

CONSTRUCTIVE THINKING

Project Ref: **3128**
Project Name: Paul Street/Oriel Street between Vauxhall Road and St Bartholomew Road
Liverpool L3 6DX

Planning Application No.: **18F/0585**

Planning Application Description:

*To redevelop part of site (Phase 1) by the erection of part 7, part 8 and 10 storey block consisting of 134 no. residential apartments, together with commercial use on the ground floor. **Amended scheme received***

Report Title: **Daylight and Sunpath Report**

Revision: *****
Date Issued: **May 2019**
Report Produced by: **DK**
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1.0 Introduction

Constructive Thinking Studio Ltd have been instructed to provide a Daylight and Sunlight Report in respect of the proposal to redevelop part of site (Phase 1) by the erection of part 7, part 8 and 10 storey block consisting of 134 no. residential apartments, together with commercial use on the ground floor.

The report considers the impact of the extant permission and the amended application upon the surrounding residential properties, and looks at aspects of comparison such as Detailed Daylight Factor, Average Daylight Factor and Sunpath Analysis.

2.0 Sources of Information

Constructive Thinking Studios:

- 3128 Pumpworks and L3 Paul Street ArchiCAD BIM City Model

The above BIM Model has been used to produce and coordinate a number of sun studies including:

- Average Daylight Studies
- Sunpath Analysis

In addition, we have adopted the use of the Velux Daylight Visualiser to determine the comparative values of daylight in the extant approved scheme and the amended submission. We also ran the same calculations for the planning permission for the existing Paul Street HMO Block as it stood at the time of its legacy planning application when the building was first constructed. Note for authenticity we have included the modelling of the warehouse that stood on the site facing the Paul Street HMO at the time it was approved, and prior to the extant permission or the subsequent amended planning application.

The following references have also informed the daylighting review and design processes

- Ordnance Survey Mapping:
- Site visit photographs:
- Google Earth mapping [image below:]

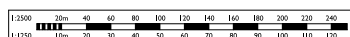
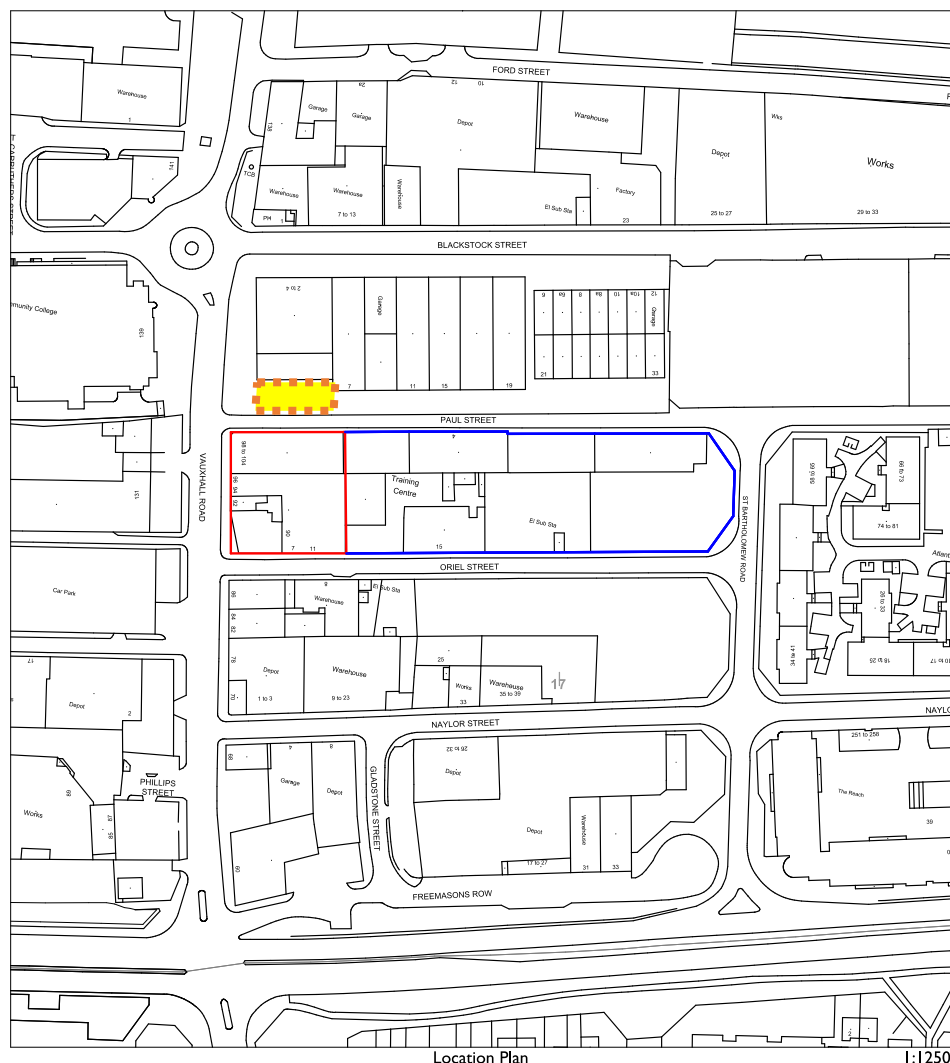


