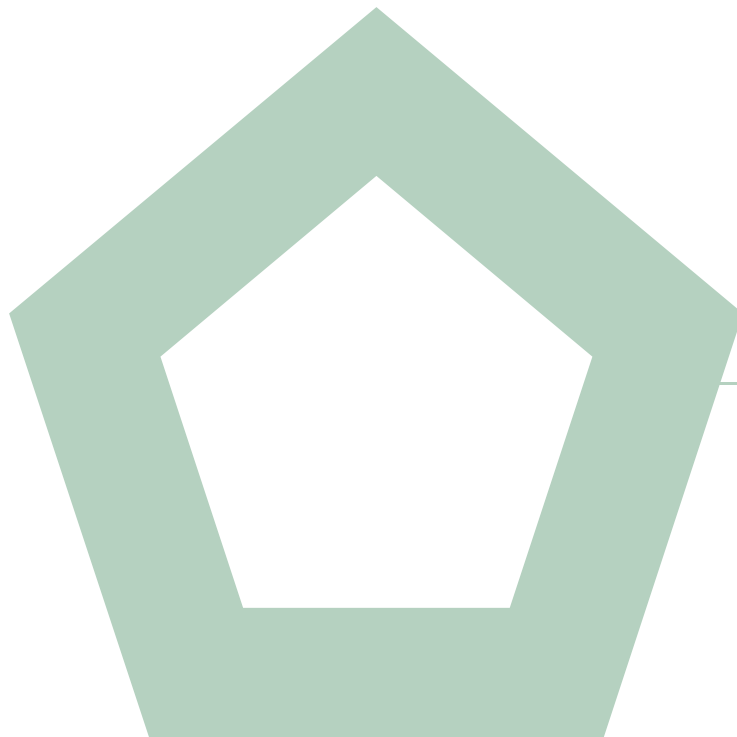


John Rylands Research Institute & Library. Manchester. University of Manchester.

MEP ENGINEERING
STAGE 3 REPORT

REVISION P2 – 27.06.2023



STAGE 3

Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
P1	19.05.2023	First Issue	BK/TA	AC/LG	DRA
P2	27.06.2023	LBC Issue	BK/TA	AC/LG	DRA

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1. Introduction

1.1 Introduction.

The intention of this document is to outline the key principles of the MEP design concept for the John Rylands Research Institute & Library (JRL) refurbishment, as a basis for progressing the design to Stage 4 level of detail.

It presents the current proposals, builds upon the Stage 2 proposals, captures the results of further stakeholder engagement as well as clarifications to the brief and further developments in the design.

It is noted that this report covers core MEP items only, please refer to other reports provided by the design team for further information relating to the Architecture, Structural/Civils, Fire Engineering and Acoustic engineering.

1.2 Surveys.

The project survey tracker identifies all surveys that have been identified and undertaken to date or planned to be undertaken at stage 4.

A thermographic survey of the underfloor heating was undertaken by James Griffiths of Uponor at stage 3 with a sketch output appended to this report showing that the findings generally align with the as-built drawing available.

1.3 NZC/Sustainability Opportunities and ESA tracker

The Sustainability opportunities tracker has been updated to the stage 3 design development and is appended to this report.

1.4 Building fabric

Due to the requirement to protect the collections in the imaging suite and mitigate existing overheating issues identified by the users in the ground level extension entrance/atrium area, several building fabric recommendations have been advised to DIA for incorporation. The Stage 3 design has been coordinated with the Architect to seek to optimise the building fabric where areas fall within the scope of the building.

The following interventions have been advised for inclusion at stage 3, please refer to the Architectural information for further details:

- Boiler house ceiling equipped with thermal insulation to reduce heat gains to the imaging suite above.
- Boiler house door to be replaced with a louvered door to facilitate additional natural ventilation to the boiler house.
- Provision of solar film to the glazing within the GF entrance and flexible use space to reduce solar gains (target 0.3).
- In lieu of openable louvres in the lobby, due to aesthetic concerns, equipping the new internal and external entrance lobby doors with the ability to be controlled open from the reception desk, to facilitate additional natural ventilation to the atrium in warmer periods.
- Sealing of the imaging suite windows to keep air permeability/infiltration to a minimum and benefit from improved u-value and g-value (target 0.3) to facilitate an energy efficient close-control environment.
- Consideration to provision of additional natural ventilation free area to the staff and meeting room heritage glazing at level 02 of the 1920s building.

2. Incoming Utilities

2.1 Electrical.

The existing incoming electrical supply shall be retained and existing systems extended as required within the capacity of the existing supply, so no new electrical utility is required. However, it is noted that the refurbishment will utilise the remaining spare capacity and so spare capacity available for any future works shall be reduced.

2.2 Water.

The existing incoming mains cold water supply shall be retained and existing systems extended as required, so no new water utility is required.

2.3 Gas.

The existing incoming gas supply shall be retained. No further alterations are proposed to the gas systems, so no new gas utility is required.

2.4 Telecoms.

The existing incoming telecom connection shall be retained, so no new telecom utility is required.

3. Mechanical and public health engineering systems.

3.1 General

Refer to section 8 for design criteria and room datasheet information for each room.

3.2 Heating and Cooling Systems.

The existing central plant serving existing heating and cooling circuits is being retained and does not form part of the refurbishment scope.

No modifications are proposed to the existing chilled water distribution systems, the existing system shall be fully retained.

The following modifications are required to the existing heating systems to facilitate the refurbishment:

- 2Nr existing 65mm LTHW VT F&R heating pipes routing through the cellar/ramp break-through area shall be redirected to route below the new structural floor of the corridor/ramp (refer to cellar layout).
- 2Nr existing 40mm LTHW VT F&R heating pipes routing through the corridor adjacent to the boiler house, shall be equipped with a 2-port control valve linked to the BMS system and new temperature sensors located in the Wolfson room to better control the existing heating to this space.
- All existing radiators within the French revolution room shall be isolated and the 1Nr radiator and associated 25mm LTHW F&R pipework riser, in the location of the new break-through, shall be isolated and stripped out

- The existing radiator in the Wolfson room, served from the riser noted above, shall be isolated but retained in its current position.
- The existing ground level underfloor heating zone at the existing revolving door entrance shall be isolated and drained down to facilitate provision of the new proposed lobby in this area.

The Contractor shall include for a pipe-freeze methodology for all break-in's required to the existing system avoiding drain down of heritage systems.

Any MEP items of equipment that are stripped out are to be carefully retained in their original condition and passed back to the University.

The following new heating and cooling systems shall be provided:

- 1Nr new low temperature chiller [4/9°C F&R with 20% glycol] shall be provided, located in the external roof level compound to serve the AHU 01 imaging suite cooling coil to achieve dehumidification and the room environmental conditions. The chilled water system shall be provided complete with all ancillaries including a duty/standby pump, combined deaerator/filter/dosing, pressurisation unit, expansion vessel and F&R spare valved connections for provision of a temporary chiller in future. All equipment/ancillaries shall be housed in an external GRP enclosure complete with lighting and electric heater for frost protection.
- 2Nr new high efficiency electric DX condensing units shall be provided, located in the roof level compound to provide two-stage heating of the AHU-02 air supply to the Wolfson room. The heating coil shall be sized to heat the air and offset the reduction in heating to the space due to the removal of 1nr radiator. The condensing units shall be capable of being switched to cooling mode to provide beneficial tempering of the air during periods of high ambient temperature.
- A new high efficiency electric VRF cooling system shall be provided to serve the flexible event space at ground floor. Condensing units shall be located in the roof level compound and refrigerant routed via the existing riser and kitchen ceiling void to serve controllers (complete with acoustic shroud) and internal cassette units within the ground level flexible event space.
- 2nr new electric air curtains shall be provided at the new entrance lobby to temper incoming air and top-up the heating requirement in the space due to isolation of the underfloor heating zone. The air curtains shall be concealed with intake/return air drawn through the top of the unit.

Heating and cooling systems shall be provided in traditional heavy grade screwed steel. Alternative press-fit/crimped systems shall not be accepted.

Where pipework routes externally, systems shall be fully insulated, provided with protective aluminium cladding and trace heated as required for frost protection.

As agreed with the University Estates team, R32 shall be the preferred refrigerant.

Water systems have been designed to avoid travelling through areas where collections are stored to mitigate the risks of leaks causing damage to collections.

Heating and cooling systems shall achieve the Architect specified aesthetic in each area with additional painting, RAL colours for equipment and bespoke accessible timber cladding/ trunking required. Refer to Architectural report for further details.

All new electrically driven plant/equipment including AHU fans, humidifier, condensing units and air curtains shall be electrically sub-metered and monitored via the University system.

3.3 Mechanical ventilation

3.3.1 Natural ventilation

Wherever possible, existing openable windows shall be re-utilised to naturally ventilate the refurbished areas of the building, particularly in heritage areas.

It has been identified that additional mechanical ventilation shall be required in some areas to meet minimum building regulation compliance, and/or to offset heat gains associated with a change in use of the space or an increase in occupancy:

- Level 01 Imaging suite
- Level 03 Wolfson Room

The following new air handling units are proposed to facilitate ventilation to these spaces. AHU-01 (Imaging Suite) process recirculation air unit shall comprise components as follows;

- Fresh air inlet louvre
- Motorised frost protection damper
- Recirculation mixing section with fresh air bleed
- Intake air filtration – frost resistant filter media/metal frame (M5/F9)
- Carbon filter
- Chilled water cooling coil
- Electric heating coil (thyristor-driven variable output)
- 254nm UVC disinfection section (specification to WELL certification criteria)
- Variable speed direct-drive plug fans with inverters (not integrated)
- Electric resistive Humidifier c/w packaged RO water and low temperature drainage
- Unit to be flat-pack to facilitate installation at roof level

AHU-02 (Wolfson room) shall generally comprise components as follows;

- Inlet/discharge louvre
- Motorised frost protection damper
- Intake air filtration – frost resistant filter media/metal frame (M5/F9)
- Carbon filter
- DX heating/cooling coil
- Variable speed direct-drive plug fans with inverters (not integrated)
- Low leakage plate heat recuperator c/w face bypass damper (>73% eff.)
- Extract air filtration
- Unit to be flat-pack to facilitate installation at roof level

A cost allowance has been included for overhaul and upgrade of the existing 1920s supply and extract Fan. The selected Contractor shall undertake a site survey of the fans and overhaul/upgrade to confirm whether the system can be optimised to maximise the airflow to each space served. Where this is deemed viable an allowance has been include for upgrade and full recommissioning of the existing system.

A new extract fan is proposed to replace the existing EF08 extracting air from the end of the 1890s cellar and discharging to the louvre in the boiler house. It is proposed to remove EF 08 and provide a new fan sized to accommodate the additional air load for the Dante room in addition to the existing cellar extract flowrate. A new ductwork system complete with associated ancillaries shall be provided, connecting into the existing ductwork system to facilitate extract from the Dante room.

Main filtration shall achieve a minimum of SUP 4, ISO ePM1 85% in accordance with the new BS EN ISO 16890 which, in 2018, replaced BS EN 779:2012. It is understood that no specialist filtration is required for the extract air beyond an ISO ePM10 50% panel filter. A carbon filter has been included in both AHUs.

Both AHUs shall be located on the level 04 external roof plant deck, refer to the drawings for further details.

Fresh air inlets are located at roof level away from pollution sources and shall be equipped with weather-proof louvres and insect mesh to the Architects specification. Air discharges are located so that they are positioned away from existing openable windows and intakes to mitigate vitiated air being drawn back into the building.

External AHUs shall be fully weatherproofed with a pitched roof provided. All supply, return, intake and discharge external ductwork shall have a pitched top and be fully clad. Airside and room side attenuation shall be provided on both ventilation systems to achieve the requirements of the acoustic report.

Ductwork will generally be provide as galvanised with insulation on supply and extract, however, a suitable allowance shall be included for painting/cladding ductwork to achieve the Architects aesthetic and acoustician's requirements. It is noted that the acoustician has requested acoustic lagging on the AHU-02 ductwork at roof level.

An duct-mounted horizontal humidifier section shall be provided, selected for its external location and appropriately weather proofed with a pitched roof. The duct section shall be equipped with an internal bitumastic lining and provided with a fixed drain point.

Fire rated ductwork shall be provided on the supply and return ductwork where it routes through the stair/atrium (i.e. from point of entry/exit at roof to point of entry/exit at the imaging suite). Fire/smoke dampers shall be provided where ductwork crosses lines of compartmentation, refer to the fire engineer report and Architects fire compartmentation drawings for further details.

Ventilation system supply and return air ducts shall be provided complete with all required ancillaries including opposed blade multi-leaf volume control dampers to facilitate full commissioning of the systems.

The Imaging suite shall be equipped with high performance adjustable swirl diffusers to match the Architects aesthetic/specification. Dummy return air grilles of the same aesthetic as the supply diffusers, shall facilitate a return air path via the ceiling void and associated architectural boxing to the return air bellmouth.

The Wolfson room shall be equipped with high performance adjustable swirl diffusers to match the Architects aesthetic/specification. Dummy return air grilles of the same Aesthetic as the supply diffusers, shall facilitate a return air path via the ceiling void and to the extract return air bellmouth.

The Dante room shall be equipped with an extract grille to match the Architects aesthetic/specification.

All diffusers and grilles shall be provided complete with acoustically lined side/top entry plenums, as required by the acoustic strategy. Refer to acoustic report for additional details of cross talk requirements, acoustic linings and lagging requirements for services.

All diffusers/grilles shall be hard ducted, flexible connections shall not be accepted.

