

[PS]K DESIGN

Document Title	Park Inn Manchester Heat Pump – Planning Conditions Justification
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Radisson Park Inn Manchester Heat Pump - Introduction



- Executive Summary
- Existing Heating and Domestic Hot Water network on site utilises Gas fired Boilers and Water Heaters to be replaced with heat Pump and Electric Boilers as a method of decarbonisation for the Building.
- Centralised Heat Pump option to utilising the existing LTHW heating network infrastructure and previous Capex investments.
- Centralised Heat Pump option optimising targeting primarily the Domestic Hot Water Services.
- Cap Ex Investment between £1.1m and £1.3m to decarbonise the

2. Domestic Hot Water Services Infrastructure

Existing Centralized Domestic Hot Water Services Infrastructure

The Hotel currently has an existing centralized Domestic Hot Water Services system providing hot water services to the Hotel.

Hot Water is generated via 2No. Gas fired domestic hot water heaters, Plate Heat Exchangers and a calorifier.

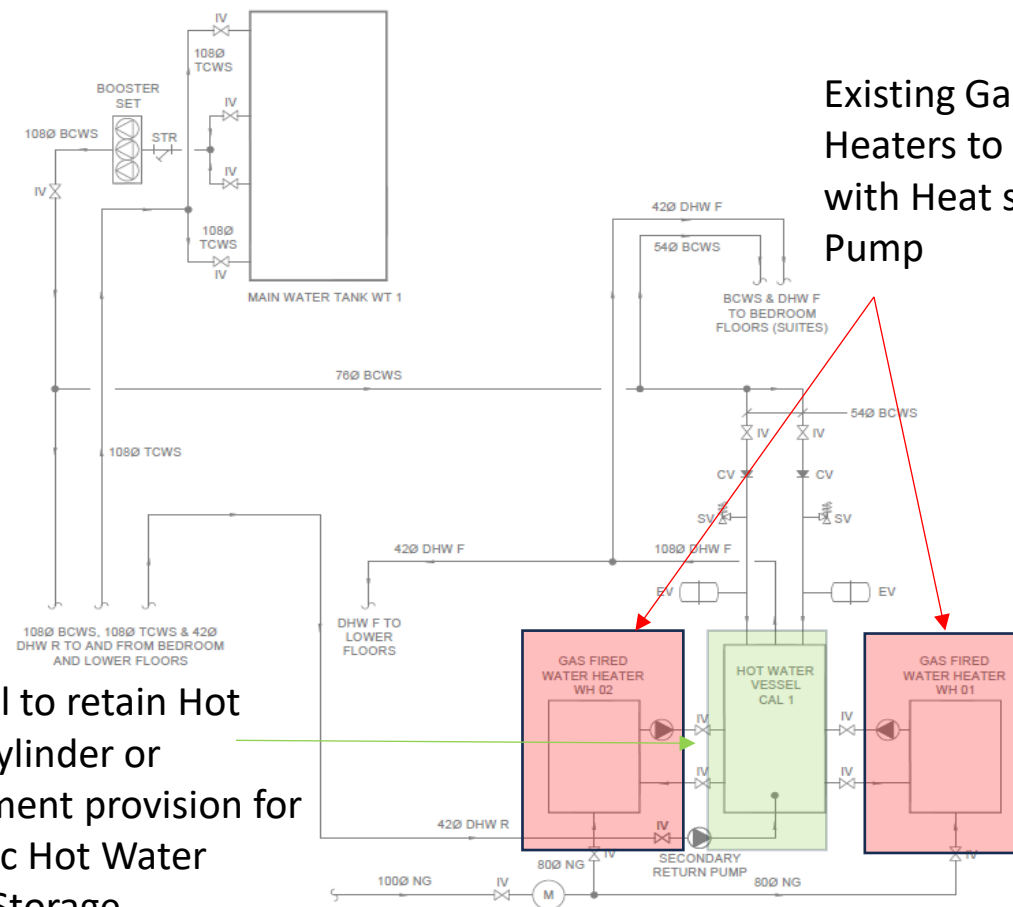
- Existing Andrews Water Heaters R300 direct gas fired Water Heaters.
- Domestic Hot Water Cylinders
- Secondary Domestic Hot Water Return



Existing Domestic Hot Water
Andrews Water Heater

Design Considerations

- DHWS System operating temperature 60- 65 Deg C delivery temperature and 55 Deg C system return.
- Design and installation in parallel to existing system remaining operational.
- 10 Deg C MCWS Service temperature – Single stage of two stage heat pump.
 - Single Stage COP - 4
 - Two Stage COP - 2
 - Option of CO2 refrigerant and Electrical Source of heating at periods of low demand
- Proposed solution to provide a common LTHW & DHWS heat source or dedicated DHWS low carbon solution.



Existing Gas Fired Water
Heaters to be replaced
with Heat source via Heat
Pump

Potential to retain Hot
Water Cylinder or
replacement provision for
Domestic Hot Water
Service Storage

3. Existing Low Temperature Hot Water Heating System Infrastructure

Existing Centralized Low Temperature Hot Water Heating Network

The Hotel currently has an existing centralized Low Temperature Hot Water Heating Services system providing LTHW heating services to the Hotel.
The LTHW Services serves the
LTHW is generated to the building via natural gas fired boilers.

