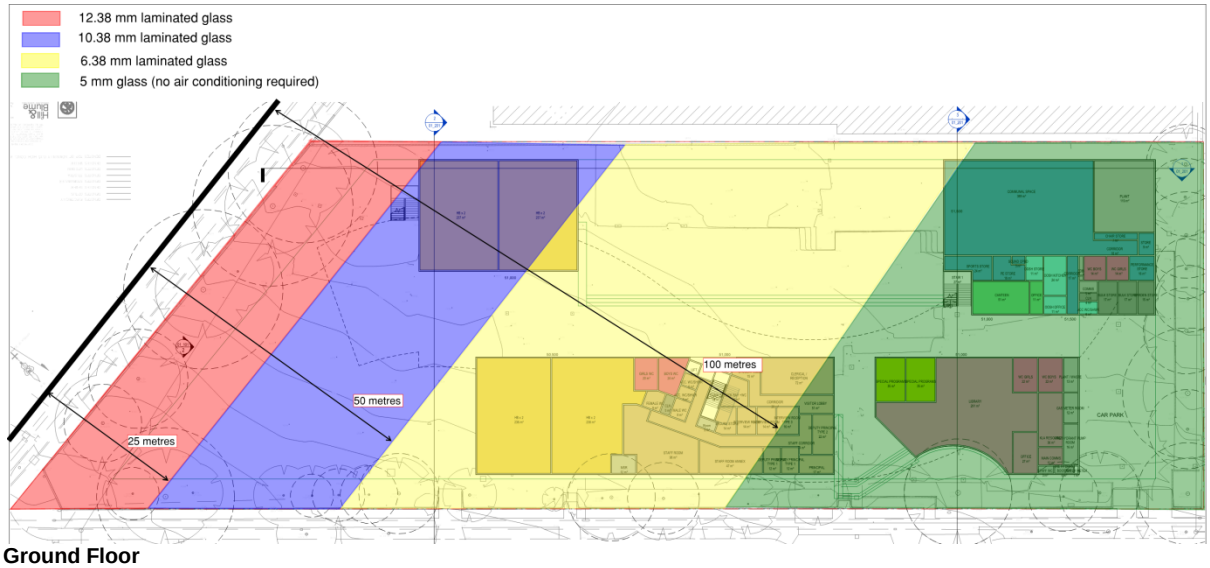
All habitable area will be naturally ventilated via operable windows/louvres with opening area not less than 5% of floor area in accordance with NCC Clause F4.5.

Natural ventilation for passive cooling will be provided/ coordinated with the architects by way of building openings allowing cross ventilation (Document DG05 Air movement clause 05.01) using the corridor space and adjoining classrooms; induced by thermal currents created via ceiling fans, high level operable corridor windows or wind powered roof ventilators.

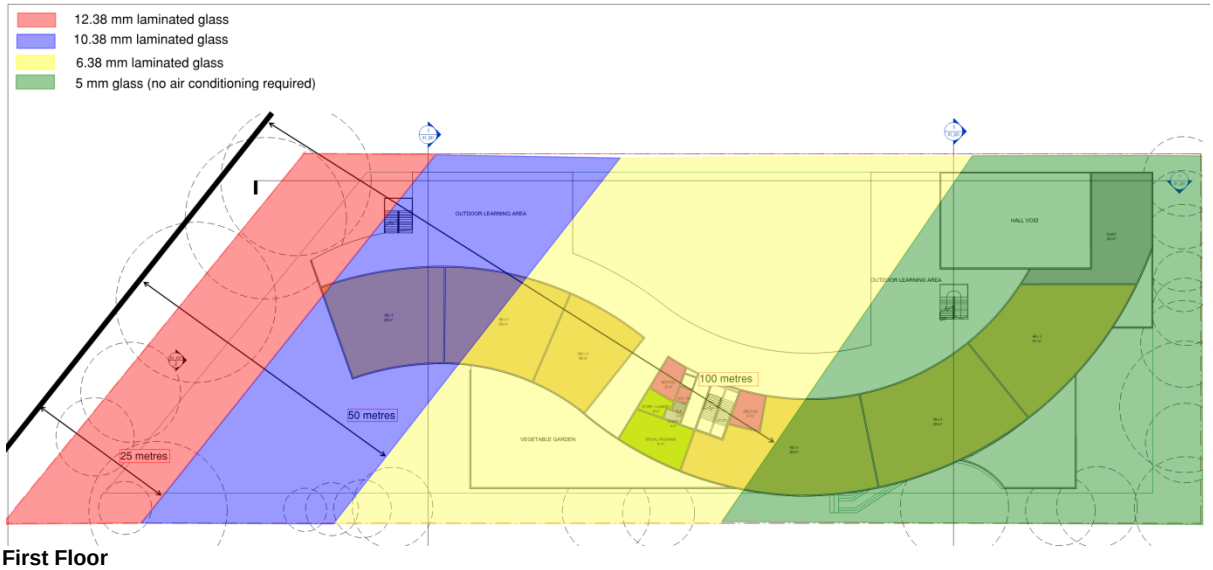
Where cross ventilation is not possible, mechanically assisted cross ventilation is to the provided