3.4 Hot and cold water supply systems.

The building potable cold water system is currently served by a mains pressure incoming cold water feed.

Existing systems are generally to be re-utilised, modified and extended as required to provide fully operational domestic water systems.

As there is no new sanitaryware being provided, domestic hot water systems do not form part of the scope of this project.

A new 15mm cold water feed shall be extended from the existing cold water feed in the fourth floor plantroom across to the new packaged RO water plant and subsequently the new electric resistive humidifier in the new level 04 atrium riser cupboard, serving the imaging suite ventilation system. A cold water dump valve shall be included at the end of line to encourage water turnover through the pipework during periods of low use.

A new 15mm cold water feed shall be extended from the existing cold water feed in the fourth floor plantroom across to the new chiller microfill pressurisation unit (CH-01).

Pipework shall be provided in traditional brazed polyethylene coated copper, with appropriate backflow protection provide to achieve the water regulator requirements.

Where pipework routes externally, systems shall be fully insulated, provided with protective aluminium cladding and trace heated as required for frost protection.

3.5 Above-ground waste water drainage systems.

Existing drainage/ventilated stacks will generally be re-utilised, modified and extended to provide a fully operational drainage system to serve the new condensate drainage from the humidifier/RO plant, AHUs, and condensing/ AC units.

Additional drainage modification is required where the new breakthrough from the atrium to the cellar ramp is being undertaken. The existing 110mm uPVC soil stack shall be diverted/relocated to facilitate the breakthrough. Refer to the drawings for further details.

Drainage in the new extension shall generally be provided as copper, connecting into the existing uPVC vertical distribution. Drainage ventilation systems shall be modified to facilitate appropriate ventilation for the system.

The drainage systems in the refurbished areas will be designed and installed to ensure that:

- Appliances drain quickly, quietly and completely at all times without nuisance or risk to public health
- Discharge is conveyed without crossflow, backfall, leakage or blockage
- Foul air from the system does not enter the building
- It can be adequately tested, cleaned and maintained.

All condensate drainage shall be brazed copper gravity condensate pipework connecting back to the vertical soil stacks, via self-sealing traps. Where gravity condensate is not possible to achieve, pumped drainage shall be utilised.

The humidifier selection shall include for a humidifier capable of reducing the outlet temperature of the discharge to 60degC. Drainage shall be routed from the humidifier via copper pipework to the existing uPVC stack.

All below ground drainage, direct below ground connections and floor gulley's at GF/basement level shall be designed by the Civil Structural Engineer (WML Consulting).

3.6 Building Management System & Controls

The existing Building management system will generally be re-utilised, modified and extended to serve new plant/equipment provided as part of the refurbishment. It is noted that the existing systems are non-compliant with the University EPMs (Trend panels and some older schneider equipment currently provided instead of latest Schneider equipment). The recent BMS virtualisation works have been completed and it is understood the panels now provide full compatibility between the existing Trend systems and University Schneider head end.

A new Schneider form 1 MCCP shall be provided at roof level to serve the new roof level equipment. This shall be provided in full compliance with the University EPMs and shall be networked into the existing system.

New controllers shall be provided in accordance with the latest University requirements to seek to facilitate easy integration with any future sitewide BMS upgrade.

The Building Management System will comprise motor control panels, network outstations, field devices and all associated control wiring, including for all items required to achieve compatibility between the existing and new systems.

The systems shall be fully networked to the existing University head end and software and graphics updated accordingly to reflect the latest design.

Packaged AHU controls shall not be accepted, the new local control panel shall facilitate connection to the BMS via open protocol systems (e.g. Modbus, BACnet).

The following new items of plant/equipment are linked back to the BMS system for control, monitoring and data logging:

- AHU-01
- AHU-02
- CH-01
- DX/VRF condensing units
- Humidifier & RO plant
- Air curtains

A new 2-port control valve arrangement shall be provided in the boiler house to serve the Wolfson building radiator heating circuits, linked to temperature sensors in the Wolfson room to facilitate control of the temperature within the space (imaging suite radiators shall be isolated/drained).

A new 3-port control valve arrangement shall be provided to the roof level chiller CH-01 and linked to the BMS.

Temperature and CO2 sensors shall be fitted to the Ground floor flexible event space and linked to the existing supply fan and kitchen extract fan to modulate the airflow to the space based on occupancy.

Air curtains shall be controlled via local controllers (located at the reception desk) and linked to the BMS.

The imaging Suite shall be equipped with multiple CO2, temperature, and humidity sensors in each zone to relay accurate information to the BMS system for monitoring and control. A local controller shall be provided in the space which shall be locked to enable users to control the system in either:

1. Trickle mode – controlled to provide 70l/s of fresh air to the space and facilitate heating/cooling to achieve 21degC in heating season and 25deg C in cooling season (activates at 28degC). The airflow shall modulate based on CO2 monitoring, no humidity control.
2. Collections mode – controlled to provide 70l/s of fresh air to the space and facilitate full conditioning mode to control the room temperature to 20°C +/- 1°C at 50%RH +/- 5%RH. Activated by the users when collections are brought into the room. In this mode the unit shall be set to provide a nominal positive pressure to the space.

A time schedule shall switch the unit off at night and default back to trickle mode at the end of each working day on the basis that collections are managed and returned to the basement storage area.

AHU-02 Wolfson room AHU shall modulate based on CO₂ monitoring and temperature sensors located within the space.

The fire strategy for shutting down ventilation plant override facilities will be agreed in advance with the University fire officer. It is understood at this stage that in a fire scenario the ventilation plant shall be powered off.

4. Electrical engineering systems.

4.1 Existing LV Infrastructure

The existing building has a power supply which is currently limited to 400A.

Initial load estimates based on half hourly metered data provided by the University, indicate that the existing supply will be sufficient to accommodate the proposed scope of works.

Peak demand (June 2021 to June 2022) approx.. 90kVA

Agreed Supply Capacity 220kVA

Estimated Spare Capacity – 130kVA

Initial load estimates, based on new mechanical plant selections, changes of use of areas, additional power outlets, etc, indicate an increase in the overall building electrical load of approximately 115kVA, which is less than the estimated spare capacity. However, the proposed works will increase the overall load such that it is close to the agreed supply capacity, and we would advise that the client monitors the actual electrical load once the works are complete.

It should be noted that the 400 amp supply has a capacity of 276kVA, and it may be possible to increase the agreed supply capacity if required. This would need to be discussed and agreed with the District Network Operator (DNO) to confirm if their infrastructure can support an increase in supply capacity.

However, at this stage we do not anticipate this to be necessary but will need to be reviewed at the next stage of design.

4.2 Mains and Submains Distribution

Generally, all existing switch gear is to be retained and reused to accommodate the new refurbishment works.

New submains will be provided to serve the new refurbished area and to supply equipment throughout the building including but not limited to:

- Local distribution boards
- Power supplies to new plant equipment

Where it is necessary to increase the number of final circuits beyond what is currently available within local distribution Boards, the preferred solution is to replace the existing DB with larger equivalent boards. This will provide additional ways and allow for the use of RCBO's in lieu of MCB/RCD combinations (which currently take up 2 ways per circuit).

Distribution boards will generally be located within plant areas and risers with suitable space to accommodate easy maintenance access to equipment. New distribution boards will have split sections covering lighting and power to allow for separate metering of energy consumption where required.

4.3 Sub Main Containment

The proposed works will include a number of vertical and horizontal containment routes.

Routing of services are generally being retained where possible. Where new routes are required, proposals will need to take into account limitations associated with the heritage elements of the building. All containment / cable routing is to be agreed with England Heritage and subject to a detailed survey at the next stage of design.

4.4 Metering

All supplies will be metered in accordance with building control and in accordance with the University standards. Sub-metering will be provided to all distribution boards and fixed loads in accordance with part L requirements.

4.5 Small Power and data

General - Power

Existing small power is generally being retained and upgraded/extended to serve refurbished areas. Spare capacity within existing distribution boards has been assessed in areas where additional circuits are to be provided. The majority of the existing boards have sufficient spare ways where only a small number of circuits are being proposed. Some areas, as noted below, do not have sufficient spare ways and replacement boards are proposed for these areas

It should be noted that whilst the number of fixed power outlets and circuits will increase in some areas, the overall building load will not necessarily increase as well. This is because currently, many of the rooms use significant numbers of extension leads with multiple socket outlets that will effectively be replaced with fixed outlets. The extension leads are a health and safety issue due to trailing leads throughout the workspaces and the potential to overload parts of the installation. It may not be possible to eliminate all extension leads, but the intent is to reduce this to a minimum where possible.

Local power supplies will be provided within all spaces for all fixed equipment including but not limited to the following types of equipment;

- General power outlets
- Local mechanical plant such as extract fans, etc
- Audio-visual equipment
- Fixed specialist equipment, etc

Designated socket outlets will be provided where required for cleaners’ outlets, as well as outlets within plant spaces for use of hand tools/ maintenance.

General - Data

The Information and Communications Technology (ICT) systems infrastructure will be generally retained and reused to accommodate the works associated with the refurbishment works.

The system comprises a common structured cabling infrastructure on which the data, voice, CCTV, access control, AV, WiFi, Lifts, and similar systems can be connected to a common Internet Protocol Switch.

Infrastructure supporting media information, is on a separate server and not run on the same network as the core library services. All Media outlets are to be segregated (including separate containment) to the main Library system network.

The new installation will comply with BSEN 50173, BSEN 50174, ISO 11801 and EIA/TIA 568 standards. The design will maintain a maximum 90 metre ‘permanent link’ cable length between the communications equipment rooms and user outlets.

Horizontal cabling, to link user outlets to the existing Comms rooms, will be to Category 6A cables U/FTP Low Smoke Zero Halogen (LSOH) Cca-s1a,d1,a1 specification.

Horizontal Category 6A cables will be terminated in RJ45 outlets. The quantity of RJ45 outlets to be provided will be in accordance with the design Stage 3 information.

The active LAN infrastructure for the scheme will remain as per the existing, with 2 comms rooms and 13 active switches located around the building for connectivity. It is understood that all the equipment has been updated and standardised and should not need upgrading or replacing as part of the scope of this project.

Upgrade of the WiFi provision is not within this scope of works, however, there is another ongoing project looking at this element of the works. The designs for each project are to be coordinated as far as reasonably practical. It is currently assumed that any new Access points required within the areas covered by our scope of works, it will be within this project to supply and install the Access points. The associated cabling and any software / hardware upgrades shall be by others

Further reference will be required at the next design stage to the University Responsibility Matrix schedule to identify the split responsibilities between the Client side and contractor side provision. It is understood at this stage that all active equipment will be provided by the Client.

Cellar Ramp

The scope of works within the cellar area is limited to the area to be re-purposed as a ramp access route from the existing ground floor to the cellar level. Within this area it is proposed to install 3 No. media screens and associated power and data outlets will be required.

The ramp area is to be accessed via 2 new doors, each to be powered open/shut and provided with access control and associated power supplies accordingly.

All outlets will be surface mounted metalclad type with shallow back boxes.

Entrance & Lobby

Within the Entrance area at ground floor, the small power works are mainly centred around the new entrance Lobby area.

The new Lobby will include 3 No. new automatic sliding doors which will require a power supply each via a fused connection unit mounted at high level within the lobby. The final location is to be coordinated with the chosen door manufacturer. If mounted out of site of the public, then the fused connection units and be surface mounted white plastic. If mounted in public view, the outlets shall be recess mounted brushed aluminium.

The doors will be interfaced to the fire alarm system via a new fire alarm interface unit (FAI). An allowance shall be made for a power supply to the fire alarm interface until such time that it can confirmed whether the FAI can be loop powered (next stage of design).

Also associated with the new entrance Lobby, will be 2 No. Overdoor Heaters (ODH). These are proposed to be three phase electrical, and each will be supplied via a 25 amp 3 phase switch disconnector, to be located on the roof of the lobby or in a discreet location out of sight of the public but with access to allow isolation of the ODH as and when necessary

The new reception desk will be fed from the existing floor outlet box. Behind the reception desk will be a new, wall mounted information screen which will require a twin power and a twin data outlet to be flush mounted on the wall at high level, coordinated with the final screen location. The outlets will be brushed aluminium and recess mounted.

Allow for 1 No. WiFi Access point to be supplied and installed within this area

Event spaces

At ground floor level the area to the rear of the existing entrance shall be utilised for events and presentations etc. The currently installed floor outlet boxes are 3 compartment with;

- Compartment 1 – twin socket outlet
- Compartment 2 – Single data outlet
- Compartment 3 – empty

It is proposed to install a new twin socket outlet within the empty compartment 3 for each existing floorbox. These will be extended from the existing circuit and will primarily be for general public to use for charging of handheld and mobile devices.

The area to the rear of the space shall potentially be used for presentations and a mobile screen shall be semi-permanently located in this area. A lectern for presentations shall also be provided as indicated on the drawings with new power and data socket outlets being provided to supply a laptop, the screen, etc. The current proposal is to install new outlets on the internal wall at low level, though this it be reviewed at the next stage of design dependant on the type and location of the lectern. All outlets will be flush

mounted white plastic. Trailing leads will not be accepted for fixed items of equipment, and for mobile equipment, the cable connections shall be disconnected and stowed away when not in use.

A new Fire shutter is to be installed to the new single door leading into the lobby from the event space. This will require a power supply to the shutter and also allow a power supply to the Fire alarm interface. The outlets shall be located at high level within the lobby and be of the surface mounted metal clad type fixed to shallow back boxes.

Within the event space at high level, fused connection units shall be provided to supply the local air conditioning units which are to be installed within the new ceiling panels. Fused connection units shall be surface mounted, metalclad type on back boxes.