- Remaha 610 Boilers
- Existing LTHW Primary pump circulators
- AHU’s 1 & 2 Serving Guest Rooms- Frost and Re-Heat Coils
- AHU’S 3-7 Serving Kitchen, BOH, Dining,
- Swimming Pool PHE
- Over Door Air Heaters



Existing Gas Fired Heating Boilers

Design Considerations

- Existing LTHW Operating Temperature 82 - 71 Deg C.
- Design and installation in parallel to existing system remaining operational.

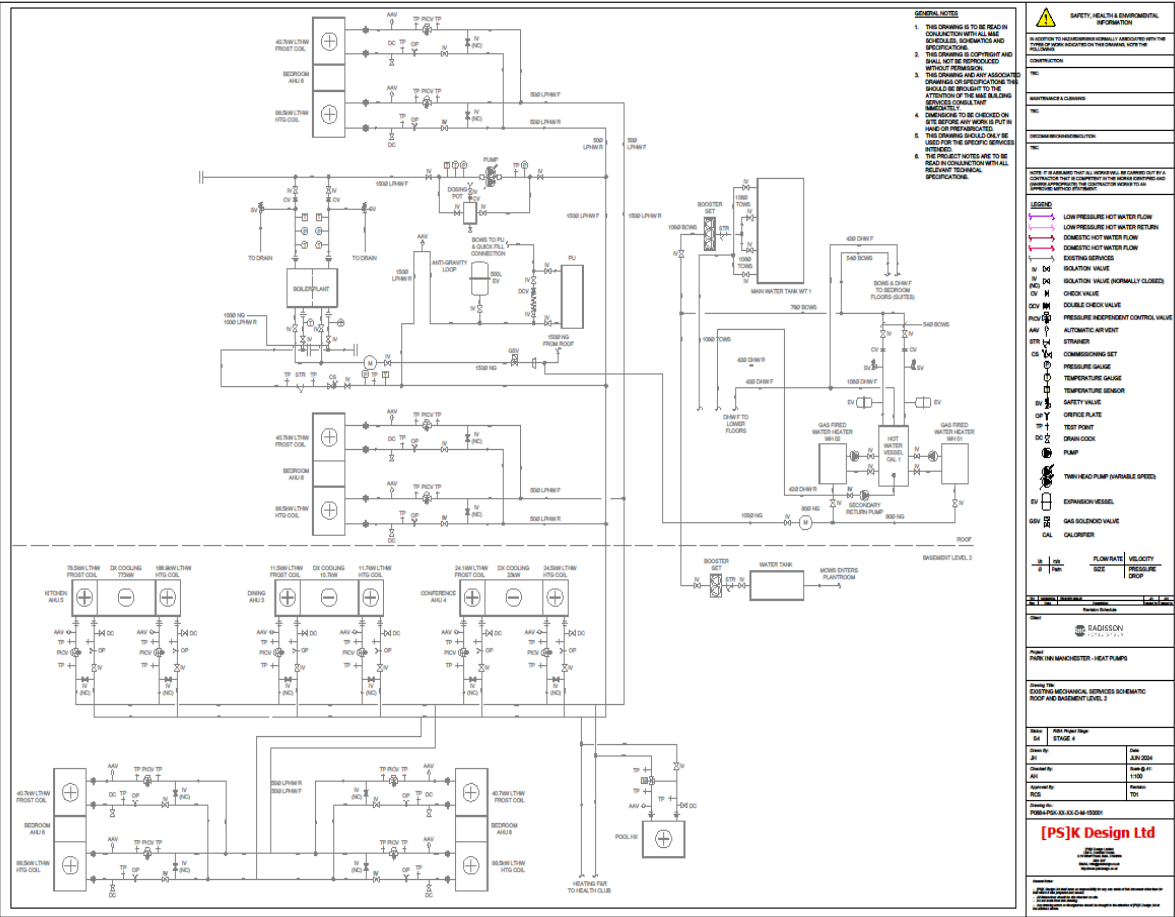
Option A. Drop-in replacement to Boilers with cascading two stage heat pump to achieve existing system operating temperatures.

- Increased Cap Ex Costs.
- Existing AHU LTHW Coils to be retained – no impact to output
- Existing DX Cooling to be retained.

Option B. Single Stage Heat Pump with lower operating temperatures

- Lower Cap Ex Costs
- Replace Bedroom AHU’s Frost sand Re Heat Coils – No Heat Recovery.
- Replace DX Coils for Basement AHU’s with Reverse Cycle DX for RE Heat and Cooling (Existing Condensers circa 15 Years)

- Swimming Pool AHU Plate Heat Exchanger secondary side operating temperature of 32 Deg C.
- Common system or dedicated Heating Heat Pump.



4. Planning Conditions

Prior to the commencement of development, details of any externally mounted ancillary plant, equipment and servicing shall be submitted for approval in writing by the City Council, as Local Planning Authority. For the avoidance of doubt, externally mounted plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location.

Please refer to Pre Construction Noise Impact Assessment and operations, servicing and maintenance documentation for the proposed plan equipment.

Prior to the operation of the plant, a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria. A verification report and measures shall be agreed until such a time as the development complies with part (a) of this planning condition.

