

MECHANICAL AND  
ELECTRICAL ENGINEERING  
CONSULTANCY



**Project Title:** Library at Mayfair Building, Kilkenny

**M&E Strategy Report**

**Date:** 25-April-2019

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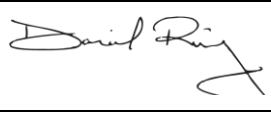
Library, Mayfair Building, Kilkenny.

**Job No:** NLCE\_4638

**Issue:** Rev\_01



Proposed Library at Mayfair, Kilkenny (Source: RAU)

<b>CURRENT ISSUE - Rev_01</b>			
Issue No:	01	Issue Date:	April 2019
Sign Off	Originator:	Checker:	Reason For Issue:
Print Name:	Laura Nolan	Daniel Ring	M&E Strategy – Library at The Mayfair Building, Kilkenny
Signature:			
Date:	April 2019	April 2019	

<b>PREVIOUS ISSUES</b>				
Issue No:	Date:	Originator:	Checker:	Reason For Issue:

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## Executive Summary of Proposed M&E Strategy

Kilkenny County Council appointed an architect lead design team under architects 'Reddy Architecture and Urbanism' to carry out an assessment of the proposed Library at the Mayfair Building. As part of the appointed design team, Noel Lawler Consulting Engineers (NLCE) have prepared a mechanical and electrical (M&E) Strategy for the proposed refurbishment to the Mayfair building.

The proposed building services use will incorporate adult, children and teenager spaces, a digital hub, a reception, staff area, ancillary areas and an exhibition space. The building is formed of a refurbishment of the existing Mayfair building and new build extension elements to the south west and north east ends of the existing building.

The M&E strategy proposed differs for several areas of the library according to each area's needs.

The heating strategy for the library proposes the use of an air source heat pump to provide low temperature hot water to the underfloor heating/ low surface temperature (LST) radiator system in all areas of the building. It is anticipated that underfloor heating shall be incorporated into the new build extension areas and first floor level. LST radiators shall be incorporated in the existing ground floor area where it is not acceptable to raise the existing floor to incorporate underfloor heating.

Mechanical ventilation will be installed to serve the building where required, this includes the adult's area, first floor teenager space, meeting room and the digital hub. Mechanical extract shall be provided to the toilets, staff canteen and the coffee dock.

There are two areas, the digital hub and the meeting room, which have been identified as having high internal gains and therefore cooling shall be provided to these areas.

The remaining areas of the library shall be naturally ventilated, which includes the children's area, first floor adult's area, exhibition centre and staff areas. These areas shall be naturally ventilated through openable windows at high level and wind catchers.

New lighting will be LED's with PIRs and daylight sensors where possible. Sample daylight analysis shows that adequate daylighting levels are achieved within the main seating areas of the building.

If feasible, the proposed development shall target LEED certification, the level of certification achievable shall be assessed during detailed design.

## 1.0 Proposed M&E System Strategy

### 1.1 Heating System Strategy

Following an analysis of the heating system options available, NLCE have determined that an air source heat pump (ASHP) is the recommended option for the library at the Mayfair building. The heat pump will be used to serve all spaces of the building. The heat pump is environmentally friendly and represents significant economic savings on energy bills in the long term.

The renovation of the Mayfair building will enhance the civic function of the area by creating a library for the public as well as providing an exhibition space. The building will have long opening hours, 24-hour use in public areas and therefore will have a high heating load to maintain comfort conditions. An ASHP can provide this, while reducing building CO<sub>2</sub> emissions at the same time, which is the best option for the environment. The existing elements of the building where the floor level is being maintained shall be heated via new LST radiators served by the ASHP.

The extension to the building, which includes spaces such as the exhibition space, IT Hub and meeting room shall be heated using underfloor heating. All the areas of the building will be heated via the ASHP.

The proposed ASHP units to provide heat to the building shall be in the first-floor plant room, to the rear of the building facing Breaghagh River. From this location, the distribution pipework will be returned to the building and into the new proposed mechanical riser. The external unit required for the cooling of the IT Hub shall be located at ground floor level adjacent to the exhibition centre, facing the Breaghagh. Both plant spaces shall be external but shall be screened by a louvred enclosure.

### 1.2 Mechanical Distribution

A new mechanical and electrical riser shall be installed to serve the building. Distribution between rooms, allocation of space for ducting and conduit for proposed services and an allowance for future services, have all been considered.

Each space will be designed to accommodate the intended purpose and a detailed mechanical design tailored to accommodate occupant comfort conditions will be prepared.

Outdoor conduit and ducting on the outdoor plant area at first floor level will be concealed in outdoor weather proof enclosures, out of the elements and in-line with best practice.

Where mechanical ventilation is required in the ground floor adult area and the first-floor teenage area, service finishes will be mindful of the intended use of the building and in so far as is practical, discreetly place services. The strategy will encompass services which are easily accessible, neatly distributed and will meet the comfort conditions of the occupants.

### 1.3 Fabric Upgrades

The existing elements of the building shall be upgraded where it is possible to do so whilst maintaining the architectural vision of the development in accordance with TGD Part L of the Building Regulations.

The windows of the existing building, the extension and the new proposed rooflights shall be new fittings, in accordance with Table 1 and Table 11 of TGD Part L 2017.

The existing roof is to be retained and thermally upgraded in accordance with Table 11 of TGD Part L 2017. The new roof over the proposed extension shall be designed in accordance with Table 1 of TGD Part L 2017.