Allow for 1 No. WiFi Access point to be supplied and installed within each event space

Imaging suite

The existing power and data provision within the imaging suite room, will not meet the requirements of the proposed use of the space. New power and data shall be provided as indicated on the drawings, primarily mounted on low level skirting trunking around the perimeter of the room. The skirting trunking shall be of bespoke manufacture, to match the existing skirting used elsewhere. Outlet plates shall be polished brass with black inserts. Socket outlets shall have USB outlets integrated into the faceplate.



At the front of the room, new power and data will be provided to the work desk, and also at high level for a new media screen. These outlets shall be flush mounted with concealed cable drops via flush mounted conduits

Power is also required to the new door access controllers associated with each of the two doors into the space. These shall be fed via fused connection units located at high level within the area. The new door is to be powered open/shut and will need an associated power supply. The position of the door activation buttons shall be

Exit from the room - at the bottom of the ramp within the room,

Entry to the room - to the right hand side on the wall within the lobby area.

Allow for 1 No. WiFi Access point to be supplied and installed within this area

Dante and Ante-Dante rooms

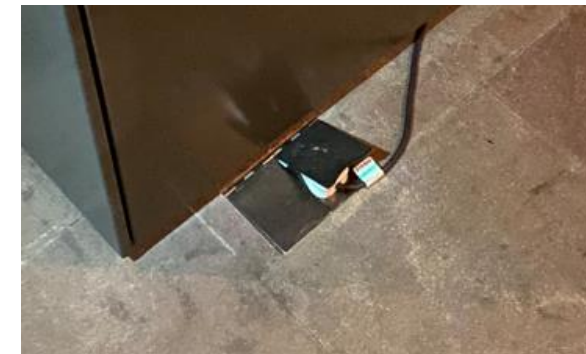
All existing power and data within these two rooms shall be retained. Within the Dante room, it is proposed to install 1 new twin socket outlet and 1 twin data outlet adjacent to the existing socket within the room. All outlets will be surface mounted metalclad type with shallow back boxes.

Allow for 1 No. WiFi Access point to be supplied and installed within this area

Exhibition Galleries

The existing Exhibition spaces have limited power and data available. Many of the exhibit showcases are supplied from below with power and data where required. Power outlets are presented as flush floor mounted socket outlets. There are a number of outlets around the walls, which are again fed from the basement area below.

The proposed exhibition design is still at concept stage, so exact requirements and locations for power and data are not yet confirmed. It is proposed to use the existing power and data wherever possible, however, it is anticipated that additional power and data will be required. This will be provided from the basement below and be sympathetic to the area and the historical importance of the spaces. Wherever possible, new power and data installations shall replicate the existing, as this is known to have been accepted previously.



Allow for 8 No. WiFi Access point to be supplied and installed within this area to cover the various rooms and public corridors

Reading Rooms

The existing Reading Rooms have limited power and data available. The proposed exhibition design is still at concept stage, so exact requirements and locations for power and data are not yet confirmed. It is proposed to use the existing power and data wherever possible, however, it is anticipated that additional power and data will be required. Wherever possible, new power and data installations shall replicate the existing, as this is known to have been accepted previously.

Meeting Room

The proposed meeting room is currently used for imaging. There are a number of socket outlets and 2 twin data outlets surface mounted on back boxes fed via surface mounted conduits (1 twin socket is flush mounted).

The proposal is to lower all outlets to 450mm AFFL and supplement with 1 No. new twin socket outlet. Each existing outlet will be provided with a new faceplate to ensure consistency of the finish.

Allow for 1 No. WiFi Access point to be supplied and installed within this area



Staff Room

The existing staff room has a small number of power and data outlets which are flush mounted into the wooden panelling with brass faceplates. These will be retained as existing and supplemented with 1 twin power and 1 twin data outlet at high level to supply a media screen. Outlets shall be polished Brass finish

Allow for 1 No. WiFi Access point to be supplied and installed within this area

Virtual teaching space

The room is currently used for imaging and there are a small number of power and data outlets which are flush mounted into the wooden panelling with brass faceplates. These will be retained as existing and supplemented with new twin power and twin data outlets as indicated on the layouts.

Allow for 1 No. WiFi Access point to be supplied and installed within this area

Printed Book Room

Currently used as an office, this area has a small number of power and data outlets which are flush mounted into the wooden panelling with brass faceplates. The number of outlets is inadequate for the current use and there are a large number of extension leads feeding multiple sockets and data outlets.

The proposed use is also for office space, and additional power and data outlets are proposed to be installed whilst retaining the existing outlets. It is proposed to install all new outlets on skirting trunking in certain locations within the room, as indicated on the layouts. The skirting trunking shall be of bespoke manufacture, to match the existing skirting used elsewhere. Outlet plates shall be polished brass with black inserts.

Allow for 1 No. WiFi Access point to be supplied and installed within this area

Wolfson Room

Currently used as an office, this area has a small number of power and data outlets which are flush mounted into the wooden panelling. There is a mix of brass and white plastic faceplates to the outlets. The number of outlets is inadequate for the current use and there are a large number of extension leads feeding multiple sockets and data outlets.

The proposed use is also for office space, and additional power and data outlets are proposed to be installed whilst retaining the existing outlets. It is proposed to install all new outlets on skirting trunking in certain locations within the room, as indicated on the layouts. The skirting trunking shall be of bespoke manufacture, to match the existing skirting used elsewhere. Outlet plates shall be polished brass with black inserts.

Allow for 1 No. WiFi Access point to be supplied and installed within this area

Roof Plant Area

There are a number of mechanical plant items proposed to be installed on the existing roof. Please refer to the mechanical sections of this report for details. It is proposed to install a new distribution board at level 4, as indicated on the layouts, which will provide the power requirements for all mechanical plant items and associated controls.

4.6 General Lighting and Emergency Lighting

General

Generally lighting and emergency lighting will be upgraded throughout the refurbished areas as per the Stage 3 Electrical services layouts drawings.

The lighting installation will be designed in accordance with the following criteria:

- CIBSE Code for Interior lighting
- CIBSE Lighting Guide 7 – Office Lighting
- CIBSE Lighting Guide 5 – Educational Buildings
- CIBSE Lighting Guide 8 – Lighting Guide 8: Lighting for Museums and Galleries

Light levels, colour temperature, direction, patterns and luminaire aesthetics significantly influence the look and feel and ergonomic performance of a building, and all luminaires have been selected to meet the specific requirements for the area proposed.

Energy efficiency LED lighting will be provided throughout the refurbished where possible, however due to the nature of the building other sources might be selected to match existing. Refer to the luminaire schedule for details of proposed luminaires – Doc Ref JRL-HLEA-70-LS-E-3001

Lighting control has been considered for each area with a view to minimising energy use whilst still meeting the functional requirements of the end users.

The existing Central battery system for emergency lighting is to be retained and upgraded as required to accommodate the emergency lighting in the refurbished areas. Where possible, existing emergency lighting is being retained, or replaced with similar to meet the new aesthetic requirements. There are a small number of additional emergency luminaires proposed, and further investigation at the next stage of design is required to confirm if the existing systems can support the revised layouts.

The new emergency lighting will be designed to comply with BS5266 fulfilling, but not limited to, the following functions:

1. To indicate clearly the proposed escape route.
2. To provide illumination along such routes to allow safe movement towards, and through the exits provided.
3. To ensure that fire alarm call points and firefighting equipment provided along escape routes can be readily located.
4. To permit operations concerned with safety measures.

Illuminated 'exit' luminaires will be provided at final exits and emergency exits and along identified escape routes as required. Legends will comply fully with current legislation.

Cellar Ramp

Remove existing general luminaires and associated containment. Replace with new wall mounted up/down lighting luminaires to accentuate the vaulted ceiling within this space. Coordinate the lighting with the proposed media/information screens. In conjunction with the manufacturer of the handrail, provide continuous linear LED lighting integral to the handrail.

Luminaires are to be centrally controlled on/off using the existing lighting control system

Relocate the existing ceiling emergency luminaires to reflect the new layout and ensure that sufficient lighting reaches all parts of the proposed ramp.



Ramp Access

In the areas indicated on the layouts, remove the existing ceiling mounted circular luminaires and replace with new wall mounted up/down lighting luminaires to match those in the ramp area.

Lighting control to be retained as existing

Retain existing emergency lighting and exit signage and supplement with new exit sign above the new door, as indicated on the layouts.

Entrance & Lobby

Lighting within the new lobby shall be recess mounted circular downlights mounted into the ceiling. The luminaires located towards the rear of the lobby shall include asymmetric optics to wall wash the rear wall of the lobby. The external lobby luminaires shall be IP54 rated minimum and provide lighting to accentuate the entrance and highlight the etched pattern the side walls.

Lighting within the lobby will be controlled from the existing central controller and be switched with the main entrance area as existing.

Emergency lighting will be provided within the lobby in accordance with BS5266.

In the existing entrance foyer, the existing linear luminaires shall be retained.

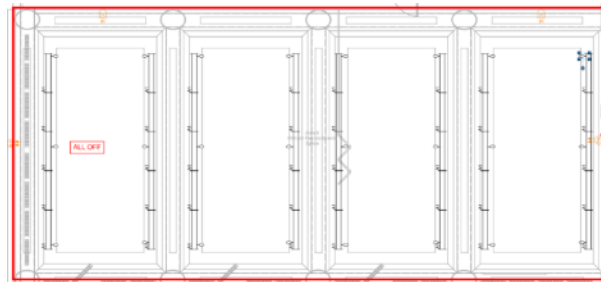
Event spaces

In the main event space at ground floor (Event space 01), the existing linear luminaires shall be removed and replace with a new linear lighting system with linear LED downlighting. The existing system has uplighting which will be redundant due to the introduction of ceiling panels in this area. Within the infill sections between the linear LED lighting, new LED spotlights shall be provided to provide lighting to points of interest. Allowance at this stage will be for spotlight to be provided at either end and in the middle of each linear section.

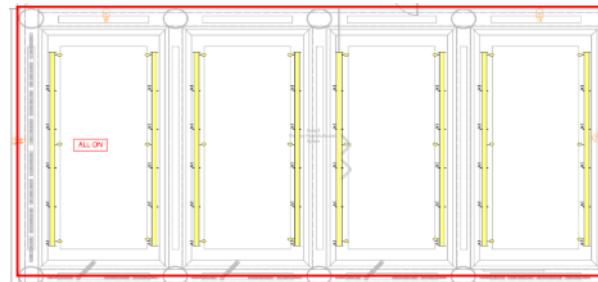
The new lighting shall be of matt black metal finish with the final selection to be agreed with the architect.

The lighting is currently controlled by the central lighting control system. This shall be reconfigured to ensure that the event space is zoned separately to the entrance area. A new scene setting control panel shall be provided within the event space, as indicated on the layouts, to allow local manual override of the lighting within the event space. As a minimum, the following scenes shall be allowed for:

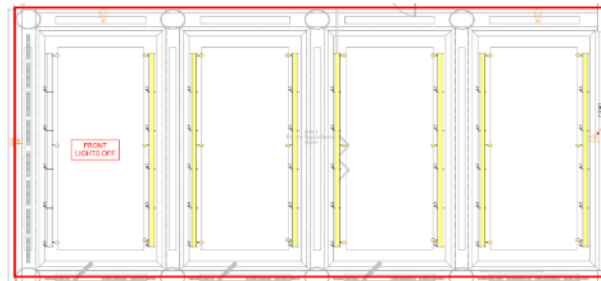
All off



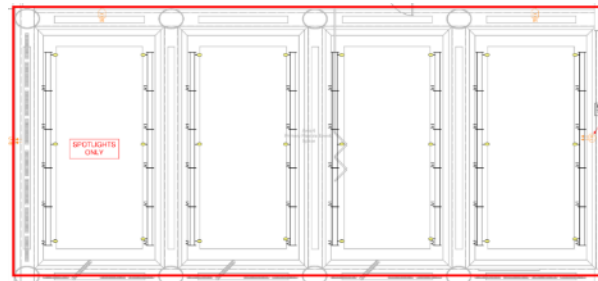
All on



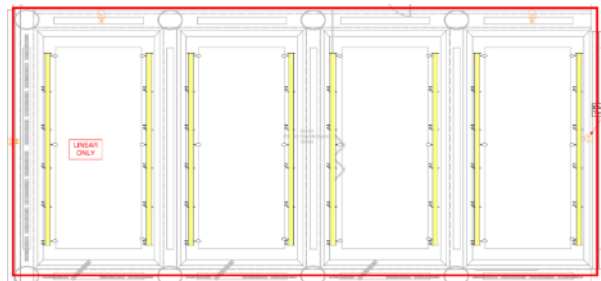
Front Lights off only



Spotlights only



Linear lights only



The existing emergency lighting within the general area has not yet been verified. There are standalone recess luminaires located within the bulkhead detail along the inner wall. Where possible, the existing emergency lighting shall be retained.

Existing Boiler Room

There is a requirement to insulate the slab between the boiler room and the Imaging suite which is located directly above. This will be achieved by either applying insulation direct to the ceiling within the boiler room, or by installing a suspended ceiling with insulation above. The final proposal is to be developed and agreed.

To facilitate either option, it will be necessary to de-mount the existing luminaires and the re-instate when the insulation works are complete. It is proposed to replace the existing linear fluorescent luminaires with equivalent LED versions which are more energy efficient.

Imaging suite

Existing lighting within the new imaging suite shall be removed and replaced with new recess ceiling mounted luminaires. The existing lighting consists of surface mounted linear fluorescent luminaires fixed directly to the suspended ceiling. There are also additional linear luminaires fixed to conduits at a lower level illuminating the bookshelves. All luminaires and associated conduits are to be removed.