2.1 Sources of Information

The proposed site is shown with a red boundary, with adjacent site area for future phases bounded by a blue line.

The existing residential building that forms the focus of this report is on Paul Street, adjacent to the site corner, and shown indicated on the site location plan below with a Yellow hatch with an Orange dashed Outline.

The remaining neighbouring properties in the area are not residential in nature and as such are not subject to the rigors of this report.



| | |
|---|----------------------|
| CONSTRUCTIVE THINKING | |
| Construction Training Systems Ltd Construction Training Park, 2nd Floor 125 High Street, London E15 2ET Tel: 020 300 00000 Email: info@constructivethinking.co.uk | |
| Client: | North London College |
| Project: | LP |
| Existing Phase 1 Location Plan | |
| Date: | 10/10/2020 |
| Drawing Location: | North London College |
| Scale: | 1:1250 |
| Sheet: | 3128 |
| Page: | 3 of 3 |

3.0 Standard Survey Limitations

Although we have undertaken as detailed an inspection as possible, the standard limitations that apply to this survey report may be present where the following assumptions apply:

Best estimates were made in establishing building use (residential or commercial) and room uses: generally, these were made from as built drawings produced by Constructive Architects Studio Ltd that may have been subject to subsequent change by the occupier.

4.0 External Daylight and Sunlight

The impact of a proposal in respect of daylight and sunlight amenity should be assessed by reference to the BRE guidance report: Site Layout Planning for Daylight and Sunlight: A good Practice (2011).

It is important to remember that the BRE Guide states that ‘the advice given here is not mandatory and should not be seen as an instrument of planning policy’.

Furthermore, Daylight criteria should be ‘interpreted flexibly because natural lighting is only one of many factors’.

Based upon these statements it is important to apply the guidance sensibly and flexibly taking into account the context of the site. Similarly, it is also important to understand that a neighbouring building’s design or position may not allow for good daylight/sunlight even prior to development of neighbouring land. In such cases it is inappropriate to strictly apply the guidelines if an adjacent building imposes excessive constraints upon a neighbouring site.

4.1 Daylight Background [ADF & VSC]

Only residential properties are considered for daylight levels in the BRE Guideline document entitled ‘Site Layout Planning for Daylight and Sunlight – a Guide to Good Practice’. Furthermore, living rooms, kitchens and bedrooms are the primary focus of the guideline recommendations.

We have considered the proposal in relation to the VSC [Vertical Sky Component], which is a measure of daylight at the centre of a window and the BRE Guidelines permit a reduction of up to 20% on the existing situation. This is based upon the BRE stating that such a change would remain unnoticeable. Average daylight Factors [ADF] have also been adopted as an additional method for considering daylight within a room, and it combines the VSC from each window serving the room with various characteristics such as room and window size to provide value that can give an approximate expression to the amount of daylight within the room. Technical analysis has been carried out on the properties to Paul Street, and Oriel Street, as well as reviewing the internal courtyard facing rooms of both the extant planning permission and the proposed planning permission.

5.0 Daylighting Analysis

The proposed scheme can be found illustrated within the appendix at the back of this document. The sunpath analysis is rendered for the extant planning permission and also for the amended submission.

The analysis of the effects of the proposed development upon daylighting levels in existing adjacent residential buildings has been assessed by the following methods:

- External Sunpath Shadow Studies
- Vertical Sky Component Analysis
- Average Daylight Factor Analysis
- Internal Lux Mapping Analysis
- External Lux mapping Analysis

5.1 External Sunpath Analysis

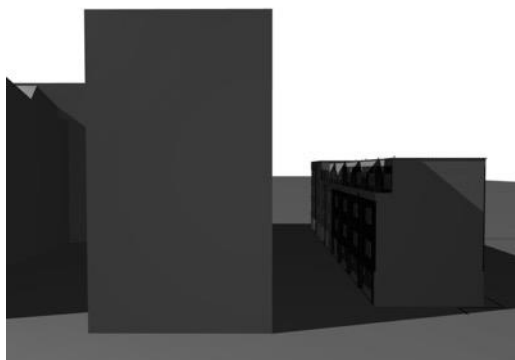
The full data sets of sunpath studies of the extant permitted scheme and of the proposed scheme can be found illustrated within the appendix at the back of this document.