The ground floor of the existing building shall remain largely unchanged due to a limiting room height at ground floor level, the new ground floor installed as part of the extension however shall be new and insulated in accordance with Table 1 of TGD Part L 2017.

The above upgrades and new elements in accordance with TGD Part L 2017, shall have a significant positive impact on the thermal efficiency of the proposed library compared to the existing building.

### 1.4 Ventilation Strategy

A new ventilation strategy for the Library at Mayfair shall be developed as part of the works. Natural ventilation shall be used where it is appropriate, these areas include the children's area at ground floor level, the adult area at first floor, the exhibition centre and associated staff areas. Mechanical ventilation will however be required on the south east side of the building, which includes the ground floor adult's area and the first-floor teenage area. Local mechanical extract will also be required to the staff canteen. Ducting will need access externally for an extraction duct.

Extract fans will be provided to each of the toilet facilities and the accessible shower. The ducting from each toilet space to an outer wall will be accommodated in the design.

The lift shaft will be designed with a permanently opened vent at the top of the shaft.

### 1.5 Lift Strategy

The proposed building services will incorporate a new lift shaft within the reception area of the building serving the ground and first floor.

The proposed lift location will have electrical ducts, ventilation and fire safety features. The proposed lift shall contain the motors within the lift car unit or shaft. The new lift pit is located above the level of archaeology and will require a form of drainage and a sump pump. Adequate room for manoeuvrability from the lift for persons entering or exiting the lift car will be provided on both floors.

An assessment of the expected lift traffic and load/weight was carried out to determine the size of the car, motor and corresponding lift shaft required. The lift shaft will require a permanently open vent at the top of the shaft.

## 1.6 Lighting Strategy

Lighting in the library spaces will be used to enhance the user experience, through spot lights, LED strip lighting and dimmable/changeable lighting where required. Study areas with desks will be provided with the adequate levels for readings and writing. LED lighting with PIR / occupancy controls and daylight dimming in all relevant areas shall be installed. Emergency lighting will be included in all spaces as part of the design.

## 1.7 Water Services Strategy

The fresh mains water to the Mayfair building currently enters the building at ground floor level, this will be rerouted and the new water storage tank, sized to suit the new water requirements for the proposed building shall be located at first floor level in the outdoor plant area. Provision for piping to new toilets and additional sinks will be accounted for via designated routes.

## 1.8 Electrical Distribution & Infrastructure

The electrical infrastructure has been removed as part of the previously approved demolition works and therefore the electrical infrastructure in the new Mayfair Building will be completely redesigned as part of the works. A strategy will be designed around cable management, cable services distribution, future cable diversity, sufficient power points, public areas power points, outdoor power points etc.

The proposed electrical wiring will be enclosed in concealed metal ducting, conduit and cable trays with lids. Particular attention will be paid in the public spaces to conceal electrical services.

An electrical service shaft will be installed for the first-floor office, meeting room and importantly the digital hub, and a strategy of cable management will be designed. Cables which are distributed between rooms will be sufficiently allocated with the space needed for ducting, conduit and cable trays both for proposed services and an allowance for future services.

Cables will be terminated neatly and locally to the area of designated use. Network cables, fire services and security cables will be separated from electrical cables where possible during detailed design. Each room will be designed to accommodate a specific purpose and a cable plan will be designed around this to successfully accommodate the occupant.

Outdoor cabling will be concealed in outdoor weather proof conduits or in enclosed cabling trays, out of the elements and in-line with best practice. The lightning protection tape is to be redesigned.

## 1.9 Other Electrical Design Elements

### 1.9.1 Access System

Given the intended difference in the opening hours for the public library space and the staff areas, and the differing functions of the two spaces an access system which is suitable for the proposed spaces will be designed. The two areas will function separately, and correct levels will be allocated. Points for access control will be included.

### 1.9.2 Security

Further to the access system, a CCTV security system will be installed in all public areas with adequate coverage and lack of blind spots. The CCTV cameras will be tamper-proof and of reasonable durability. The security feed will return to a central location within a secure room of the building.

### 1.9.3 Audio/Video

The library will likely be interactive with intelligent screens for information, book finding, book returns etc. A suitable audio/visual design around the library experience will be carried out by a specialist fit out consultant. Video and audio equipment (Speakers, TVs, Projectors, Fixed Screens, Dimmable LEDs etc.) will need ducting and permanent power points within the meeting room.

### 1.9.4 Data

The digital hub, public library spaces, meeting room and office spaces will require data cabling for WI-FI and network. Interactive displays, computers, cashflow/pay points etc. will all have data requirements. A design strategy around where these points shall be located will be carried out.

### 1.9.5 Controls

Energy metering, heating controls and electrical services controls will all be incorporated into the new design. A small BMS system with network access for remote building control and energy management for the building manager shall be provided.

Points on actuators, lighting, ventilation and heating will be installed for BMS controls.

## 2.0 Daylighting Assessment

A daylighting assessment has been carried out on three sample areas of the proposed Mayfair building, as shown in figure 1 and figure 2 below. Further to this, several sample task areas were analysed, as shown in figure 3, based on indicative desk layouts.

Each area was tested for the daylight factor achieved at the working plane and compared to recommended daylight factors for each area.