New lighting shall consist of 600 x 600 modular LED recess mounted luminaires, installed within the new suspended ceiling. The luminaires shall be LG7 compliant to reduce glare on any materials being worked upon as part of the imaging process, and any exposed parts of the body the luminaire shall be painted of a colour that limits reflections from the proposed imaging equipment.



The luminaires shall be installed to suit the new curtain arrangement, which creates the working “booths”. Each booth will be provided with a dimming switch to control the associated luminaire within the space. At each entrance door to the room, a 2 way manual switch shall be provided to control the luminaires at the front of the room only.

Emergency lighting is provided by ceiling mounted standalone luminaire located at the front of the room. This will be retained in its current location, fixed to the new ceiling.

Dante and Ante-Dante rooms

Within these two areas, it is proposed to generally retain the existing arrangement of suspended linear fluorescent luminaires with manual switching. Within the Dante room however, it is proposed to replace the existing luminaires with new LED Linear suspended luminaires. The existing emergency lighting shall be retained also.

Exhibition Galleries

Within these areas, the existing lighting is via wall and ceiling mounted heritage lighting which is to remain. Within the cross corridor there are a number of wall mounted existing luminaires currently not in use, and it is proposed that these shall be re-lamped and brought back into use. Dependant on the final solution for the Exhibition design, track lighting may be introduced to this area only, similar to the existing in the flexible spaces.

Within the corridors it is proposed to re-lamp the existing luminaires.

The existing lighting controls are to be retained. However, for new luminaires and for Luminaires which may be connected via 13 amp plug and socket, each luminaire shall be provided with a driver capable of accepting remote control switching, such as the “Casambi” driver.

Emergency lighting is being retained as existing.



Staff Room

Existing lighting within this area is via suspended heritage luminaires fixed to the ceiling. These luminaires shall be retained and cleaned and re-lamped, with no new lighting proposed.

Existing lighting control is via manual switching by the door, which shall be retained.

Emergency lighting to be retained.



Emergency lighting to be retained

Printed Book Room

Existing lighting within this area is via suspended heritage luminaires fixed to the ceiling. These luminaires shall be retained and cleaned and re-lamped. It is proposed to provide a number of new free standing LG7 compliant task lighting luminaires, which can be located within the area to suit the desk configuration (1 per desk).

Existing lighting control is via manual switching by the door, which shall be retained. Task lighting shall be provided with integral PIR detection to activate when movement is detected in the local area.

Emergency lighting to be retained.

Wolfson Room

Existing lighting within the Wolfson room shall be removed and replaced with new recess ceiling mounted luminaires. The existing lighting consists of surface mounted linear fluorescent luminaires fixed directly to the suspended ceiling.

New lighting shall consist of 600 x 600 modular LED recess mounted luminaires, installed within the new suspended ceiling. The luminaires shall be LG7 compliant.

Existing lighting control is via manual switching by the door, which shall be retained.

It was not evident from a visual inspection what emergency lighting was provided within this space. There was no evidence of a standalone luminaire, so it is currently assumed that the emergency lighting is integral to the general luminaire(s). As the general lighting is being replaced, it is proposed that a new integral emergency luminaire be provided.

Roof Plant Area

Retain existing lighting to this area

4.7 Final Circuit Containment

General

The proposed works will include a number of vertical and horizontal containment routes.

Routing of services are generally being retained where possible. Where new routes are required, proposals will need to take into account limitations associated with the heritage elements of the building. All containment / cable routing is to be agreed with England Heritage and subject to a detailed survey at the next stage of design.

Generally, the containment shall be as described in section 4.5 small power and data.

Within certain areas it is proposed to install bespoke cable containment systems due to the sensitivity of the area and historical importance.

Bespoke Skirting trunking

Within a number of rooms there is an inadequate number of power and data outlets. This has led to an extensive use of extension leads with multiple power and data outlets fed from one fixed outlet. This provides a safety hazard, not just in terms of potentially overloading the circuits, but a trip hazard for people within the area.

Within the scope of this project, it is proposed to provide sufficient numbers of power and data outlets in all rooms to negate the need for this to occur. However, due to the sensitivity of the spaces and existing restrictions, this may not always be possible. Where appropriate, it is recommended that additional “desk management” is provided with the new furniture, with power and data provided at the desk if necessary.

To accommodate the additional outlets, in certain areas as described above in the small power section, it is proposed to install a skirting trunking which is sympathetic to the existing wood panelling, flooring, etc.



Staff Meeting Room



Virtual Teaching Space

Virtual teaching space

Existing lighting within this area is via a suspended heritage luminaire fixed to the ceiling. This luminaire shall be retained and cleaned and re-lamped. It is proposed to provide a new free standing LG7 compliant task lighting luminaire, which can be located within the area to suit the desk location.

Existing lighting control is via manual switching by the door, which shall be retained. Task lighting shall be provided with integral PIR detection to activate when movement is detected in the local area.

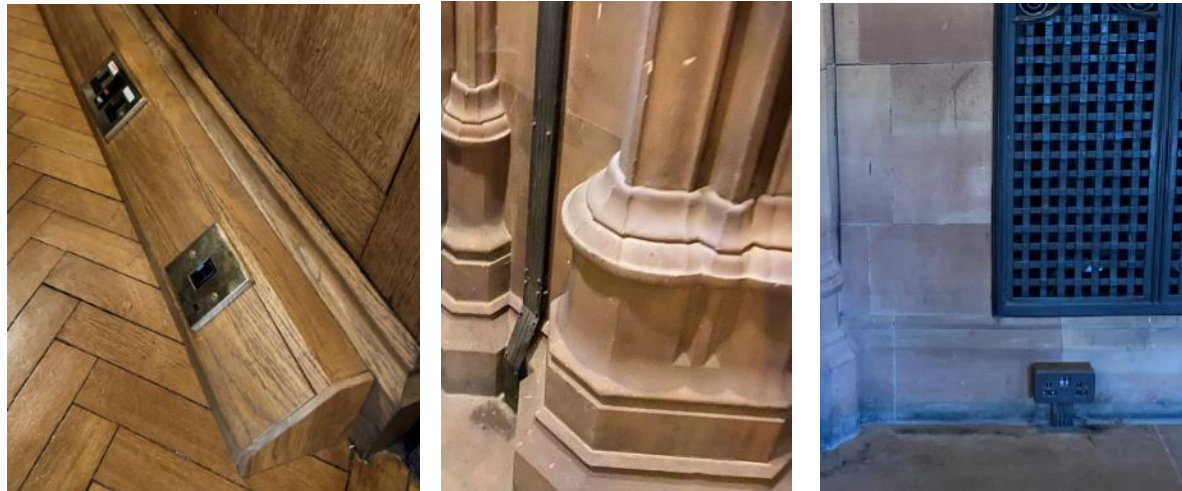
Emergency lighting to be retained.

Meeting Room

Existing lighting within this area is via surface mounted linear fluorescent luminaires fixed to the ceiling. These luminaires shall be replaced with new linear LED luminaires in the same approximate locations.

Existing lighting control is via manual switching by the door, which shall be retained.

There is a precedent already on site, and it is proposed to replicate this with modifications as necessary to ensure that the finished product is suitable for the environment it is to be installed.



Example of existing bespoke skirting trunking. Example of existing bespoke Cable trunking

Bespoke Cable trunking

Within the exhibition spaces and associated circulation spaces, there is a requirement to provide all exposed cable trunking in a manner that is sympathetic to the existing.

Examples of how this has been achieved previously are shown below.

4.8 Fire Alarm

General

The existing fire alarm system is generally being retained and upgraded/extended to serve refurbished areas. The fire alarm design will be in accordance with BS 5839 “Fire detection and alarm systems for buildings” and with the fire strategy report which has been prepared for this project. The design of the system will be subject to final approval by the building control and fire officer.

The two existing fire alarm panels are Honeywell Notifier panels and are to be retained. The two panels are networked together to form one system.



Existing Fire panel in extension

Existing Fire Panel in Original Building

Existing Fire alarm cabling is MICC and is generally being retained and extended to connect to new field devices. However, there is a risk that due to the age of the existing system, that new devices may not be compatible or available. This is being investigated and will be confirmed at the next stage of the design process.

A risk item has been raised regarding compatibility of any proposed new system/parts with the existing fire alarm system. It is noted at this stage that no allowance has been included in the budget for wholesale or sitewide replacement of the system.

If not included in this scope/budget, it is advised that wholesale replacement of the system is undertaken as a long-term maintenance project prior to, or in parallel with the John Rylands refurbishment works. Otherwise, there is a high risk that the system will not comply with current BS 5839 due to inadequacy of spare parts for the existing fire alarm system.

Cellar Ramp

The cellar ramp is an existing area converted to public access to the cellar level from ground floor of the extension. There is currently a smoke detector within the area, and this will be retained in the new scheme. Additionally, a new fire alarm manual break glass unit will be installed at the lower level of the ramp, as this now forms part of the escape route from the cellar level. The new device will be zoned with the corresponding cellar level.

At the lower level, the double doors from the ramp area to corridor will be provided with door détentes, which will allow the doors to be held open. This system will be interfaced to the fire alarm and in the event of a fire the doors will automatically release and close.

At the top of the ramp, the new sliding doors will be interfaced with the fire alarm system such that they open in the event of a fire alarm being raised. The doors shall also “fail open” in the event of a power failure.

Ramp Access

A new door is to be provided within the existing corridor, and as such a new detector will be provided. Existing sounders are to be retained, with one number to be slightly relocated to allow for a new door opening into the public space.

The door from the event space into the ramp area is to be powered and access controlled. As such, a fire alarm interface shall be provided to ensure that in the event of a fire alarm being raised, the door opens and the access control is released.

Entrance & Lobby

Within the new lobby, a new smoke detector shall be provided. New interface(s) shall be provided to the 3 No. new sliding doors. During normal open hours, or when events are being run (i.e. when there is public access to the library), the 3 No. sliding doors will open automatically in the event of a fire alarm being raised. When the Library is closed, the doors will be locked, and therefore the doors will not open if the fire alarm is activated.

An existing beam detector system is installed throughout the existing ground floor reception space. As a new partition is being installed in this area, effectively dividing the space into two, it shall be necessary to reconfigure the existing system such that two beam detectors are provided, one for the reception area, and one for the event space (either side of the new partition)

Event spaces

As described above, a new “event space” is created by installing a partition wall within the existing reception area. This area will be protected by a beam detector system.

A new door leading from the event space to the stair will be provided with a new fire shutter, which will be connected to the fire alarm system via a new interface unit.

Imaging suite

The existing room has a wall mounted fire alarm sounder and two ceiling mounted smoke detector devices. It is proposed to retain these devices, however, it be necessary to relocate the smoke detectors to align with the new ceiling and bulkhead, as indicated on the layouts.

New fire alarm interface units will be required for each of the access control devices on the doors into this room.

Dante and Ante-Dante rooms

Retain existing – no proposed works.

Exhibition Galleries

Retain existing – no proposed works.

Meeting Room

The existing smoke detector in this room is “black” to match the ceiling colour. This device will need to be replaced with a new standard white coloured device

Staff Room

Retain existing – no proposed works.

Virtual teaching space

Retain existing – no proposed works.

Printed Book Room

Retain existing – no proposed works.

Wolfson Room

It is proposed to retain all Fire alarm devices within this room, however, it should be noted that the ceiling mounted smoke detectors will need to be carefully maintained during the ceiling replacement works.

Roof Plant Area

Generally, retain existing Fire alarm devices. A new fire alarm interface is to be provided to shut down the new plant in the event of a fire alarm..

4.9 Security

General

Existing security systems such as intruder alarm, access control and CCTV are generally being retained and extended to serve refurbished areas subject to confirmation that the current equipment is fit for purpose and that they meet industry standards.

Security systems require upgrades have been outlined in the received Security Improvements Stage 1 Report.

The security equipment provided will be in line with The University security codes of practice and the preferred security equipment manufacturers where this is viable.

Noting that the extent of the new legislation “*Duty to Protect Public Spaces from Terror published 24th February 2022*” is still unclear and full implications have not been defined at this stage, further development on security services will be required to ascertain that the new legislation is fully captured. Therefore, the current design does not take it into account.

Principle Components

The principal components of the security system are proposed as follows:

Access Control system

The existing ASSA access control system is now obsolete. Whilst there is the possibility to add additional field devices to the system, this is limited by the software currently installed. The proposed works only includes for a small number of new Access Controlled doors, and as such it is not proposed to upgrade the head end system as part of the scope of these works.



Typical proximity Card reader

CCTV Surveillance

The existing CCTV system is an analogue system utilising DVR's and analogue cameras connected via Co-Axial cable. The monitors are located in the security room adjacent the historic entrance and the system is not capable of being networked onto the University network.

The proposed works will introduce a small number of new cameras (approximately 3), and it is understood that there are sufficient spare connections on one of the DVR's to accommodate this.

Intruder detection and alarm system

The existing Chubb system is now obsolete and sourcing new parts will not be possible. It may be possible to obtain a small number of parts, but generally the system is no longer supported.

The current proposal is therefore to replace the two existing panels with new Texacom – Premier Elite panels. This would allow the system to retain the majority of the existing cabling and end devices, whilst allowing new devices to be added. This is still to be finalised and confirmed. New field devices could be added to the system and supported by the new panels.



Existing panel located in security hut.



Existing panel located in reception office



Proposed new Panel

It should be noted that the Next Chapter project has not made allowances for the complete replacement of the now obsolete Intruder detection system.