This Document constitutes a verification report of the proposed installation and is to be updated following post completion photographic evidence of the installation and Post Completion Noise Impact Assessment readings.

to The assessment has been based on the sound data from only 1 of the 16 AC units but it has been confirmed that multiple types of AC unit are be installed. How come the data for only 1 unit has been used? Is this because all the AC units still haven been selected? The assessment will need to be based on the actual noise data for each of the units and cumulative rating of each of the units being used as the rating level for the AC units once they are known.

Please refer to existing and proposed mechanical equipment schedule presented within this report identifying each equipment's technical information including noise and sound data.

to The report advises that the plant will operate at 50% of design duty during the night and only 50% of the AC units will operate during the night. We will need confirmation from the applicant and heating engineer / building management that this is the case and how this will be controlled not exceed this duty and unit operation as the assessment has been based on this reduced load during the nighttime hours .

Please refer to the screenshots of the existing building management controls system demonstrating the Air Conditioning systems serving the Hotels front of house areas such as the Ground floor Bar and Restaurant and Conference Centres are non -operational during unoccupied hours i.e. during the night therefore no external plant noise is generated by this equipment.

A drawing has been submitted to address previous comments regarding the acoustic enclosure providing a screen from the line of sight to the upper floors of the residential units overlooking the plant deck, but we are not sure how this has been determined / calculated. We will need assessment and comments including within the acoustic report and calculations to demonstrate how the acoustic enclosure screens the upper floor residential properties, so they benefit from the noise mitigation. The drawing submitted also only includes line of sight for one of the residential receptors at Cypress place and should include assessment for the other 15 story residential too.

Please refer to the Acoustic Screening manufacturing drawings, Structural steelwork drawings and screening technical literature identifying the sound reduction index for the proposed material meeting the specification requirements outlined in the pre-construction noise impact assessment.

The plant screen / mitigation measures may possibly need to be revised once the assessment has considered the actual noise data from all the AC units to be installed to address point 1.

Please refer to the proposed and existing Mechanical Plant Schedule

Once the above has been agreed, we will need a maintenance strategy for the plant enclosure to confirm inspection frequency, time frames for replacing any broken or damaged parts and how it can be ensured that any replacement parts or panels meet the acoustic performance criteria stipulated in the report.

To be issued

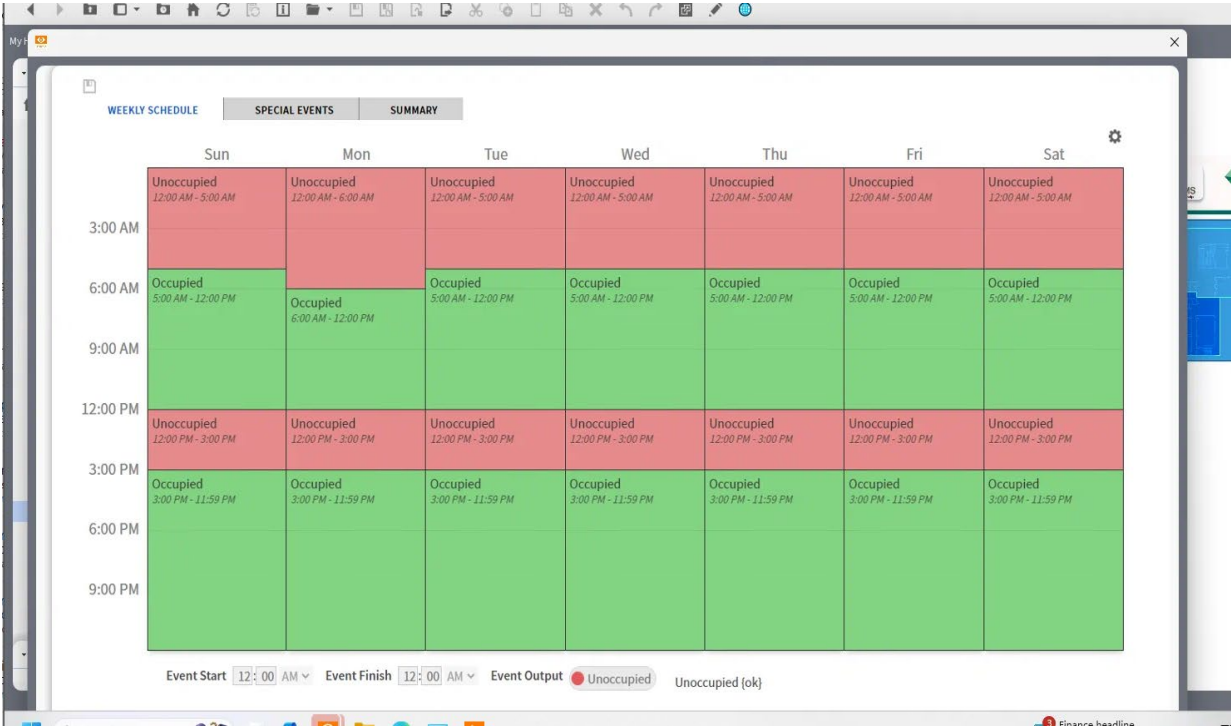
5. Existing and Proposed External Plant Equipment