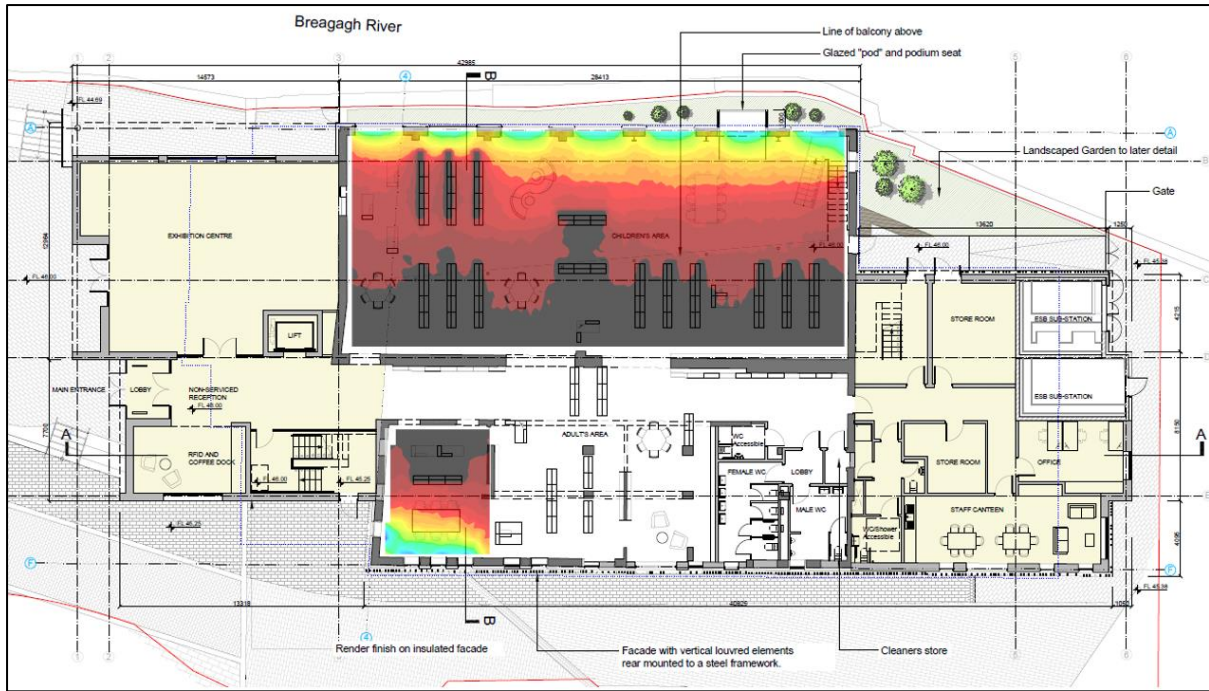


Figure 1. Ground Floor Sample Rooms for Daylight Assessment

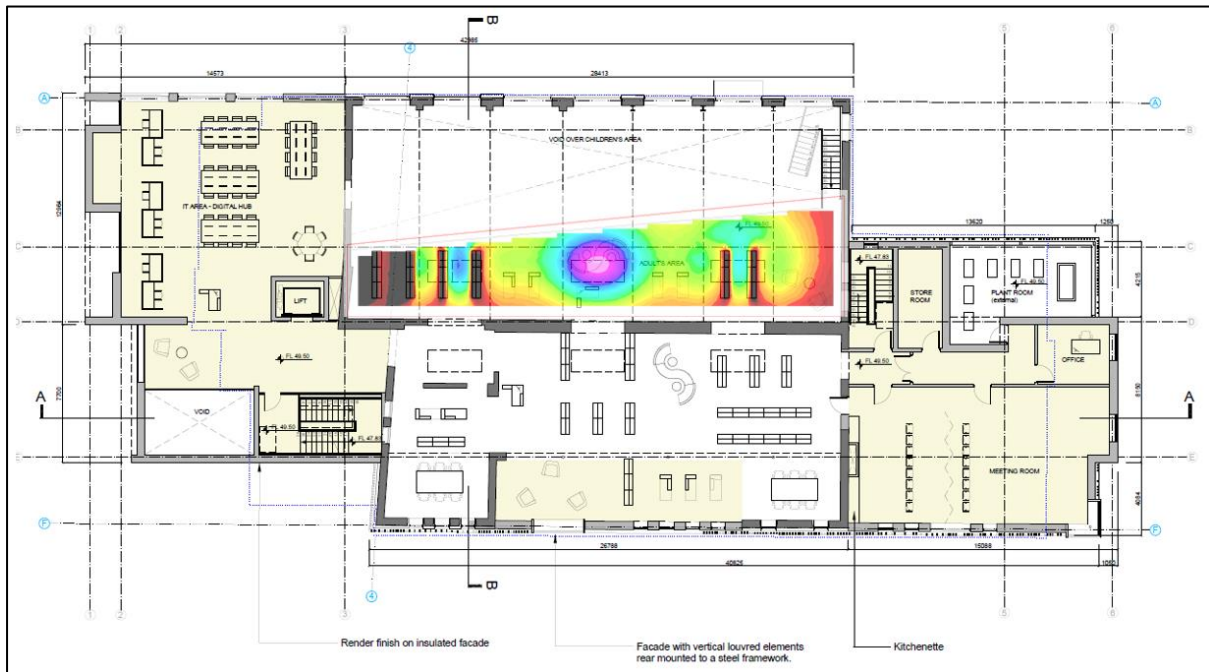


Figure 2. First Floor Sample Room for Daylight Assessment

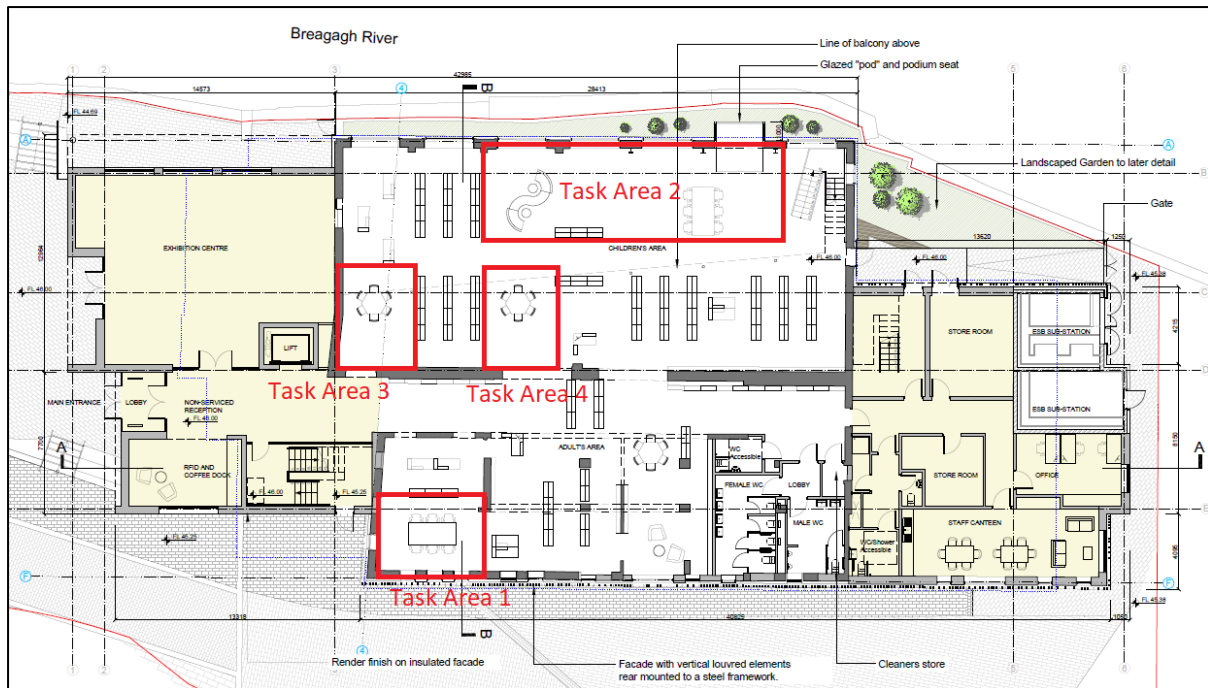


Figure 3. Task Areas for Daylight Assessment

The results of the daylighting analysis show that adequate levels of daylight are achieved in accordance with the associated daylighting factor design levels required, see Appendix A, Figures A1 to A7. Adequate daylighting levels in these areas will allow the benefit of reduced use of artificial lighting and daylight dimming can be incorporated to avoid lights being turned on unnecessarily. Occupant controlled blinds can be incorporated where glare may be an issue.

### 3.0 Compliance and Certification

All work for the proposed Mayfair refurbishment and extension shall be carried out in accordance with TGD Part L 2017 of the Building Regulations.

The building is classed as a change of use and a major renovation and therefore the work shall be carried out in accordance with the relevant sections associated with that.

If feasible, the proposed development shall target LEED certification, the level of certification achievable shall be assessed during detailed design.