Cellar Ramp

The cellar ramp is an existing area converted to public access to the cellar level from ground floor of the extension. As such, a new fixed lens CCTV camera is to be located in this area to monitor the area.

Ramp Access

A new fixed lens CCTV camera is required to cover the area which is now public access leading to the ramp and the cellar area.

The new door leading from the Lobby into the existing corridor, and the new door from the corridor to the ramp are to be limited access and entry shall be restricted using the Access control system.

Entrance & Lobby

The existing rotating entry door is to be removed and replaced with a lobby with 3 sliding doors. The external sliding door will be provided with door contacts which are to be monitored using the existing Intruder alarm system.

The existing pass door to the left of the rotating door (as you enter the building) is to be removed and the door contacts removed and disconnected from the intruder alarm system.

A new fixed lens CCTV camera shall be installed within the new lobby. This shall provide monitoring of movement and facial recognition of all persons entering the building.

Within the existing reception area, there are two existing CCTV cameras. The centrally mounted camera previously provided monitoring and facial recognition of people entering through the rotating door. This camera is to be relocated to the ceiling above the reception desk and will continue to monitor people entering the building and provide facial recognition.

The second existing camera is to be retained in its current location.

Event spaces

No proposed works in these areas

Imaging suite

Existing wall mounted PIR detection to be retained.

New access control restricting access into the Imaging suite shall be provided on the existing and new doors to the room.

Dante and Ante-Dante rooms

No proposed works in this area

Exhibition Galleries

The existing gallery areas are protected using wall mounted PIR detection, and it is not currently proposed that any works are required to the general detection within this area.

The exhibition show cases are provided with Vibration detection and anti-tamper devices to prevent unauthorised access to the exhibits within. The detection systems, which are located within the base of the showcases, are connected to the intruder alarm system via radio receivers located within the rooms.

The proposed exhibition design is still at concept stage, so exact requirements for the number and location for Vibration and anti-tamper devices are not yet confirmed. It is proposed to try and restrict the number of showcases due to the limitations on extending the existing IDS system.

Meeting Room

No proposed works in this area

Staff Room

No proposed works in this area

Virtual teaching space

No proposed works in this area

Printed Book Room

No proposed works in this area

Wolfson Room

No proposed works in this area

Roof Plant Area

No proposed works in this area

4.10 Facilities for the Disabled

General

All services will be installed with a particular regard to achieving compliance with Part M of the building regulations. Each service in their own right will have a set of design criteria to ensure all requirements are met. These include but are not limited to;

- Small power outlets
- Lighting switches
- Accessories having colour contrast to the background for the visually impaired
- Audible and visual fire alarms
- Services will be installed to suit DDA & special needs requirements in locations identified by the client/building control. Consideration will be given to the location to which these services are provided.. These include but are not limited to;
 - Induction loops within specific areas as identified by the University
 - Portable induction loops for use within multi-use rooms

Final DDA specifications to be agreed with England Heritage

It should be noted that in some areas (as specified within this report) power and data socket outlets will be mounted on skirting trunking, which will mean that they will be installed lower than 450mm and therefore not in accordance with the recommendations of Part M of the building regulations.

This condition will only occur in staff areas where Heritage requirements restrict the locations available to install such devices.

Emergency Voice Communications

At cellar level, there is a requirement for a disabled refuge point from cellar level up to the main entrance area at ground floor. This area will be provided with a 2 way voice communication system linked to the existing system within the building. The current system has a main panel located within the office at the rear of the reception desk within the modern entrance. There are sufficient spare ways to incorporate this additional EVC point.

Assisted hearing to be provided to exhibition cases/displays where they are equipped with audio.

4.11 Audio Visual Systems (AV)

General

The infrastructure for AV will be provided in line with current University AV specialist and University standards.

Details of the AV equipment are detailed elsewhere, and this report is limited to the provision of fixed power and data to the proposed AV systems to be provided. It is understood that AV will be limited to the following:

- New fixed screens in meeting rooms, staff rooms, etc.
- Mobile screens and audio for the main event space at ground floor level.
- Details of the AV equipment for the exhibitions shall be confirmed at the next stage of design

Further details and key criteria will be outlined at subsequent stages of design in accordance with the University AV specialist aspirations.

4.12 Lightning Protection & Surge Suppression

General

The lightning protection system will be extended from the existing system to accommodate external plant areas. The system will consist of roof termination tapes running along the roof levels and bonding all the roof metal work and any plant items. The extension of the system is to be installed to match existing method and in accordance with University standards and heritage requirements.

Earthing and bonding will be designed to comply with both BS 7671 and BS 7430.

The lightning protection system will be designed in accordance with BS EN 62305.

5. Sustainability

The project will be designed to include the sustainability opportunities identified in areas that fall within the scope of the refurbishment, in summary these opportunities include:

Refer to the project Sustainability Opportunities tracker appended for items identified.

General upgrade of systems to achieve NZC aspirations is outside the scope of this project.

6. Design standards

This section contains information on the general design standards that Hoare Lea will utilise in designing this project moving forward through Stage 4. The content of this section is based upon previous similar experience and industry best practice and will be extended/detailed further at subsequent design stages.

The proposed design criteria for the mechanical and electrical engineering systems will be in accordance with the following:

- Building Regulations
- The requirements of Building Control (including Fire Officer)
- Local Authority rules and regulations
- Health and Safety Executive (HSE) Guidance
- Construction Design and Management (CDM) Regulations
- Statutory undertakings regulations
- Current CIBSE Guides, Application Manuals, Commissioning Codes and Codes of Practice
- BSRIA Guides
- BESA maintenance guides
- The Air Quality Standards (Amendment) Regulations
- The Clean Air Act (including the memorandum on chimney heights)
- Regulation (EU) No. 517/2014 on Certain Fluorinated Greenhouse Gases (F-Gas Regulations)
- The Water Supply (Water Fittings) Regulations
- CIPHE - Plumbing engineering services design guide
- HSE ACoP L8 - The control of legionella bacteria in water systems
- HSG 274 Legionnaires' disease - Technical guidance
- BS 7913-2013 Guide to the conservation of historic buildings
- BS EN 16893-2018 Conservation of Cultural Heritage
- BS4971-2017 Conservation and care of archive and library collections
- University of Manchester EPM documentation (refer to derogations tracker for agreed derogations)

The MEP systems are designed with regard to health and safety guidelines, and good practice for access, maintenance of plant, and movement around plant rooms, whilst working within the constraints of the existing building and systems.

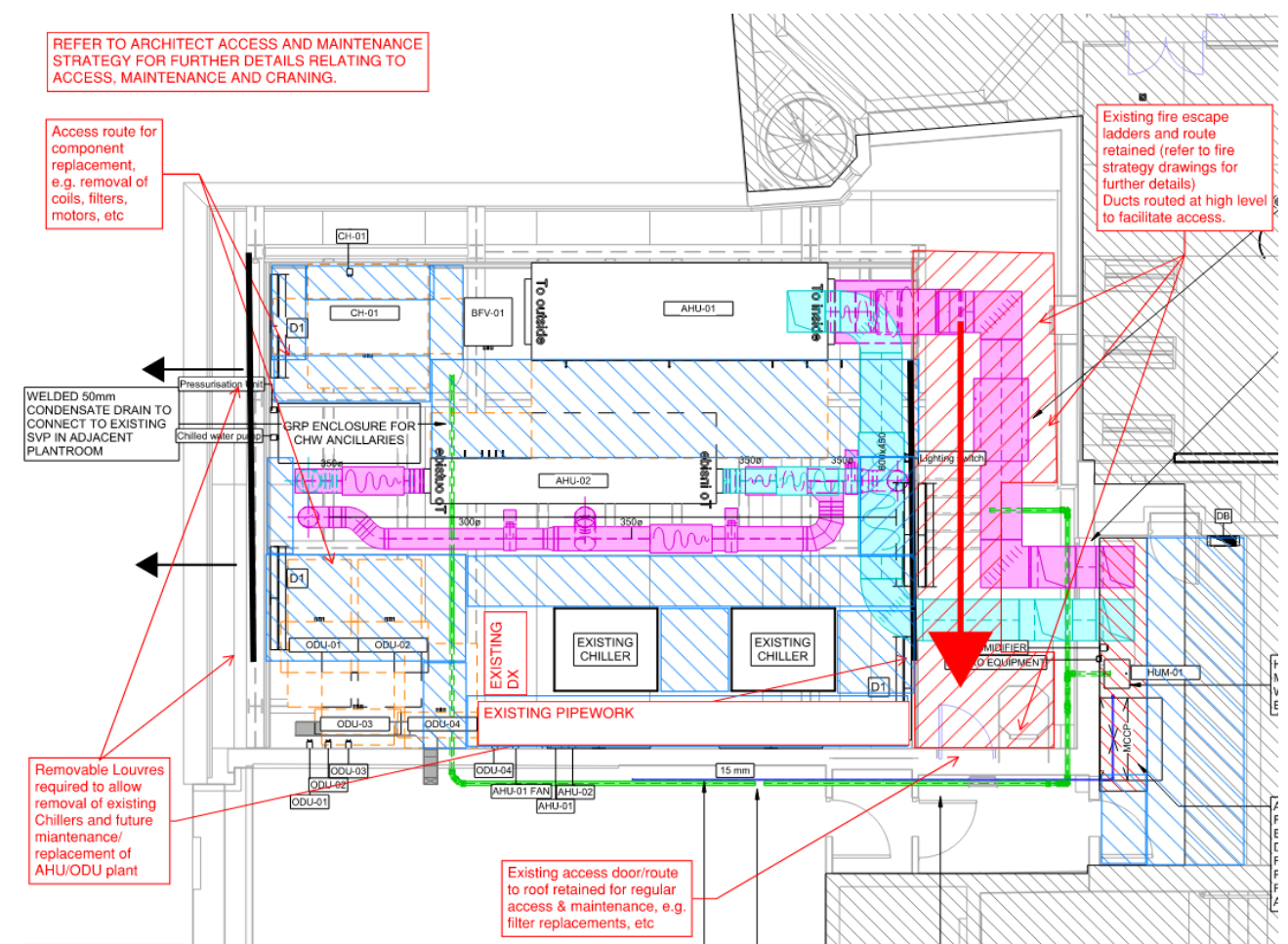
Operating and maintenance documentation shall be specified to be provided generally in accordance with BSRIA BG 79/2020 – ‘Handover Information and O&M Manuals’. A computer-based operating and maintenance manual system shall be specified, complete with search functionality capability.

A building Log Book(s) shall be specified to be provided in accordance with the relevant Part L Approved Document(s) of the Building Regulations and CIBSE TM31:2006.

New central plant and equipment has been provided in a new roof level external plant compound with installation and end of life replacement facilitated by removable louvres and craning from the perimeter of the building, as per sketch below.

Regular access to the roof is by the existing access route which shall be retained to facilitate regular maintenance.

New internal plant shall be housed in a new riser cupboard in the atrium balcony area. This shall have full height lockable access doors to provide full access to the estates team.



7. Operating and maintenance strategy

8. Numerical design criteria.

It is intended that the information contained here is thoroughly reviewed by University of Manchester. This section contains information on the design criteria that Hoare Lea have utilised in the design at stage 3 and will carry over to stage 4. This section relates only to new systems, and not existing systems.

8.1 External criteria

External design conditions for thermal load calculations and plant sizing have in general been determined in accordance with the CIBSE Guide A, Section A2 Weather and Solar Data. The weather data for Manchester has been selected.

The following external design conditions have been selected upon which thermal load calculations and plant selection will be based.

	Temperature	Humidity	Notes
Heating	-5°C	100% relative humidity	For thermal load calculations (0.4% exceedance)
Cooling	28°C* DB (dry bulb)	20°C WB (wet bulb)	For thermal load calculations (1% exceedance)
	31C* DB (dry bulb)	22.5°C WB (wet bulb)	For AHU coil selection (0.1% simultaneous DB and WB exceedance)
DX/VRF Heat Pumps	35°C maximum	With capability to operate down to -10°C (with a reduction in capacity)	
	-5°C minimum		

The above temperatures are air temperatures measured in the shade.

The summer external design temperatures identified above include for present climate change 2010*

(*2010 is the latest year that CIBSE data is available for)

8.2 Fabric Data, improvements and infiltration

In the imaging suite and ground floor flexible event space it is advised that measures are taken by the Architect to reduce the infiltration and solar gain to a minimum in order to improve the stability of the environment in accordance with the requirements of BS 4971-2017 (e.g. draft proofing, secondary glazing, solar film).

In the absence of any further information provided in the architectural specifications, the design concept is based on the following fabric values:

U-Value Roof (Wolfson)	2.0 W/m²K
U-Value External Wall (Wolfson/Imaging)	2.0 W/m²K
U-Value Glazing (Wolfson/Imaging)	4.8 W/m²K
G-value Glazing	0.7
U-Value Floor (Imaging above boiler house, new insulation)	0.18 W/m²K
U-Value Curtain Walling (GF Flexible space)	2.2 W/m²K

	Heating mode	Cooling mode
Heritage Perimeter (6m) zones	1.5 air changes per hour	0.5 air changes per hour
Heritage Internal zones	0.5 air changes per hour	0.25 air changes per hour
Extension Perimeter (6m) zones	1.0 air changes per hour	0.5 air changes per hour
Extension Internal zones	0.5 air changes per hour	0.25 air changes per hour

8.3 Internal Heat gains

Heat gains have been based on the following criteria:

New LED Lighting	7 W/m2
Task lighting (Imaging)	275W/cubicle
Equipment (Imaging)	25 W/m2
Equipment (Flexible Space)	10 W/m2
Occupancy gain in accordance with CIBSE Guide A but not less than:	
Peak Occupancy	based on architectural layouts at 85 W/person sensible, 60 W/person latent
GF Flexible Event space	80 People
01 Imaging Room	7 People
02 Virtual Teaching suite	3 people
03 Wolfson Room	10 people
Solar gain calculated in accordance with CIBSE Guide A.	