3.8 Mechanical ventilation to Areas due to Noise Impact

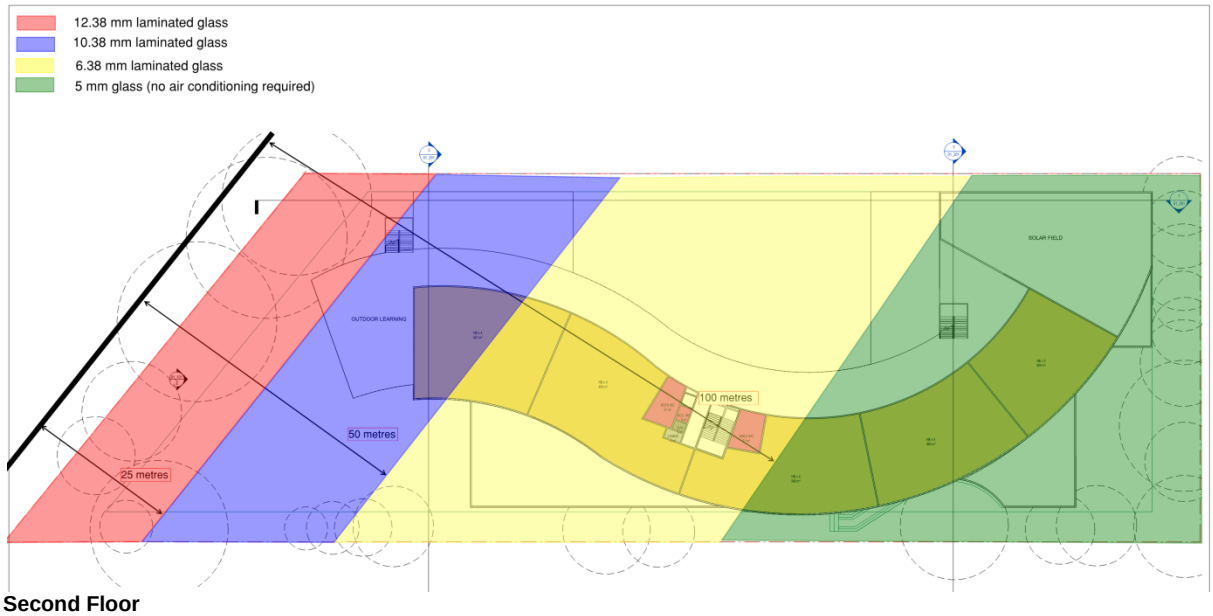
To meet the acoustic report requirements all the habitable rooms' 100 metres distances from Forest Rd will be mechanically ventilated. Please refer to extract from acoustic report.



Ground Floor



First Floor



Second Floor

3.9 Servery Area

The servery will be mechanically ventilated. Additional input is required in relation to cooking or heating appliances proposed in the space.

Local on/off switch is proposed to control the servery area ventilation system.