## Appendix A – Daylight Assessment Results

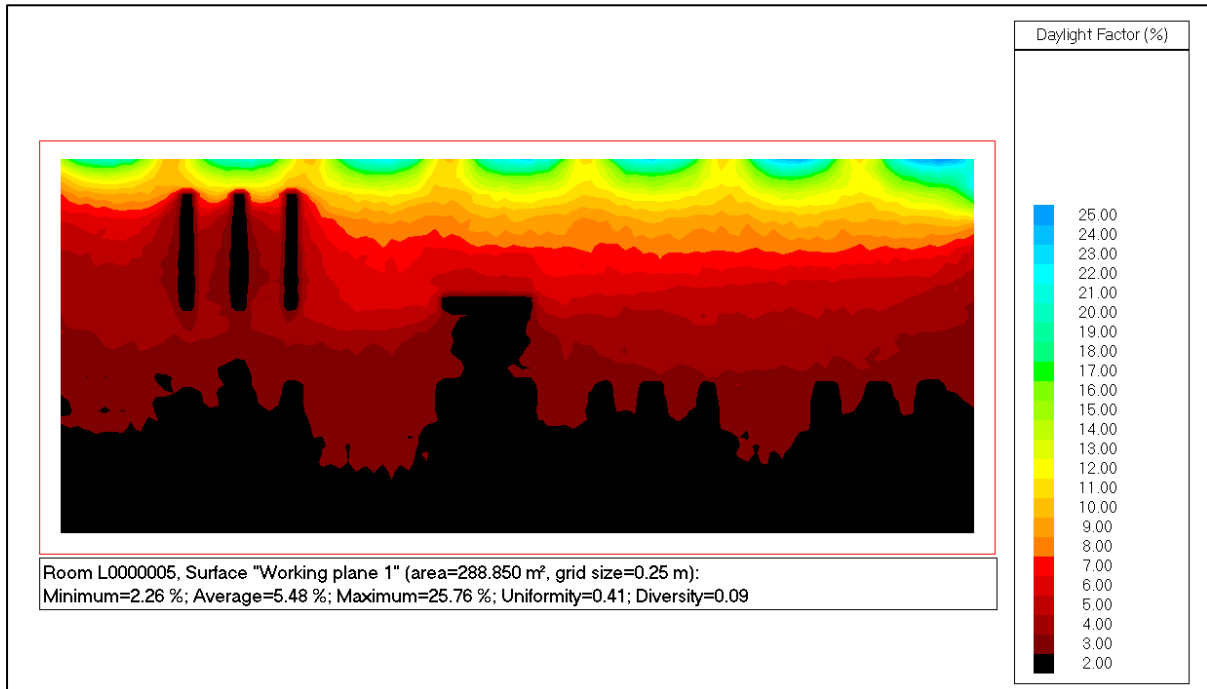


Figure A1. Daylight Factor Results for Ground Floor Childrens Area

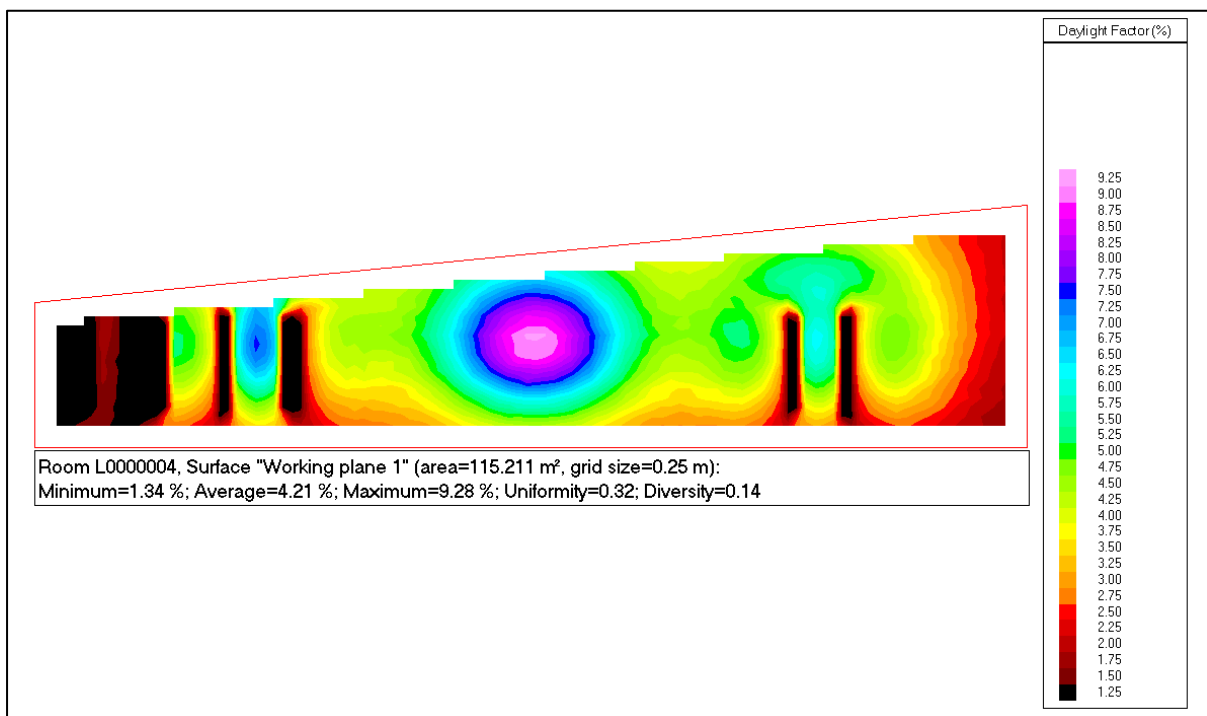