8.4 Environmental criteria.

The following schedule summarises the targeted design parameters for each space within the scope:

Area	Supply	Extract	Temperature (heating)	Temperature (cooling)	Humidity
Ramp Room	As Existing	As Existing	As Existing	As Existing	As Existing
Modern Entrance/ Atrium	As Existing	As Existing	As Existing	As Existing	As Existing
Modern Entrance – lobby	Passive		As existing (air curtains provide top-up heating)	As Existing	As Existing
Modern Entrance - Flexible events space	Min. 10 l/s/person	Min. 10 l/s/person	21°C ± 1.5 °C	25°C ± 1.5 °C (AC controllers	Not Controlled

Area	Supply	Extract	Temperature (heating)	Temperature (cooling)	Humidity
				activate at 28°C to bring temp down to 25°C)	
Boiler room	As existing – natural ventilation. Additional louvered door provided		As Existing	As Existing	As Existing
Dante Room	As Existing - passive	2 ac/hr via existing upgraded/re- commissioned extract system	As Existing	As Existing	As Existing
Ante Dante Room	As Existing - passive		As Existing	As Existing	As Existing
Imaging Suite	Min. 10 l/s/person, or greater where required to meet heat gains	Min. 10 l/s/person or greater where required to meet heat gains	21 ± 1 °C	20 ± 1 °C	50% RH ± 5%
Existing 1890s, Crawford, Spencer, perm. Gallery, flex engage, flex meet. Temp gallery,	As Existing	As Existing	As Existing	As Existing	As Existing
Historic Entrance	As Existing	As Existing	As Existing	As Existing	As Existing
Dedicated Storage	As Existing	As Existing	As Existing	As Existing	As Existing
Virtual Teaching Suite	As Existing	As Existing	As Existing	As Existing	As Existing
Meeting Room	As Existing	As Existing	As Existing	As Existing	As Existing
Staff Breakout	As Existing	As Existing	As Existing	As Existing	As Existing
Wolfson Room	Min. 10 l/s/person	Min. 10 l/s/person	As Existing (additional controls to be provided to existing radiators)	Tempered incoming air provides some spot cooling	Not Controlled

Area	Supply	Extract	Temperature (heating)	Temperature (cooling)	Humidity
Printed Book room	As Existing	As Existing	As Existing	As Existing	As Existing

It is noted that existing temperature/humidity sensors confirm that the building is generally too hot and too dry for the collections. It is advised that existing heating systems are generally controlled down to target circa. 18°C annual average temperature in spaces where collections are permanently stored and that moisture and fresh air ventilation introduced into spaces is controlled to target achievement of not less than 35% RH and not more than 60%RH in each space, all in accordance with the requirements of BS 4971-2017. Stability of temperature is critical and will need to be factored into the above and any associated tolerances.

8.5 Acoustic criteria & ductwork velocities

Refer to the acoustic report for acoustic criteria/targets for each space as well as further MEP requirements, e.g. acoustic insulation/ linings/ fill, etc.

The following maximum duct velocities will be achieved (or more onerous where required for acoustics):

Final branch ductwork	2.5 m/s
Internal main/secondary branch distribution ductwork	4.5 m/s
Roof plant	5 m/s

Appendix A – Sustainability Opportunities Tracker

John Rylands Research Institute & Library. Manchester.

The University of Manchester.

MEP ENGINEERING
SUSTAINABILITY OPPORTUNITIES
CONDITION SURVEY
REVISION 03 – 18 APRIL 2023



STAGE 2

Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Verified	Authorised
01	20/06/22	Draft	BK	BB	DRA
02	26/10/22	Updated to reflect Stage 2 proposals	DRA	AC	DRA
03	18/04/23	Updated to reflect Stage 3 proposals	BK	AC	DRA

This document has been prepared for The University of Manchester only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

Sustainability.

The University of Manchester has a comprehensive Sustainability strategy which includes alignment with Manchester Council in targeting Zero Carbon by 2038 broken down into incremental year-on-year targets.

The design team have been requested to provide input into the Condition Survey with recommendations for optimising opportunities to embed a culture of environmental sustainability within the building, looking at how improvements can be made to the building fabric and services to improve the sustainability of John Rylands Library. The table below lists several opportunities specific to the site along with some challenges and associated recommendation.

The table below represents a general overview of Sustainability measures that could be incorporated. Some of these items do not currently fall within the scope of the proposed refurbishment project but could be considered for incorporation or alternatively could be undertaken in future.

Refurbishment Opportunity	Challenges	Stage 3 Proposal
Passive/ Architectural Measures Opportunity during the refurbishment to undertake improvements to the fabric to reduce the reliance on mechanical plant, some potential improvements identified could include: - Improving natural ventilation openings with provision of high- and low-level openings in windows in areas such as the Wolfson building. This would provide beneficial user environmental control. - Provision of external solar shading, solar control film/manifestations could reduce cooling loads and mitigate overheating. There is a particular opportunity in the new extension entrance area where high temperatures have been reported in part due to the extensive glazed areas and associated solar gains. - The existing ground floor entrance area to the new extension was noted as being cold in winter and hot in summer, Architect to advise regarding provision of a lobbied entrance which could assist in mitigating drafts. - The existing ground floor entrance area to the new extension was noted as being hot in summer, Architect to advise regarding provision of additional automated natural ventilation louvres which could assist in dissipating heat. - The boiler room ceiling is currently uninsulated, so heat gains (and noise) are transferring through into the room above increasing the risk of overheating in summer. Architect to investigate provision of insulation to the boiler house ceiling. - Consideration to be given to the provision of blinds where this would assist in mitigating heat gains and reducing glare. There is a particular opportunity in the new extension entrance area General improvements to fabric – undertake thermographic survey to identify opportunities	- Architect to further explore these items. Fabric modifications would need to be sensitively undertaken and there may be limitations due to technical challenges, heritage value and/or planning constraints associated with the existing façade. - Acoustics and air quality would also need to be a consideration - Some of the works would lead to significant disruption	INCORPORATED Opportunities listed in blue still being investigated further by the Architect at stage 3 Potential additional natural ventilation where required to; staff room and meeting room. Sealing of windows in imaging, collections & quarantine Incorporation of natural openings as part of the lobby/atrium area Lobbied entrance provided, complete with electric air curtains. Boiler room ceiling being insulated Shutters being provided in lieu of blinds in flexible space to reduce glare and direct solar penetrating into the space. Thermographic survey not instructed as limited changes to fabric included within project.
Lighting The light fittings vary significantly throughout the building and whilst some have been replaced with modern low energy/high efficiency types there are still opportunities in some areas (e.g., Wolfson building, cellar...etc) to replace dated existing fittings. This could assist in: - energy reductions - mitigating glare - lowering of equipment heat gains within the spaces affected Consideration will also be given to use of appropriate task lighting or specialist cabinet lighting that can help in illuminating displays. This could potentially allow background lighting levels to be reduced leading to energy savings.	- Fabric modifications would need to be sensitively undertaken and there may be limitations due to technical challenges, heritage value and/or planning constraints associated with the existing façade. - Care would need to be taken to ensure the fittings are suited to the building aesthetic	INCORPORATED Where replacement of inefficient light fittings is part of the scope in refurbishment areas this will be undertaken wherever technically and aesthetically feasible. Some new LED replacement lighting being provided where ceilings are being changed in wolfson room, imaging suite & entrance flexible space. Task lighting being incorporated where appropriate in heritage areas. Exhibition cabinet lighting being developed by exhibition designer

Building Management System and controls (BMS) During stakeholder engagement it has become apparent that the building controls are not operating as effectively as they could. The current system (Trend) differs from the Universities standard specification (Schneider) and so does not integrate fully with the wider campus. There is an opportunity to make improvements to the system, from re-programming through to replacement of controllers. This could provide better interface with the Universities existing systems and/or achieve efficiencies through more effective environmental control. Some BMS virtualisation works are already underway to upgrade the Trend BMS with Schneider controllers In addition to upgrade of the controllers, re-commissioning of systems and review of the current operational control strategy could provide further benefit, e.g., control of underfloor heating and high level actuated louvres in the atrium areas could help mitigate overheating in this area. Previous design strategy advised supplying air to achieve 18degC in heritage spaces.	- Limitations of the installed system hardware and software - Challenges associated with retrofit in a heritage building - Differing environmental control requirements for occupants and collections	INCORPORATED The decision has been made that where new panels are required as part of the works these will be fully compliant with University requirements (Schneider). General upgrade of controls does not form part of this refurbishment. Separate BMS upgrade works have been undertaken by Estates so that panels speak back to the central University system.
1890s Heating System In the 1890s building the heating system is very limited in its ability to control the environment in individual rooms. The system includes multiple ventilation units and the original radiators linked to refurbished heating pipework. The system controls are very limited. Providing pipework (zonal controllers) could provide further user control and assist in achieving temperatures in individual zones/spaces.	- Technical challenges of retrofitting additional valves to heritage heating systems. Retrofit would require drain down and flushing of some very old pipework – this is a significant risk. - General refurbishment of heating systems does not fall within scope of project.	INCORPORATED Localised controls shall be retrofitted to the Wolfson room radiators in order to better control the temperature within this space (currently very hot when heating on). Pipe freeze methodology could be utilised to avoid drain down of system. Wholesale upgrade of control systems for existing heating systems do not form part of this refurbishment. Further provision of zonal controls would be best undertaken in future when the pipework system in its entirety is upgraded or replaced, to avoid potential damage to heritage systems.
Point of Use electric water heaters Provision of point of use electric water heaters in place of existing piped domestic systems to serve infrequently used water fittings could assist in achieving carbon savings. There are spatial benefits as cables are more easily routed than heating pipes and an additional benefit would be the reduction in heat gains to spaces caused by the hot water pipes travelling through the space (at times uninsulated). By reducing the extent of domestic hot water pipework this approach could also reduce the heat losses associated with the existing hot water system, mitigate dead legs and improve hot water response time to remaining fittings.	- Careful consideration would need to be given to the type and location of water heater as this would likely need to be capable of being concealed adjacent or within the sanitaryware unit or architecture. In the heritage areas this would be a particular challenge. - This approach generally not suitable for cleaners/kitchen sinks	NOT REQUIRED There is now no provision of sanitaryware so no opportunity to incorporate this item.
Sub-Metering Additional heat meter sub-metering could be provided to kitchens/ humidification plant and other large electrical loads to better monitor energy consumption and alert estates to energy wastage. Dedicated water metering to the kitchen/toilet block could also assist in monitoring and targeting to reduce usage.	- Type/calibration of meters is critical - Cost associated	INCORPORATED Electrical sub-metering to be provided to central fans, heating/cooling plant and humidifier (i.e. larger energy users)
Low water use sanitaryware fittings Potential for low water sanitaryware fittings to be provided where introduced as part of the refurbishment works.	- Minimal sanitaryware likely to be introduced as part of the current refurbishment	NOT REQUIRED There is now no provision of sanitaryware so no opportunity to incorporate this item.

Kitchen Equipment Potential for an assessment to be made of existing catering equipment to understand what items are still required following the refurbishment. where appropriate newer more energy efficient equipment could be procured. An all-electric kitchen could lead to Carbon savings as the grid reduces the ventilation load compared to a gas kitchen so that lower airflow rates could be used resulting in energy savings.	- Savings and payback period to be understood	NOT REQUIRED There is no provision of kitchen equipment so no opportunity to incorporate this item.
Insulation of exposed pipework Some existing pipework is exposed leading to heat losses within some heritage spaces as well as the central boiler house leading to unwanted heat gain within the spaces. Pipework, valves and ancillaries could be lagged/bagged and/or tastefully cladded in order to minimise heat gains to spaces whilst aligning with heritage aesthetic.	- Maintaining heritage aesthetic where exposed	INCORPORATED Where insulation is required within the scope of the refurbishment this will be provided and bagging of valves in the plantroom will be included to minimise heat losses to the space.
Sensor Controls linked to Variable air volume controllers or Variable speed drives Introduce CO2 monitoring to allow ventilation to be setback during low occupancy. This could be beneficial in the ground floor of the new extension where the occupancy varies greatly.	- Limited opportunity to incorporate as ventilation in the new extension is generally driven by collection requirements. Ventilation in heritage buildings assists in removing moisture.	INCORPORATED Wolfson Room AHU to be provided with CO2 monitoring to be capable of being setback during low occupancy.
Variable speed drives Where not already provided on pumps and fans, variable speed drives to be introduced.	- Pumps generally equipped with VSDs - Limited opportunity to incorporate on fans - Disruption due to upgrades requiring equipment to be isolated.	INCORPORATED 2Nr new AHUs provide with variable speed fan drives.
EC/DC motors Where not already provided on fans EC/DC motors could be introduced. Potential to upgrade existing AHUs and realise energy savings.	- Disruption due to upgrades requiring equipment to be isolated.	NOT INCLUDED 2Nr new AHUs are provided with high efficiency plug fans. Upgrade of existing fans not included within scope of these works. Potential LTM item could involve overhauling/upgrading the existing 1920s building fan to try to make it more energy efficient and to optimise the ventilation rate. Subject to LTM discussions/funding.
Heat Recovery Where not already provided on ventilation systems, Heat recovery could be incorporated to preheat incoming air stream.	- Limited opportunities to incorporate as it is generally already incorporated on systems with supply and extract or recirculation systems provided with minimal fresh air intake.	INCORPORATED Plate heat exchanger incorporated on Wolfson room AHU and 80% recirculation included on imaging suite AHU.