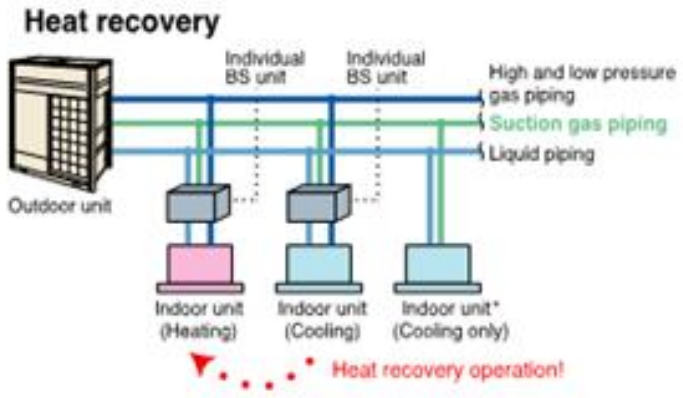
3.10 Automatic Smoke and Heat Vents For Main Stage

The Main stage will be provided with automatic smoke and heat vents in compliance with BCA NSW table E2.2b requirements. The system is complete with electrically actuated and controlled via FIP and also linked to two(2) emergency break glass..
Smoke relief ventilator(s) shall be designed to open upon the release of a 71°C fusible link or via manual or signalled release.

4. FUTURE AIR CONDITIONING SYSTEM DESCRIPTION

The future air conditioning proposed to be provided with a variable refrigerant flow / volume (VRF/VRV) energy recovery (3-pipe) air conditioning system. The VRF/VRV system consists of a common outdoor condenser, providing cooling or heating to multiple indoor units. The system provides a level of back-up operation compared to single outdoor units, as the VRF/VRV system consists of multiple compressors.

The three pipe (Heat Recovery) system allows for simultaneous heating and cooling in the different indoor zones.

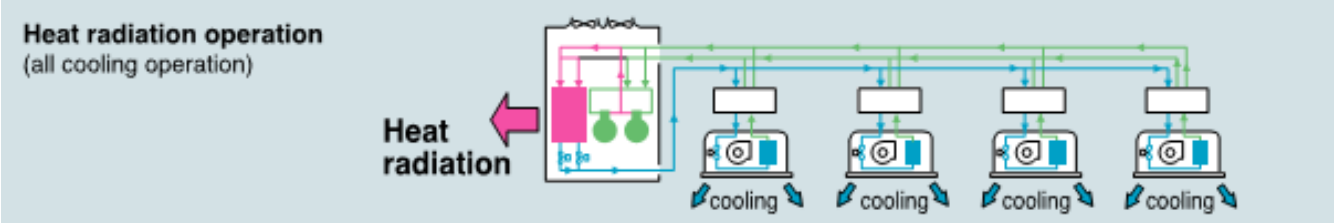


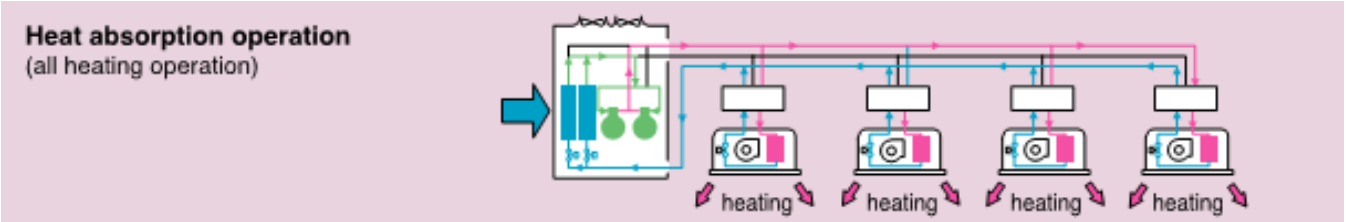
4.1 Benefits of the VRV system in comparison to other systems

In comparison to the traditional split or inverter type split A/C units (one indoor unit to one outdoor unit), the VRF/VRV system provides a more reasonable/aesthetic approach for the building exterior as it provides a lower number of outdoor units and greater flexibility in locating them as the refrigerant pipes can be reticulated for a much longer distance.