Figure A2. Daylight Factor Results for First Floor Adults Area

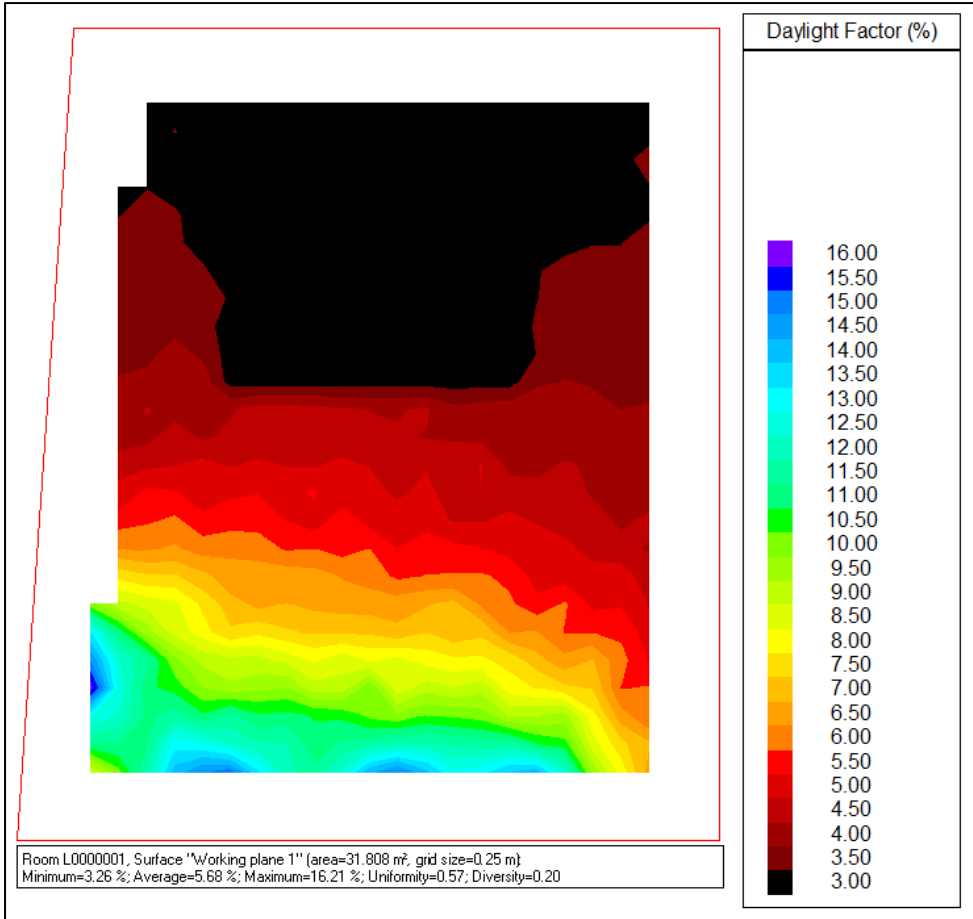


Figure A3. Daylight Factor Results for Ground Floor Adults Area

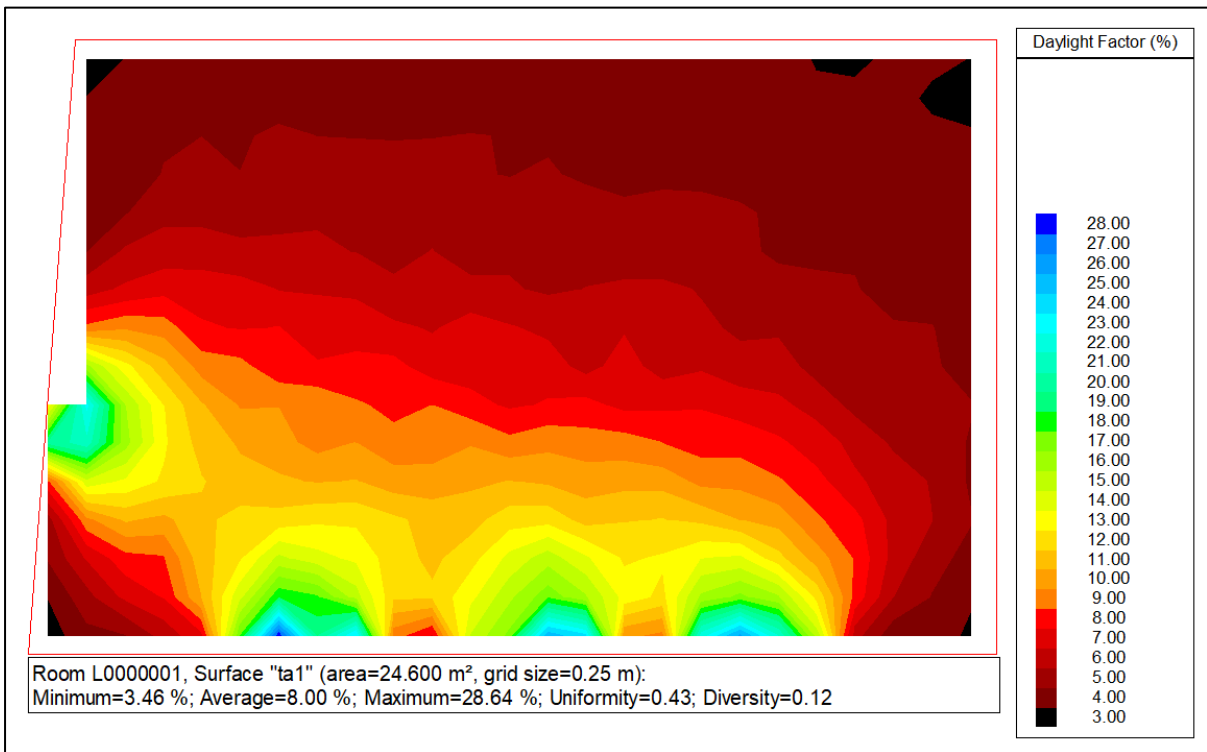