Longer Term Sustainability Opportunities	Challenges	Recommendation
TM54 Energy Analysis A TM54 energy analysis (or equivalent) could be undertaken for the building to assist in understanding current energy usage and potential opportunities.	- Limitations of software to model historic buildings. - Limitations in quality of input information available (e.g., fabric of historic building) - Majority of energy use is for the collections or for ventilation of the heritage building so there is perhaps limited benefit in a TM54 approach	NOT REQUIRED Decision has been made not to progress the TM54 as there is limited benefit due to the partial/selective nature of the refurbishment.
Manchester Civic Quarter District Heating There is a potential opportunity to connect into or provide a future connection for connection into the Manchester Civic Quarter District Heating network. Additional funding would need to be secured to extend the existing district heating system and electrical power infrastructure from its current location adjacent Heron House to serve the John Rylands Library.	- It is noted that the current energy centre runs on gas CHP plant so connection into this system would not result in a reduction in reliance on fossil fuels in the short term. - Significant cost and complexity associated with provision of a connection from the existing network. - Pipework would need to be carefully routed to minimise heat losses and there is the challenge of crossing Deansgate. - Legal/supply implications for University due to change in supplier - Planning implications?	NOT INCLUDED Understood that the University does not want to progress a District heating feasibility study at this stage.
Incorporation of electric Heat pump technologies The latest Part L now recognises the significant reductions made in recent years to the carbon emissions associated with grid electricity, this therefore encourages the use of electric heat pump technologies for space heating and domestic hot water. Opportunities could include the following: - Retrofit of air source heat pump technologies to existing underfloor heating circuits (subject to Specialist input), this could reduce reliance on gas and provide some beneficial cooling to the café/entrance area in summer though supplementary heating may be required due to the reduction in system temperatures. - Retrofit of air source heat pump technologies to serve existing air handling plant heating/cooling coils. - Retrofit of air source heat pump technologies to boiler system with weather compensation to meet significant proportion of the load through the year (backed-up from gas boilers) - Retrofit of air source heat pumps to the domestic hot water system. This would provide carbon savings and assist in reducing reliance on fossil fuels.	- Access and siting of the air source heat pumps, (would likely need to be located on the roof of the new extension) - Planning and Acoustic considerations - Spatial constraints in providing heat pumps to the older buildings - May require upgrade of electrical incoming supply - Existing heat emitters/distribution (e.g., underfloor heating, etc) would be undersized for the reduced F&R temperatures, supplementary heating in these areas may be required. - High F&R temperature required to heritage areas and no opportunity to replace the radiators so high temperature heat pump solution or hybrid solution will be required.	INCORPORATED Electric heat pump/refrigerant heating/cooling has generally been incorporated on the refurbishment scheme. In future, wholesale retrofit of ASHPs particularly to AHU plant in the new extension could be considered, this does not currently form part of this refurbishment scheme.
Incorporation of Photovoltaics and battery storage The existing new extension roof provides an opportunity for photovoltaics to be provided at roof level. If this approach is taken, there is also an opportunity to include for a battery storage facility to optimise the usage of the electricity generated ensuring that as much as possible is used to meet the building load directly. This approach could provide energy/carbon savings over an extended period.	- Panels/batteries can have relatively prolonged payback periods as the output will be limited by roof area and efficiency of the panels - Plant space for batteries is limited. - Planning implications?	NOT INCLUDED Not currently included within this scheme but could be considered as part of LTM/future NZC works undertaken at JRL.