Proposed Air Conditioning Systems													
Air Conditioning Systems - Ground and Basement levels													
Ref	Description	Location	Areas Served	Manufacturer	Model	Proposed Nomial Cooling/Heating (kW)		Net Weight (kg)	Power Supply (V/ph/Hz-A)	Dimensions (H x W x D mm)	Sound Pressure	Sound Power	Additional Information
CU G.01	Double Module Outdoor Condenser Unit	Roof	GF Bar & Dining Area	Toshiba	MMY-MAP2006FT8P-UK - MMY-MAP2006FT8P-UK	112	116	377+377	380-415/3/50-40A + 40A	1830 x 3220 x 780	64.5/65.5	86.5/87.5	Sysetm to operate as fabric protection in unoccupied hours (Night Time)
CU G.02A	Single Module Outdoor Condenser Unit	Roof	GF & Conference Room (Victoria Suites)	Toshiba	MMY-MAP1406FT8P-UK	40	45	316	380-415/3/50- 25A	1830 x 1220 x 780	62/64	81/83	System to operate as fabric protection in unoccupied hours (Night Time)
CU G.02B	Double Module Outdoor Condenser Unit	Roof	GF, Reception and Meeting Rooms & Offices	Toshiba	MMY-MAP1606FT8P-UK - MMY-MAP1806FT8P-UK	95	105.5	377+377	380-415/3/50-32A + 32A	1830 x 3220 x 780	64.5/65.5	86.5/87.5	System to operate as fabric protection in unoccupied hours (Night Time)
CU B2.01A	Single Module Outdoor Condenser Unit	Roof	Basement B1	Toshiba	MMY-MAP1006FT8P-UK	28	31.5	263	380-415/3/50-20A	1830 x 990 x 780	59/61	80/82	System to operate as fabric protection in unoccupied hours (Night Time)
CU B2.01B	Single Module Outdoor Condenser Unit	Roof	Server Room	Toshiba	RAY-GP1101AT-E	10	N/A	377	380-415/3/50-25A	1550 x 1010 x 370	50	67	System to operate with continuous cooling
CU B2.01C	Single Module Outdoor Condenser Unit	Roof	Basement B2	Toshiba	MMY-MAP1606FT8P-UK	45	50	-	240 / 1 / 50-32A	1830 x 1600 x 780	50	67	System to operate as fabric protection in unoccupied hours (Night Time)
Air Conditioning Systems - Guest Rooms													
Ref	Description	Location	Areas Served	Manufacturer	Model	Proposed Nomial Cooling/Heating (kW)		Net Weight (kg)	Power Supply (V/ph/Hz-A)	Dimensions (H x W x D mm)	Sound Pressure	Sound Power	Additional Information
CU 01.01	Single Module Outdoor Condenser Unit	Roof	First Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity
CU 01.02	Single Module Outdoor Condenser Unit	Roof	First Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity
CU 02.01	Single Module Outdoor Condenser Unit	Roof	Second Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity
CU 02.02	Single Module Outdoor Condenser Unit	Roof	Second Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity
CU 03.01	Single Module Outdoor Condenser Unit	Roof	Third Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity
CU 03.02	Single Module Outdoor Condenser Unit	Roof	Third Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity
CU 04.01	Single Module Outdoor Condenser Unit	Roof	Forth Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity
CU 04.02	Single Module Outdoor Condenser Unit	Roof	Forth Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity
CU 05.01	Single Module Outdoor Condenser Unit	Roof	Fifth Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity
CU 05.02	Single Module Outdoor Condenser Unit	Roof	Fifth Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity
CU 06.01	Single Module Outdoor Condenser Unit	Roof	Sixth Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity
CU 06.02	Single Module Outdoor Condenser Unit	Roof	Sixth Floor Guest Rooms	Toshiba	MMY-MAP2006FT8P-UK	56	58	377	380-415/3/50-32A	1830 X 1600 X 780	61/62	83/84	System to operate AT 50% Capacity