Figure A4. Daylight Factor Results for Task Area 1

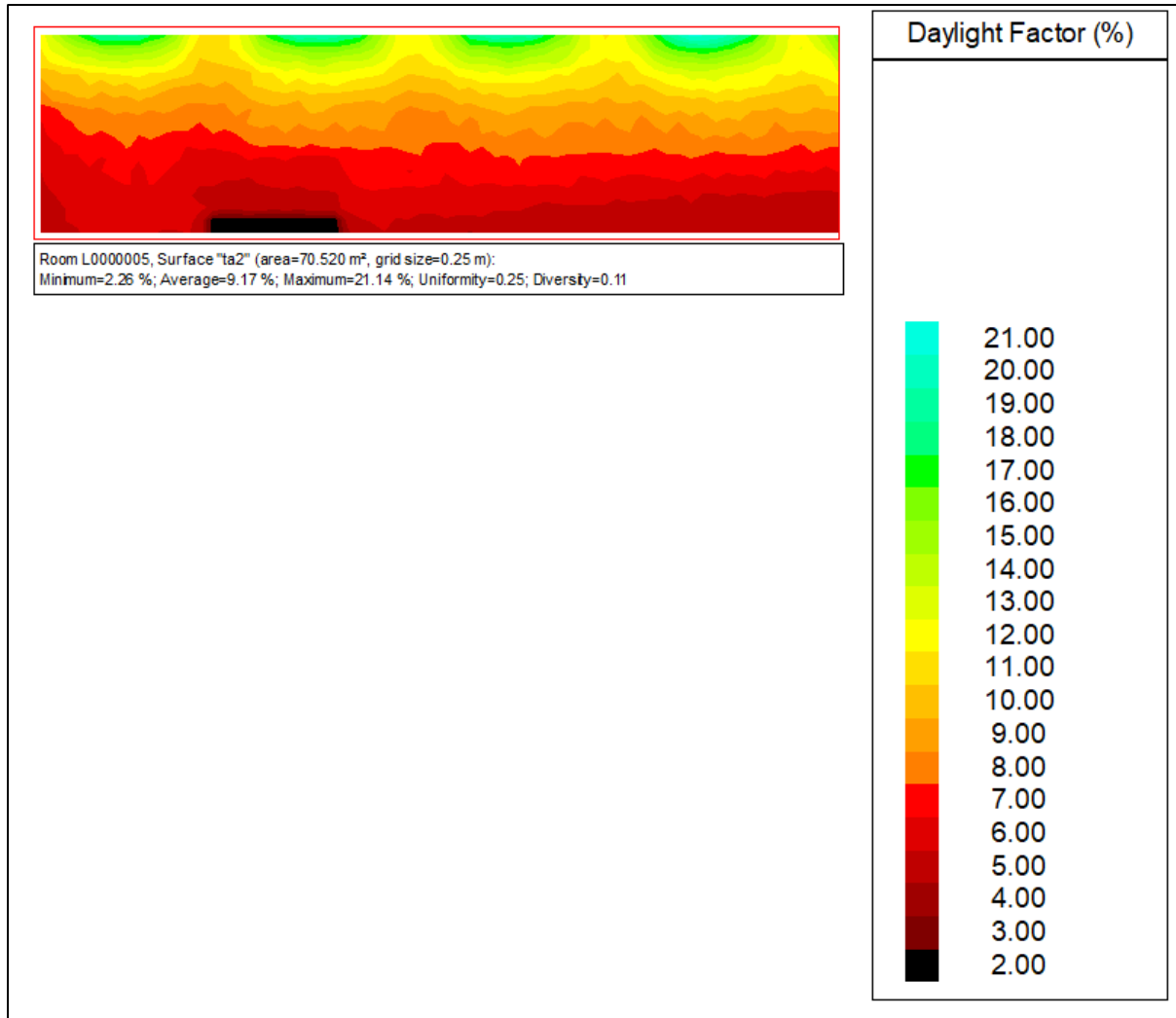


Figure A5. Daylight Factor Results for Task Area 2

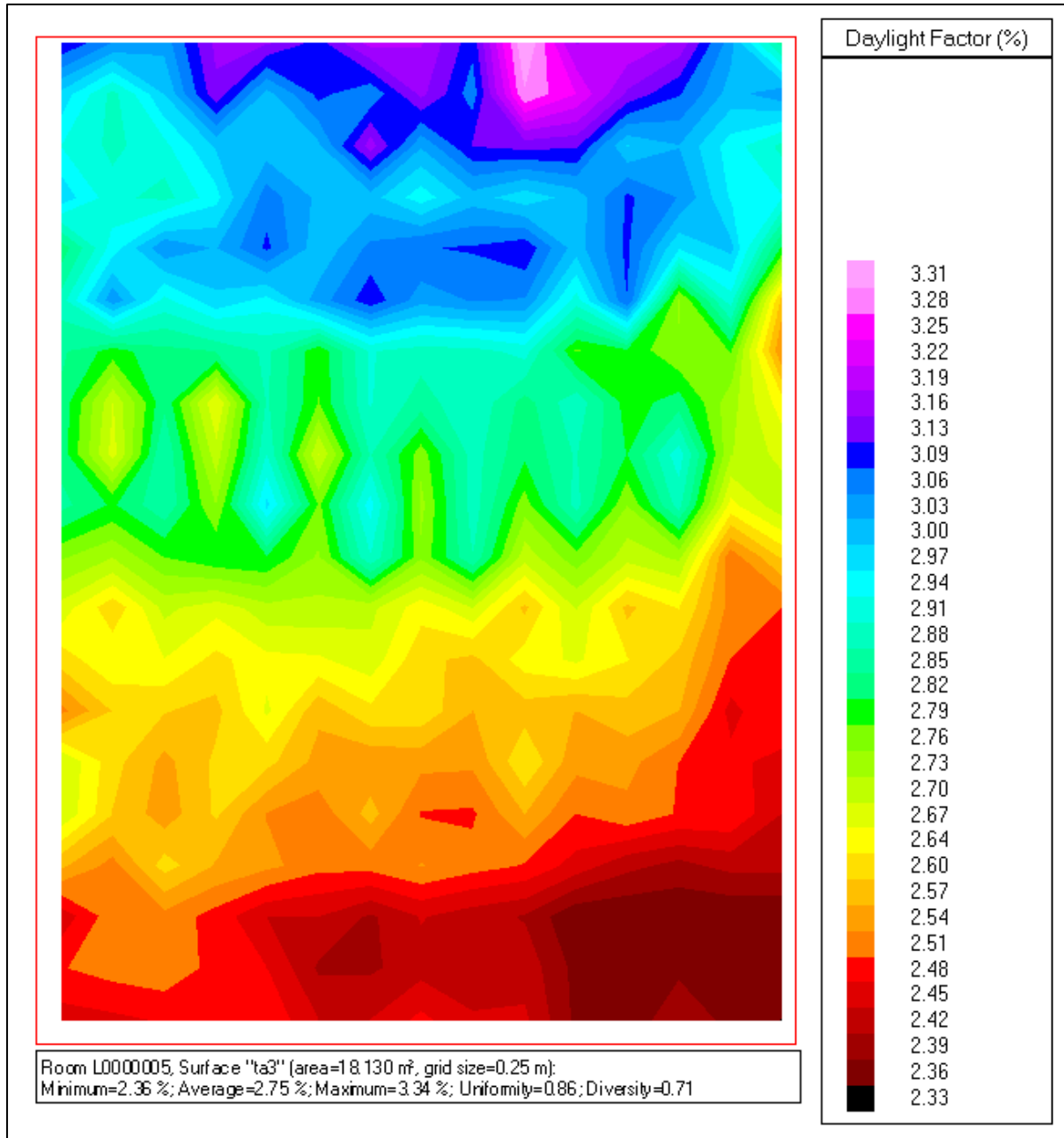