For the size of this development and in comparison to other systems (I.e. chilled water, heating water and/or condenser water systems), the VRF/VRV system is more economical to install, less noisy (in comparison to an air cooled chiller) and does not require internal plant room space. In addition to spatial factors, for the size of this project, it is more economical to run the VRF/VRV system than a chilled/heating water system.

Heating shall be provided via the reverse cycle capability of the VRF/VRV system. This is a key advantage of the VRV based system over their chilled water counterparts. Reverse cycle provides an efficient and cost effective method in delivering heating.





VRV Heating / Cooling

4.2 Indoor Air conditioning Units

A number of indoor unit system types are proposed for this project.

- Wall mounted units – proposed for comms rooms
- Ceiling cassette units – proposed for GLA, Learning Commons, and administration areas
- Concealed in-ceiling ducted units – proposed for administration areas

Wall mounted

Concealed in-ceiling ducted

Ceiling cassette

Indoor Air Conditioning Units

4.3 Economic life of the VRV system and risk advice

The economic life cycle for a VRV system is 10-15 years.
Risk of technology change may necessitate the replacement of the whole air conditioning system instead of component replacement (outdoor units, indoor units and the refrigerant pipe work); although, some suppliers are starting to provide solutions for this issue.
Leaks are not common, however they can occur and as such the system must be designed in compliance with AS1677 for refrigerant quantity. This will limit the number of indoor zones connected to a combined condenser. Typically approximately 6 to 8 areas are combined to a common condenser system – the final quantity will depend on system size, type, properties of the area served.

4.4 Air Conditioning Plant Diversity

The main plant (VRF /VRV) shall be sized with a 90% diversity factor (i.e. consider 9 out of 10 indoor A/C units are running). Note if more units run i.e. 10 out of 10, the system will stay operational but at lower capacity in each of the indoor units.

5. FUTURE AIR CONDITIONING CONTROL SYSTEMS

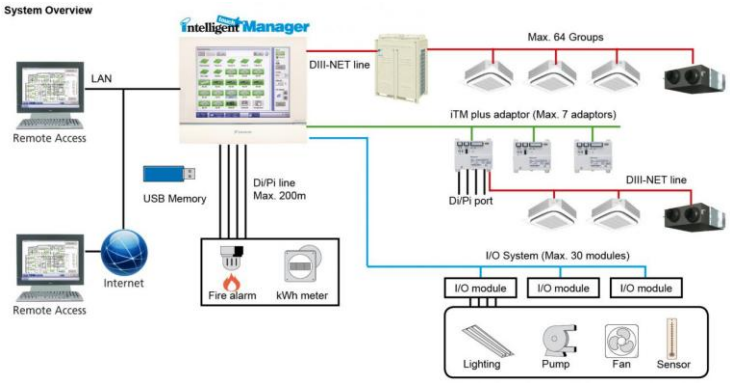
5.1 Air Conditioning

Proprietary air conditioning system controls will be provided to control and monitor the designated air conditioning plant and equipment. The control system will provide functionality only for the purposes of heating and cooling operation of the mechanical plant, and will not be integrated with electrical, hydraulic or other systems.

No central building management system is proposed.

A central air conditioning control system located in a central location such as a comms room, or the principal's office will be provided for all air conditioning plant. The control system will be equivalent to a Daikin Intelligent Touch Manager System. The system comprises of a central touch screen controller, and a web interface for remote PC access / control. This system will allow all fancoils to be controlled from a central location.

Intelligent Touch Manager Controller



Intelligent Touch Manager System Overview

Local air conditioning control in each room will be provided by a wired wall mounted controller. The functionality of each local controller can be controlled / overridden by the central controller.

Local Wall Mounted Controller

A local weather station can be provided to inform the user regarding appropriate outside conditions to rely on natural ventilation, and when to run the air conditioning plant. The client is to confirm the extent, and desired features of this item.