The sunpath analysis is rendered for the extant planning permission and also for the amended planning submission.

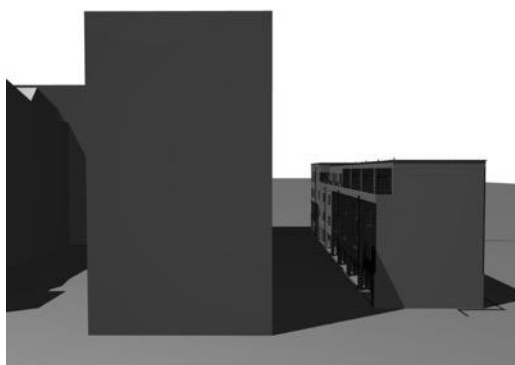
Both instances are rendered at each of the 4 quarterly seasons as indicated below, at respective Equinox and Solstice moments in the annual solar calendar. These studies have been undertaken in order to provide a thorough representation of overshadowing of extant and amended applications.

5.1.1 Winter and Summer Solstice, Autumn and Spring Equinox in Extant Permission [View West From St Bartholomew Street]

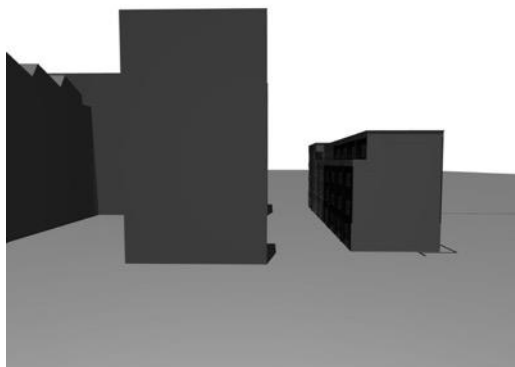
Midday sunlight December 21st



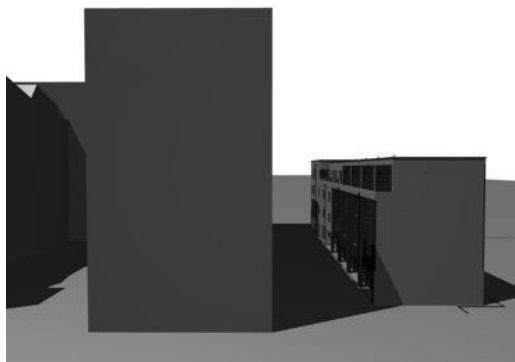
Midday sunlight March 20th



Midday sunlight June 21st



Midday Sunlight September 23rd



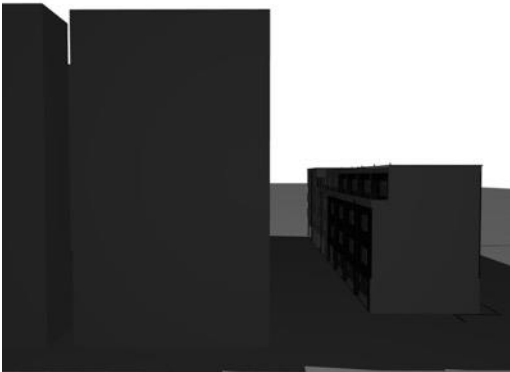
The sun path analysis for the extant permission and its effect upon the existing Paul Street development shows the existing block in shadow at midday in Winter Solstice, and partially shadowed at Spring and Autumn Equinox, with the Summer Solstice showing no overshadowing at all.

It can be noted that the extant approval for the scheme does cause overshadowing of the existing unit, and this is most noticeable during the winter months where perhaps the lower azimuth of the sun causes comparably lower light levels over the whole of the city region

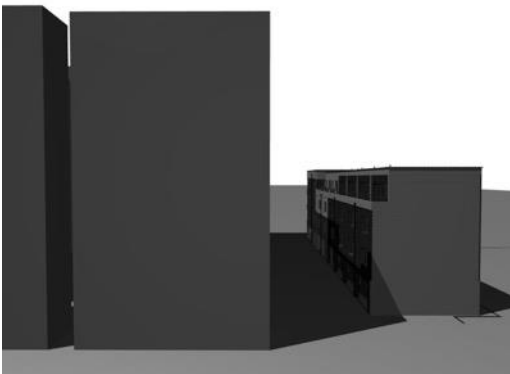
The full shadow studies are provided in the appendices of this document so that a full sun path can be monitored for both extant and proposed permissions.