Figure A6. Daylight Factor Results for Task Area 3

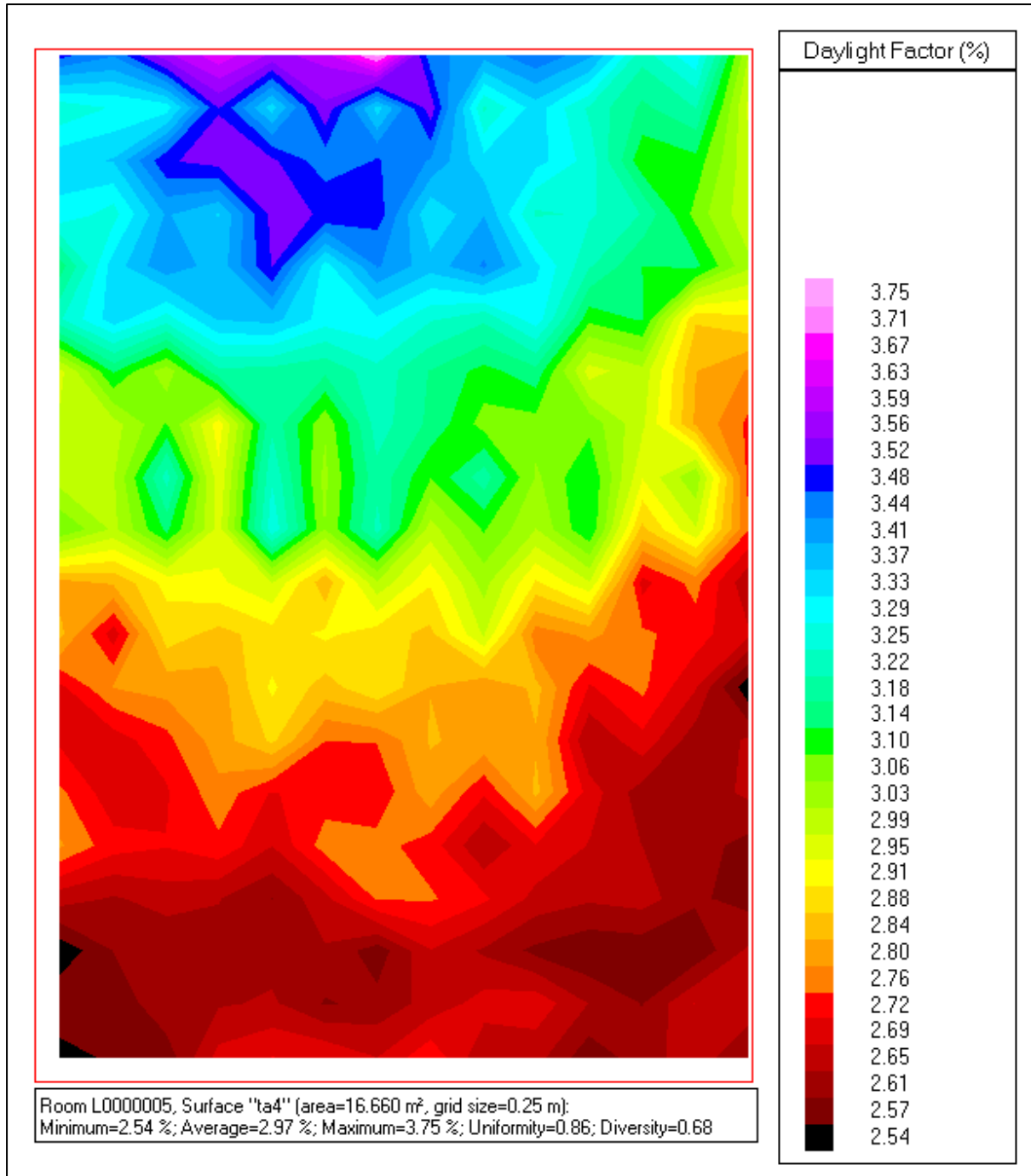


Figure A7. Daylight Factor Results for Task Area 4

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