Consideration:

The James and Mary Emelia Mayne Centre houses artwork, which requires stable air conditioning at specific temperature and humidity levels. The existing HVAC system is struggling to deliver the required conditions. It is susceptible to high levels of humidity, which can damage artwork on display and in storage. There is also an obligation to provide stable environmental conditions to attract visiting exhibitions.

A review of the HVAC system was commissioned to investigate and address these issues. The review identified a number of shortcomings particularly the method of dehumidification, which is very energy inefficient, marking this building the most energy intensive per square metre on campus. This project aims to install a more efficient system that can achieve the desired humidity levels and deliver significant energy savings up to $100k per annum.

In the last three years, there have also been two incidents where components of the electrical heating circuits have failed generating smoke in the air conditioning system. This project will remove the electrical heating and associated fire risk.

Description:

The main component of the new system is a hot water heat pump for energy efficient heating for dehumidification. The heat pump requires external ventilation and cannot be located in the existing internal plant room. The best practical location is on the north side of the Mayne Centre adjacent the stairs leading to the Level 1 plant room. It will require a concrete plinth, acoustic dampening and a screen enclosure to blend with the existing façade. Insulated hot water pipes will run from the unit underground to the adjacent plant room.
Background

- Mayne Centre currently has poor humidity levels - outside of specifications
- Risk of damage to art work
- In breach of loan conditions for external exhibitions
- Existing dehumidification system is a fire hazard with history of minor incidents
- Very poor energy efficiency – worst performing building on campus
- Project has anticipated energy savings up to $120k pa
Proposed Solution

• New dehumidification system based on hot water coils with heat pump
• Funded 50:50 by P&F and ISC (total project $600k)
• Heat pump required to be externally located due to size and ventilation
• Proposed site of new enclosure at rear of Mayne Centre:
Proposed Plan
EXISTING ALUMINIUM HI-LIGHT SCREEN

NEW 6mm ALUMINIUM BARRIER APPLIED TO UNDERSIDE OF EXISTING SCREEN. FINISH TO MATCH EXISTING ALUMINIUM SCREEN.

PROPOSED ALUMINIUM SCREEN TO MATCH EXISTING ALUMINIUM SCREEN FINISH

3  PROPOSED WEST ELEVATION 1:50

5  PROPOSED EAST ELEVATION 1:50

RENDERED BLOCK WORK RETAINING WALL
Elevations North

PROPOSED NORTH ELEVATION
1:50

PROPOSED CROSS SECTION
1:20
Existing

Proposed
Noise impacts

- Acoustic engineer engaged to assess and mitigate noise impacts
- Logger set up to establish background noise levels
- Mitigation measures include acoustic treatment of heat pump, insulation inside of screen, new Aluminium barrier horizontal below existing screen above heat pump
- Modelling shows no impact to interior spaces
- Maximum exterior noise will not exceed 48dB(A) – which is:
  - Well below max noise levels observed for the area
  - Below the average noise level for the area
  - Largely in line with the LA90 (90% of time) noise level for area
Noise impacts - graph