5.1.2 Winter and Summer Solstice, Autumn and Spring Equinox in Amended Application [View West From St Bartholomew Street]

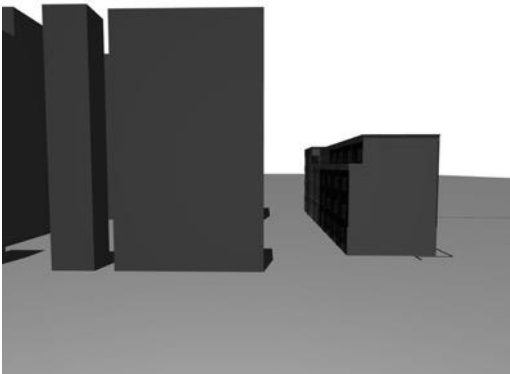
Midday sunlight December 21st



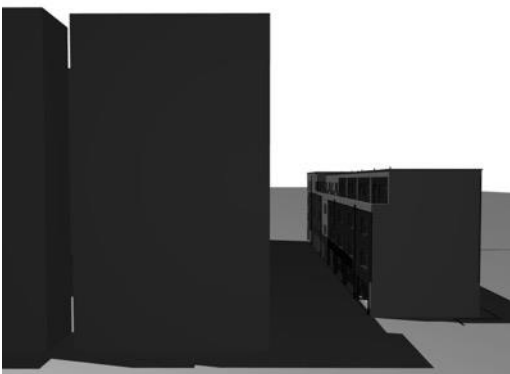
Midday sunlight March 20th



Midday sunlight June 21st



Midday Sunlight September 23rd



The sun path analysis for the amended application and its effect upon the existing Paul Street development shows the existing block in shadow at midday in Winter Solstice, and partially shadowed at Spring and Autumn Equinox, with the Summer Solstice showing no overshadowing at all.

Whilst the winter solstice condition shows full shadow, this is no worse than that as per the extant planning permission. It is also demonstratable that the difference in overshadowing between the extant permission and the amended applications windows is negligible.

The full shadow studies are provided in the appendices of this document so that a full sun path can be monitored for both extant and proposed permissions.

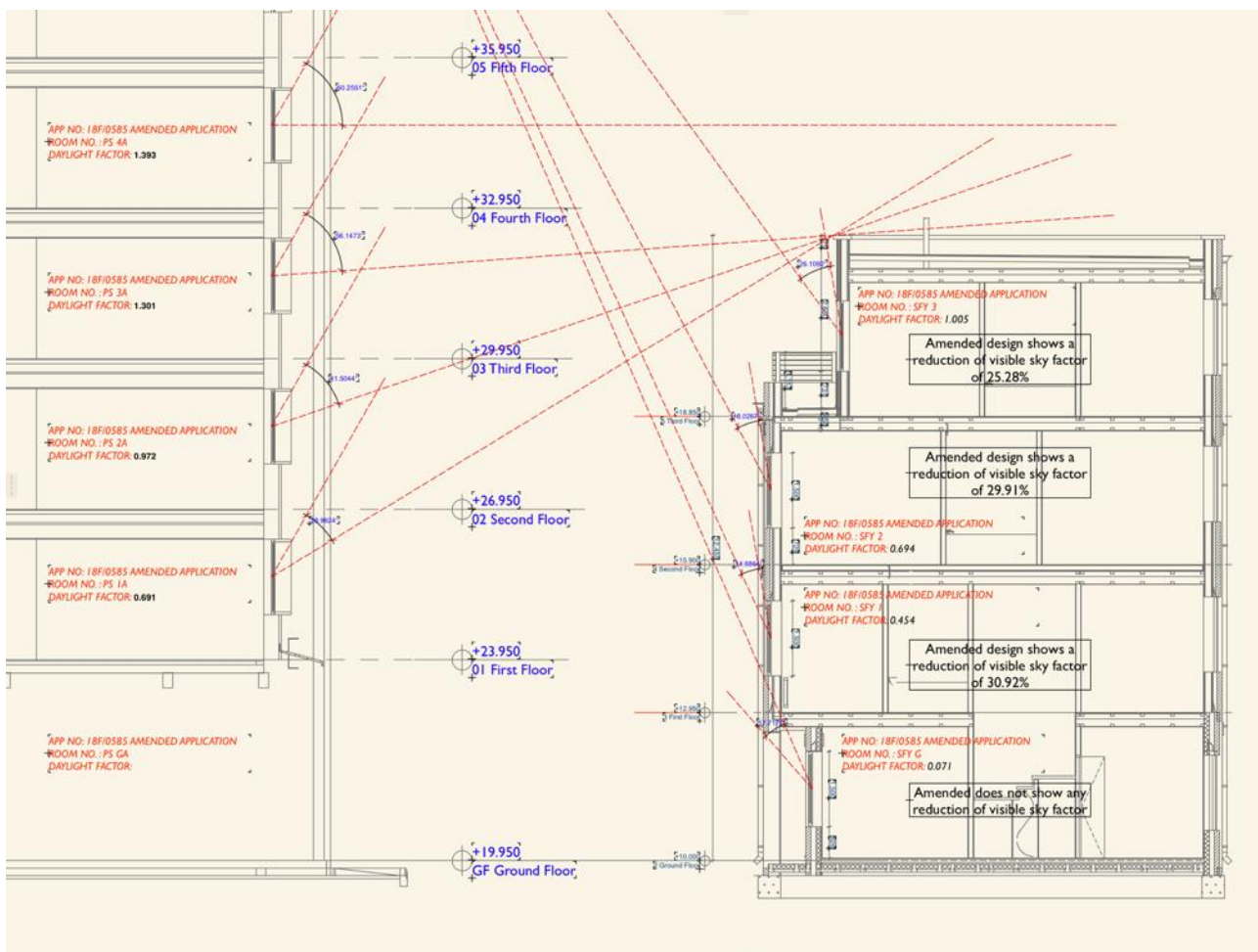
5.2 Vertical Sky Component Analysis [VSC]