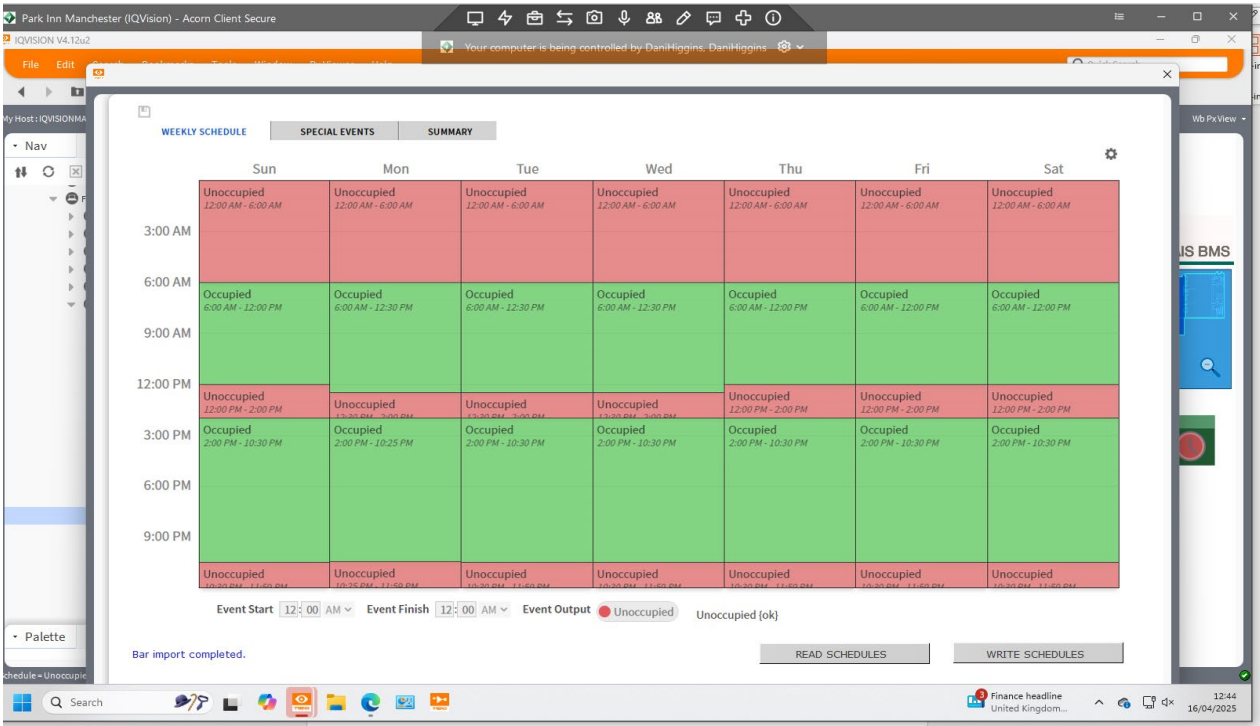
Air Source Heat Pumps													
Ref	Manufacturer	Model	Type	Duty	Operating Temperatures	Location	Dimensions (L x H x D mm)	Service Connections Sizes	Maintenance Access Clearance	Weight kg	Electrical Information	Controls	Additional Information
HP 01	Carrier	61AQ120P	Hermetic scroll compressor Heat Pump	89.1kW	70 Deg C	Roof External	2267 x 2045 x 1845	2" Flow & Return	1m All Around	1076	121A 400V - 3 Phase - 50Hz	Linked to existing BMS - Run/fault enable signals	Sound Power Level 84.5dB(A) Sound Pressure Level 52.5 dB(A)
HP 02	Carrier	61AQ120P	Hermetic scroll compressor Heat Pump	89.1kW	70 Deg C	Roof External	2267 x 2045 x 1845	2" Flow & Return	1m All Around	1076	121A 400V - 3 Phase - 50Hz	Linked to existing BMS - Run/fault enable signals	Sound Power Level 84.5dB(A) Sound Pressure Level 52.5 dB(A)
HP 03	Carrier	61AQ120P	Hermetic scroll compressor Heat Pump	89.1kW	70 Deg C	Roof External	2267 x 2045 x 1845	2" Flow & Return	1m All Around	1076	121A 400V - 3 Phase - 50Hz	Linked to existing BMS - Run/fault enable signals	Sound Power Level 84.5dB(A) Sound Pressure Level 52.5 dB(A)
HP 04	Carrier	61AQ120P	Hermetic scroll compressor Heat Pump	89.1kW	70 Deg C	Roof External	2267 x 2045 x 1845	2" Flow & Return	1m All Around	1076	121A 400V - 3 Phase - 50Hz	Linked to existing BMS - Run/fault enable signals	Sound Power Level 84.5dB(A) Sound Pressure Level 52.5 dB(A)