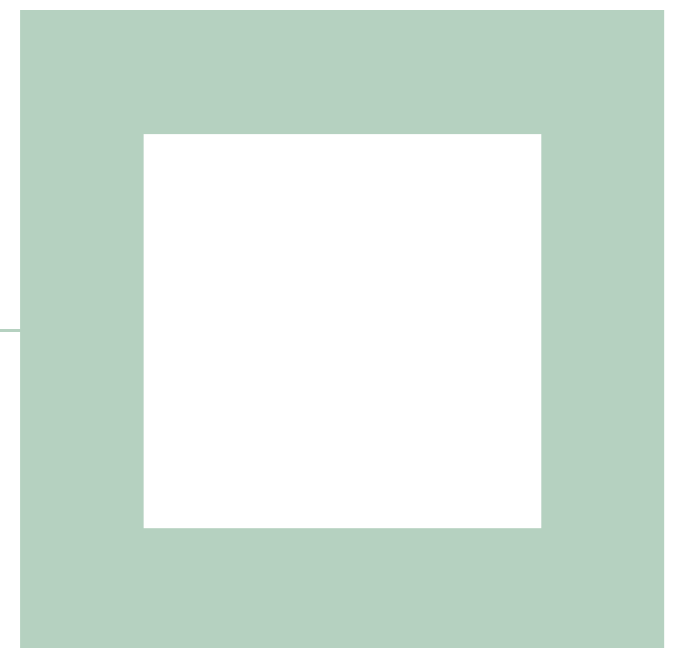


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SENIOR ASSOCIATE

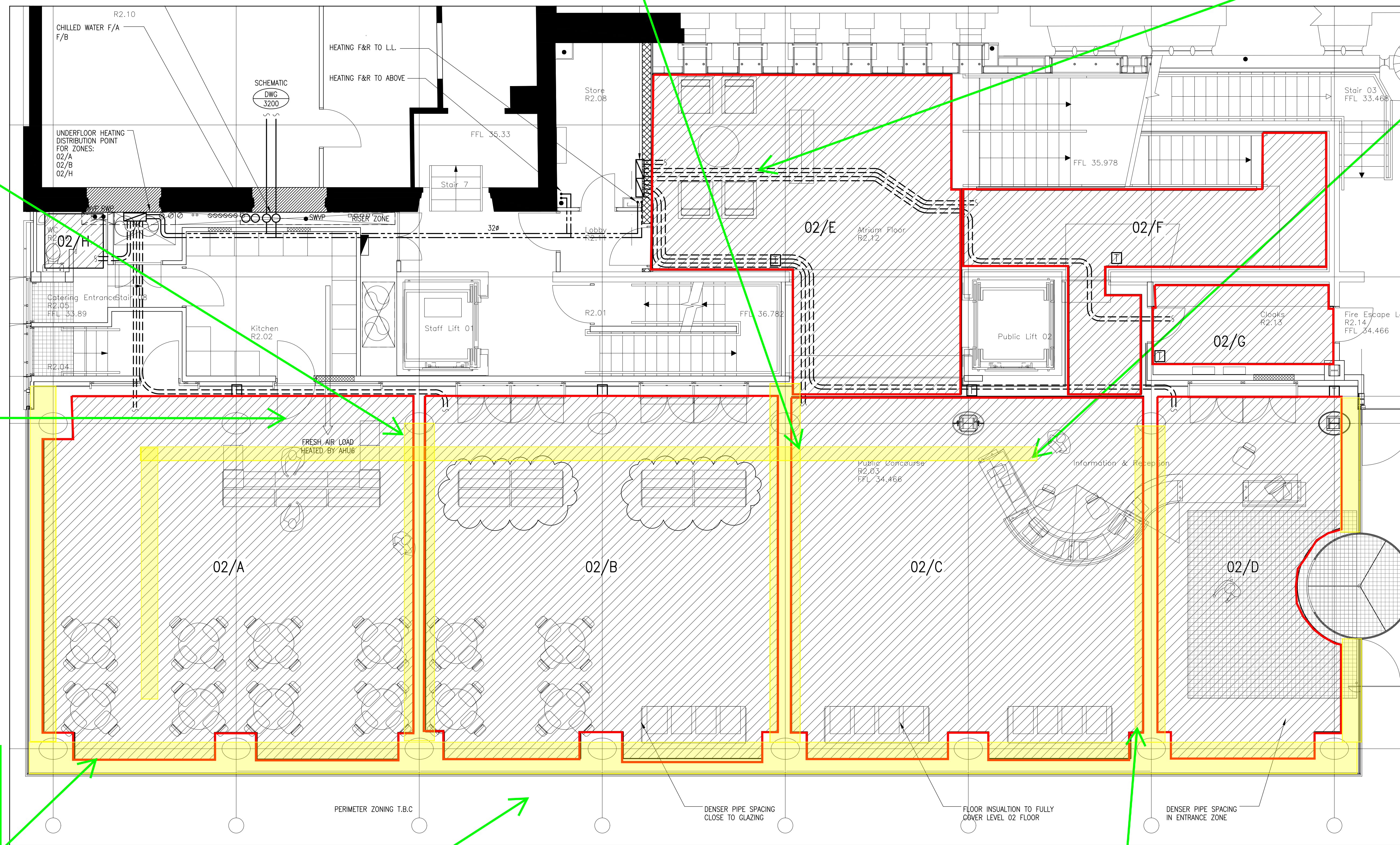
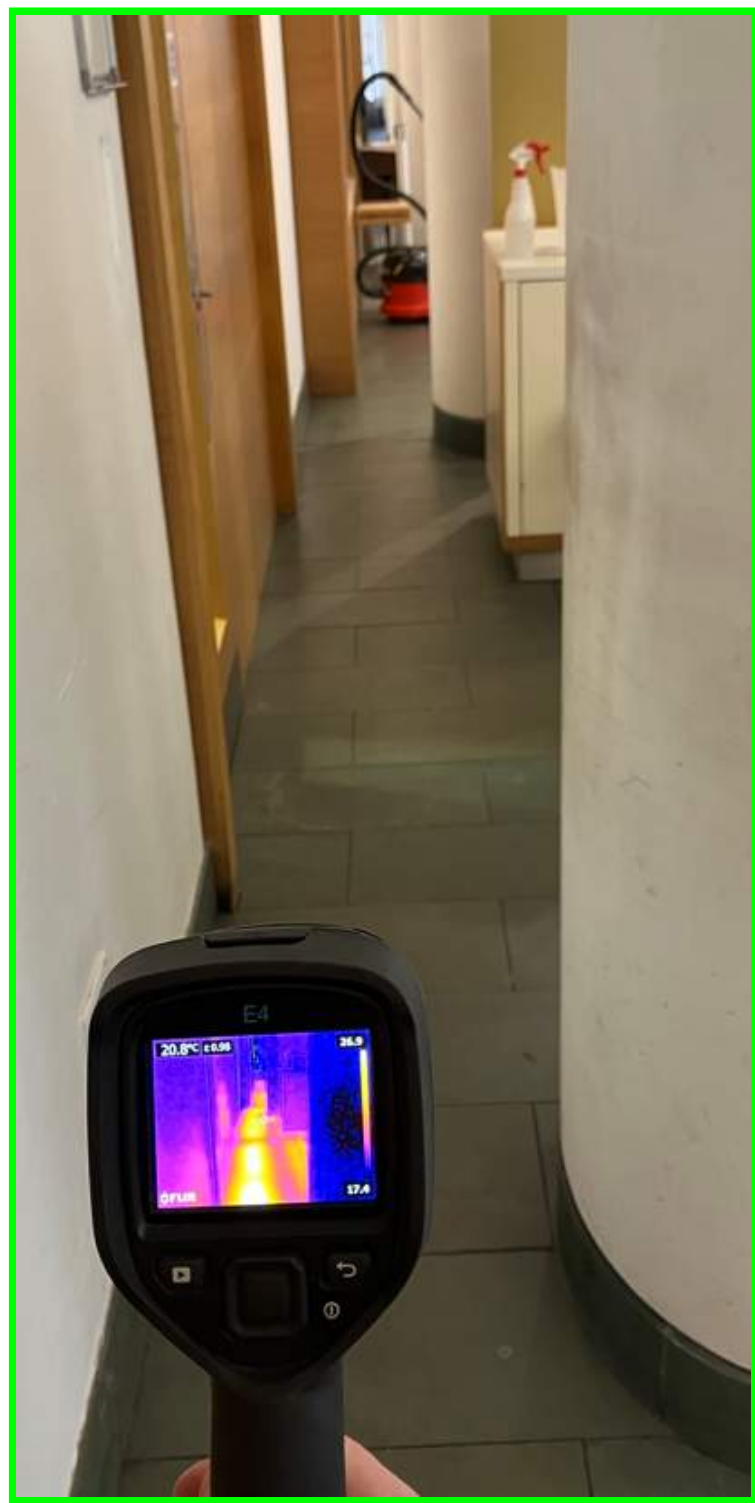
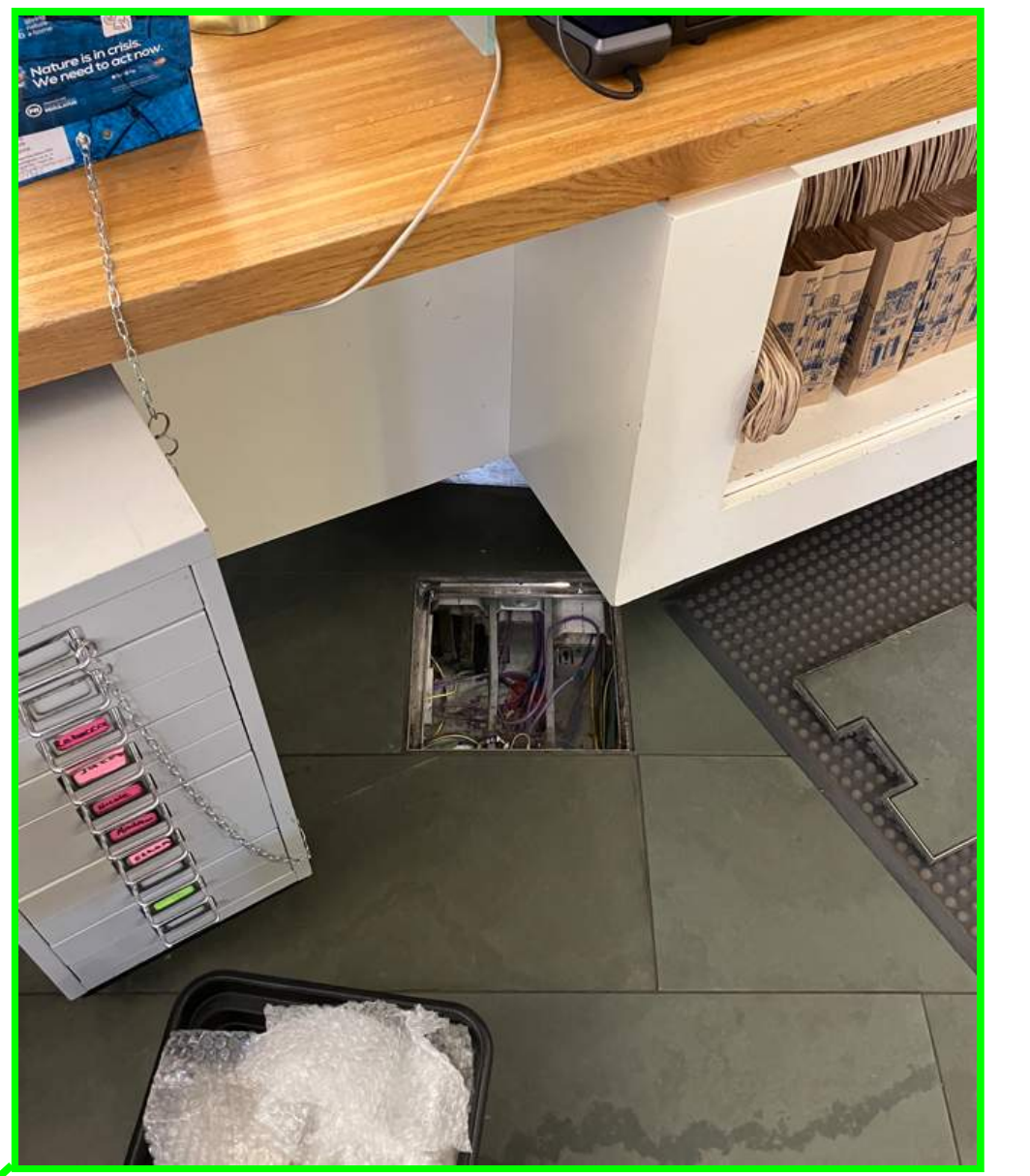
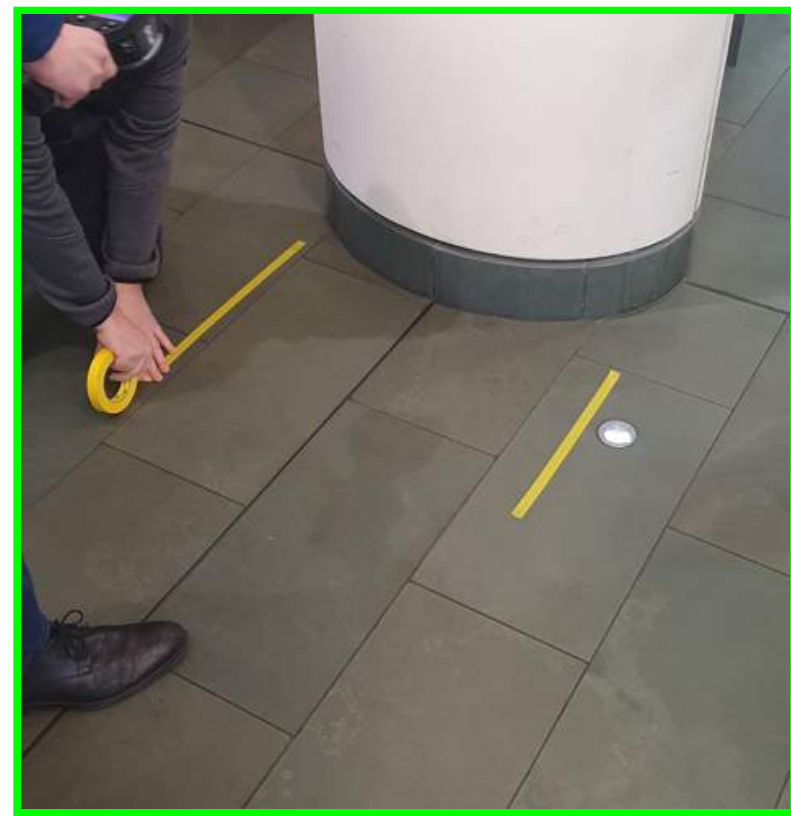
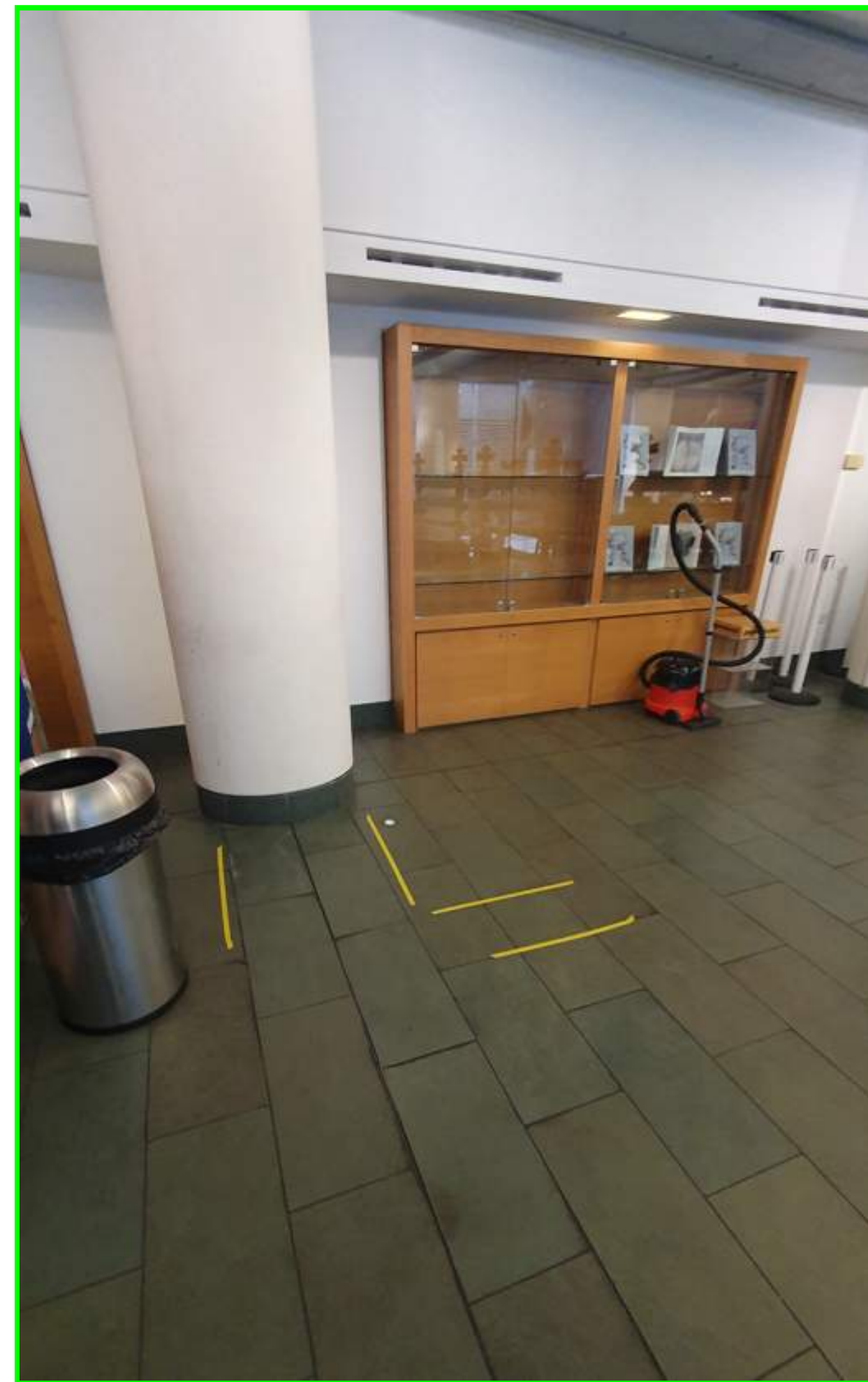
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Appendix B – Thermographic survey findings

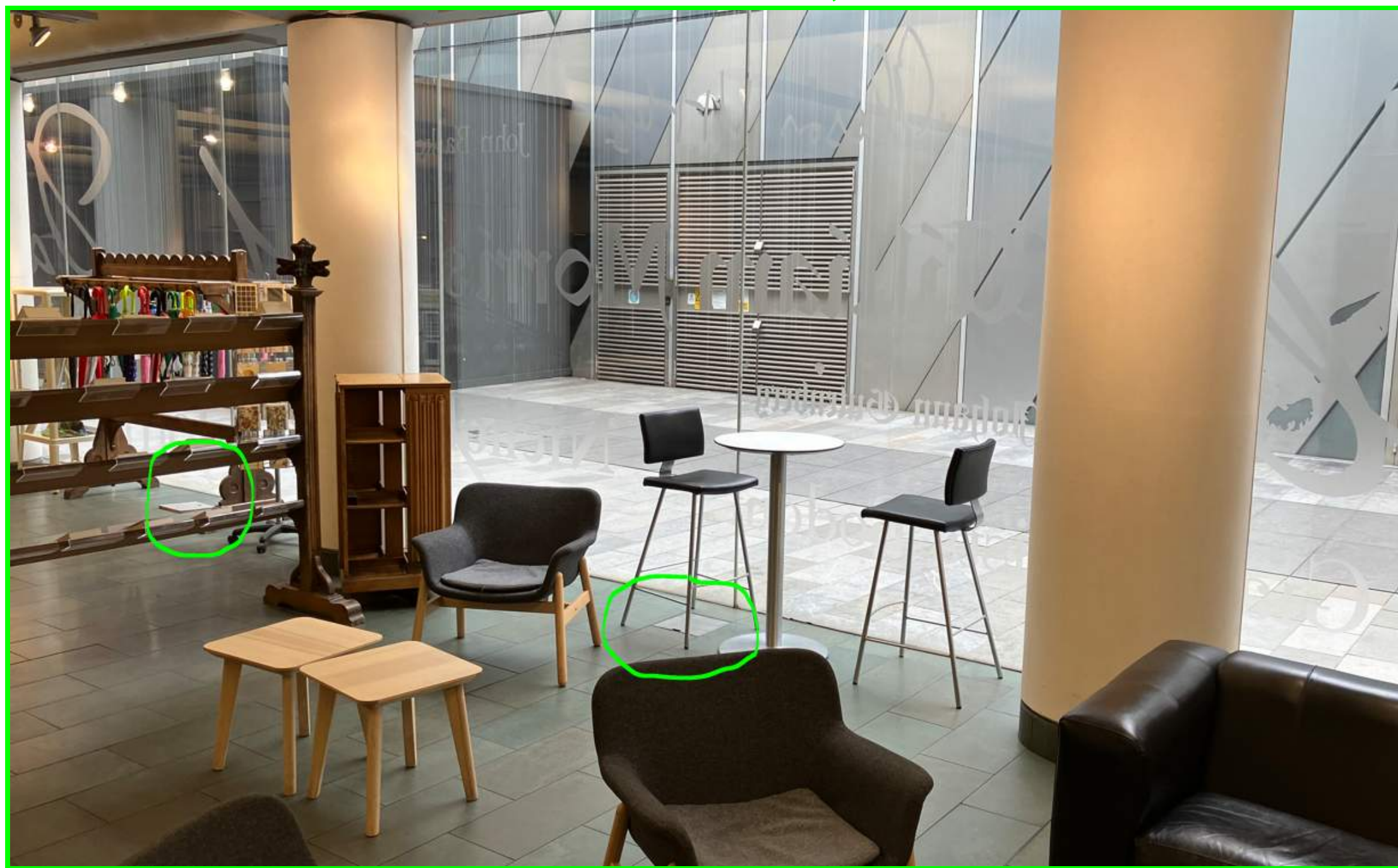


NOTES

- Pipework appears to align generally with the as-built zoning information (red outlines)
- There appear to be some areas with lower heat readings suggesting absence of pipes or more widely spaced pipes in these areas (yellow highlights)
- Underfloor heating is present and operational throughout the GF atrium and entrance areas.
- Existing expansion joints will need to be retained/re-provided as per current locations with whatever details are put forward.
- There are existing floorboxes between the columns running along the long window side. There are several additional floorboxes at GF, one of which serves the current reception desk.
- Underfloor heating is present below the entrance mat so this will need to be considered and retained in any redesign of the entrance.
- Pipework is very tight, Uponor advised that this was likely leaving circa. 100mm or less space between the pipes
- Manifolds and pipework are understood to be from the original 2004 build.
- These results are indicative, the appointed Contractor will need to carry out their own surveys and agree safe working practices prior to undertaking any works.

JRL Underfloor Heating Thermographic Survey 07/02/2023

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