6. BMS Controls Screen Shots showing time schedules

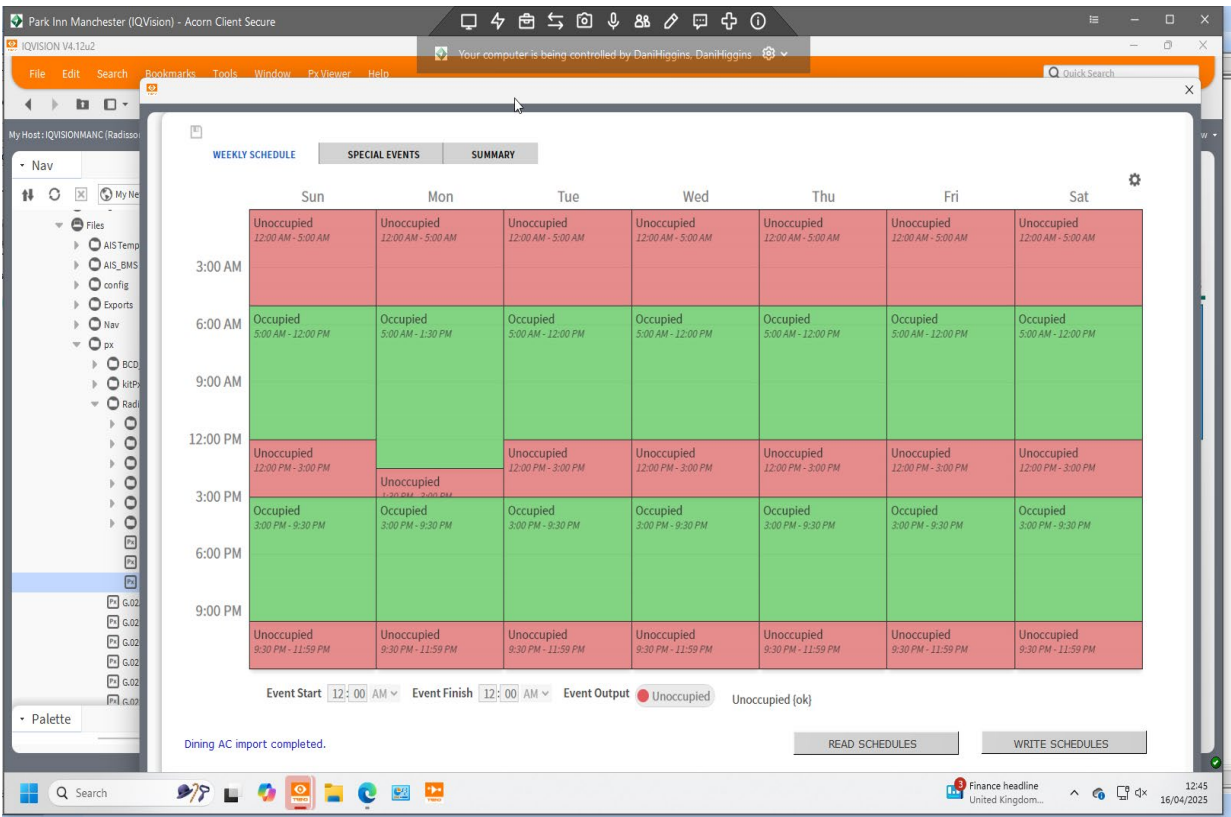
Reception AC



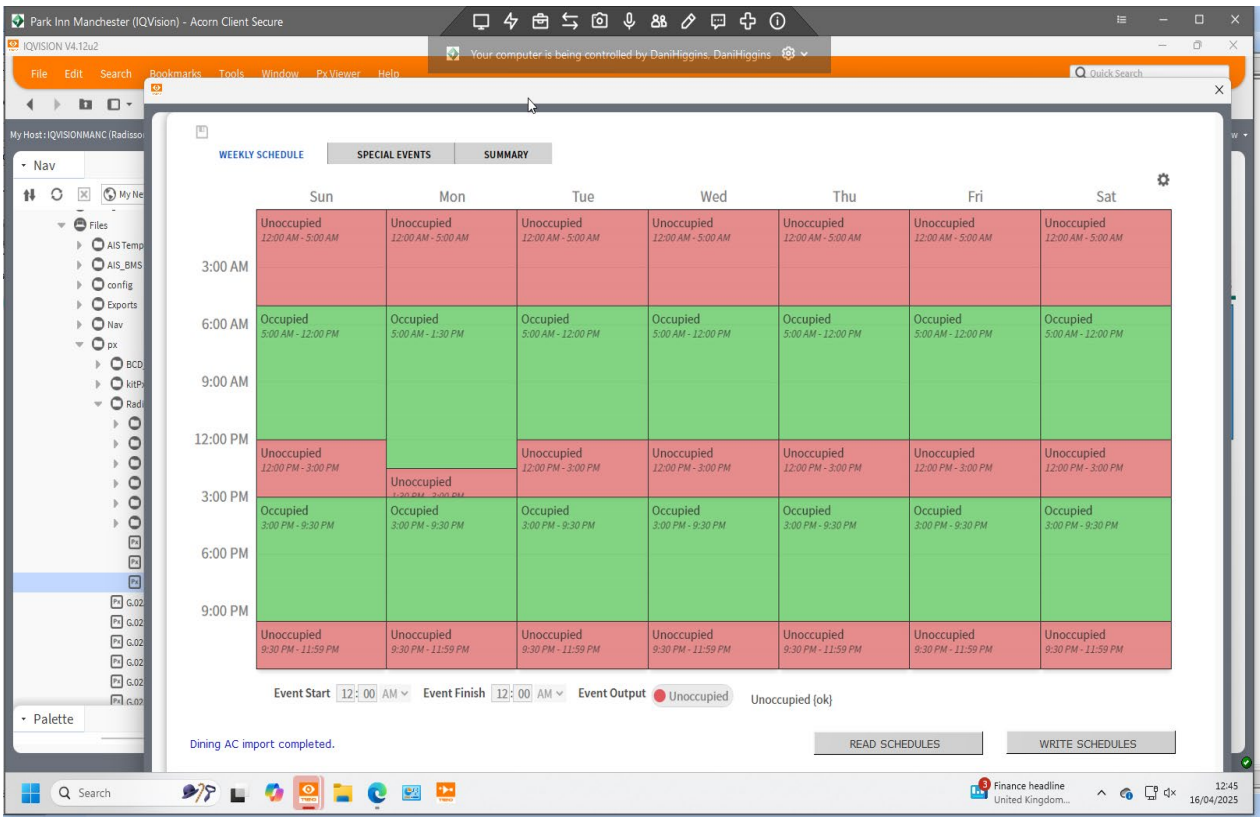
Bar AC



Dining AC

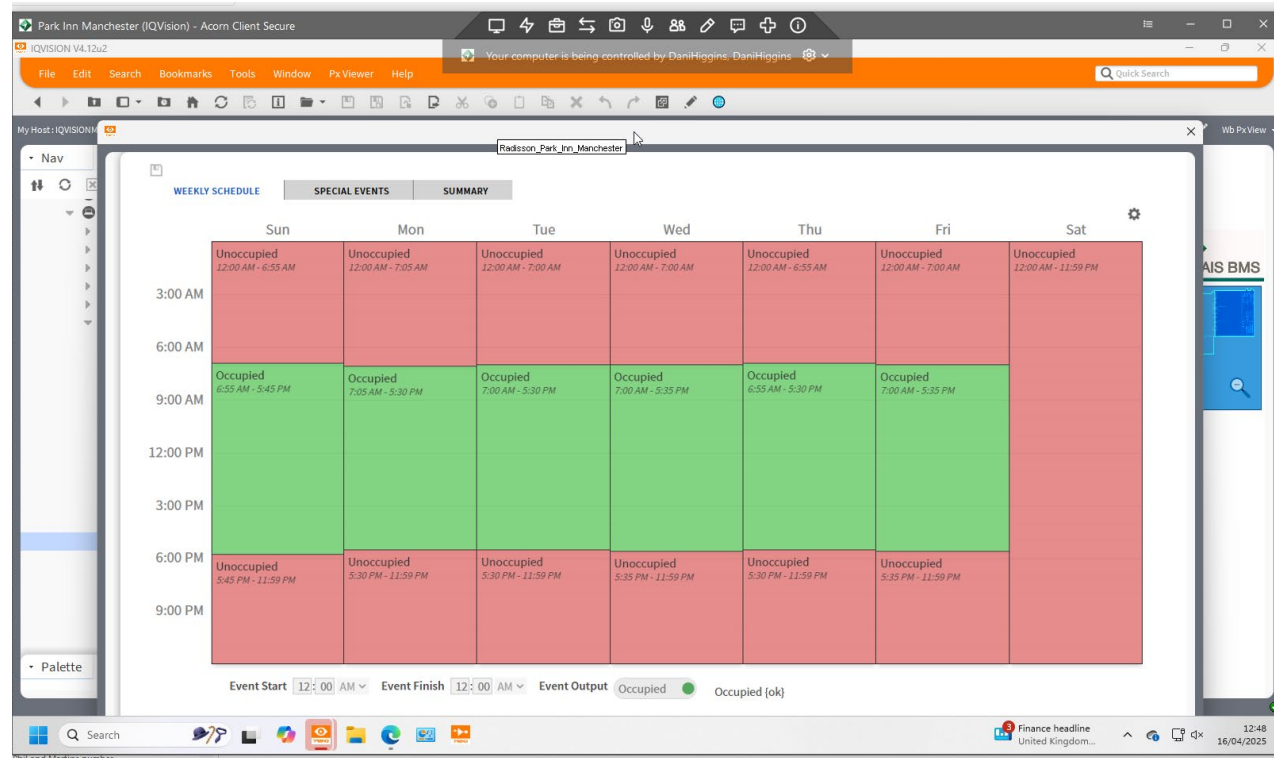


Conference Room 1 AC

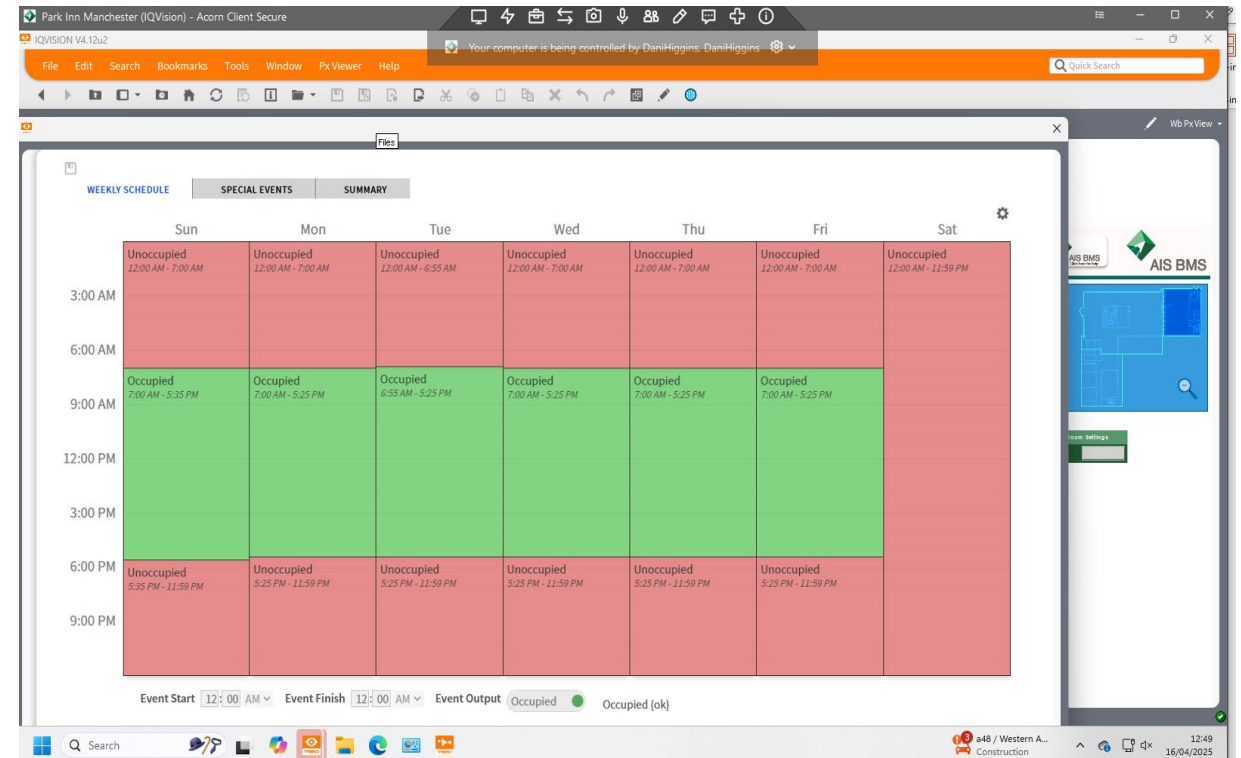


BMS Controls Screen Shots showing time schedules

Conference Room 2 AC



Conference Room 3 AC



The Above Screenshots show the unoccupied time zones for the conference meeting rooms and the existing AC Systems to be made non-operational during these times.

The Quantity of the systems serving the front of house areas equates to 50% of the total Air Conditioning Systems therefore 50% of the existing systems are nonoperational during the nighttime hours.

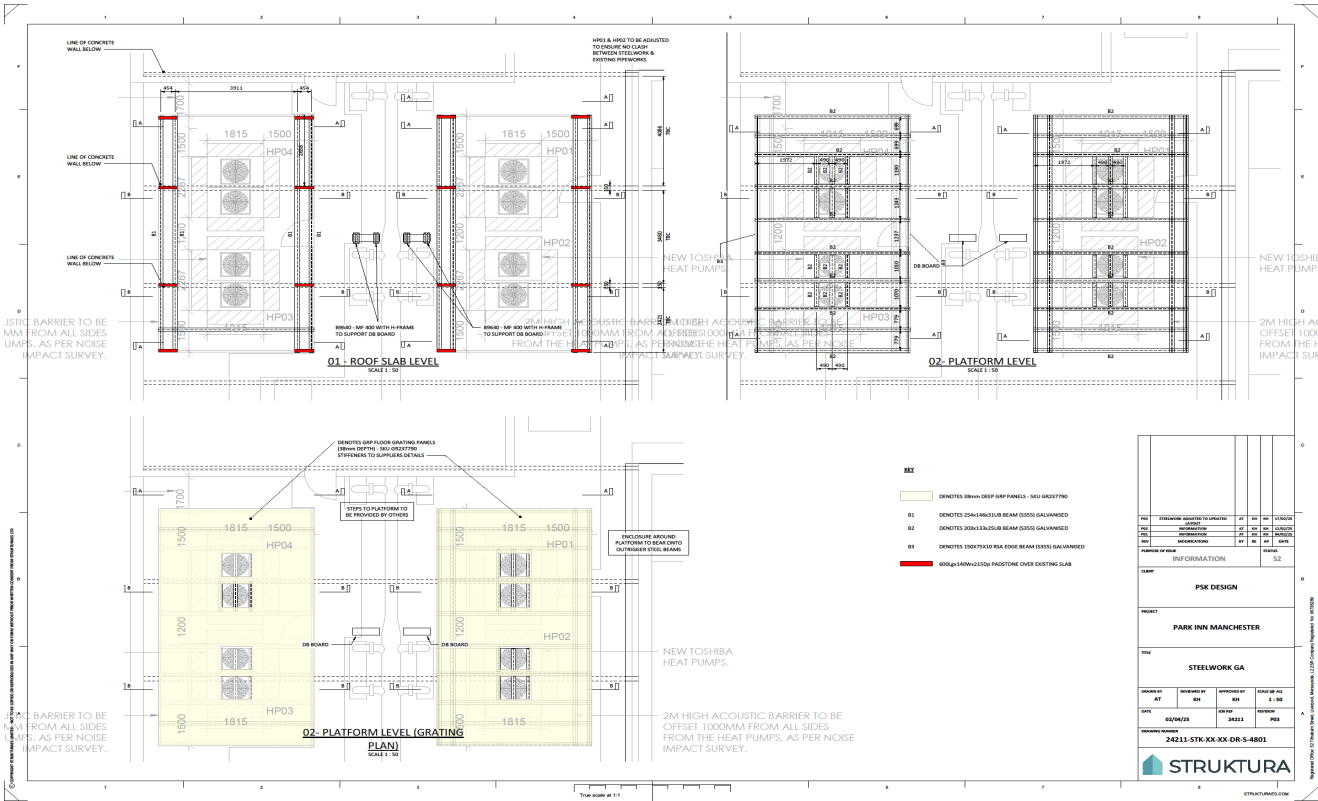
The remaining Air Conditioning Systems operate at a reduced turn down duty of 50% due serving the Hotels guest rooms.

The noise data for the Air Conditioning Condensers is not made available by the manufacturer therefore the Noise Impact assessment has been based on a similar manufacturers noise data at the turn down duty.

The Building Fabric Protection is achieved to these spaces via the Ventilation systems there the AC systems are not required.

7. Proposed Heat Pump Acoustic Screening Steel Framework

- Steelwork has been designed to support the structural loadings for the proposed Heat Pumps and the Acoustic Screening.



- The Acoustic Screening is to be fixed and installed to the lower section of the steelwork frame to create an acoustic barrier flush to the underside.