The vertical sky components of each room are measured as follows:

| Room Ref | VSC Extant | VSC Amended | % reduction in VSC with amendments |
|----------|------------|-------------|---|
| SFY 3 | 35° | 26° | 25% reduction |
| SFY 2 | 26° | 18° | 29% reduction |
| SFY 1 | 21° | 15° | 31% reduction |
| SFY G | 0° | 0° | 0% reduction [this room has zero visible sky component] |

As can be seen the biggest reduction in the area of visible sky from the centre point of each window is at first floor level and the amended proposals reduce the VSC by 31% [ground floor not providing any visible sky],

The reduction in VSC reduces at each floor up the building, with second and third floors both less than 30%, and overall average representing a reduction of 21.25% when assessed together with the ground floor.



The scope and methodology of the VSC Calculation Method can be seen in the above extract image from the section drawings, and this process has been used to inform the Average Daylight Factor Calculations for the section in both extant permissions and amended planning applications.

5.3 Average Daylight Factor [ADF] Calculation Analysis from Building Sections

When considering a room for daylight the Average Daylight Factor or ADF assessment is used. It calculates the daylight factor within a room, in other words it is used to show how well a room is illuminated.

The BRE Guidelines define ADF as; “Ratio of total daylight flux incident upon the working plane, expressed as a percentage of the outdoor illuminance on a horizontal plan due to an unobstructed CIE Standard Overcast Sky.

ADF values can be calculated for rooms within a proposed development to ensure the quality of daylight will be adequate.

Factors upon which the ADF depend are: Vertical Sky Component (VSC) at the face of each window, the total window area, total wall area, wall reflectivity and window transmission. Based upon the proposal and in accordance with BS 8206-2:2008 we have used the following values:

- Internal Reflectance values of 0.8 for ceilings and walls, and
- 0.45 for floor reflectance, all values weighted by area
- 0.75 transmission ratio of vertical double-glazed clear glass, further reduced by a maintenance factor of 0.9.

The British Standard Document 8206-2:2008 [Code of Practice for Daylighting] only provides ADF Values for habitable rooms within dwellings. The defined target values are

- 1.5% Living Rooms
- 1.0% Bedrooms

The results of the Average Daylight Factor Calculations can be seen on the extant and amended planning applications section drawings, and the results of the impact of the proposals to the Existing Paul Street Building on Paul Street can be seen on the coloured block diagram which have been extracted from the detailed sections.

In general, the results show a range of ADF in the extant permissions of between 0.017 on the ground floor and 1.307 on the third floor. The results of the ADF calculations of the amended proposals are 0.071 on the ground floor and 1.005 on the third floor. The gross reduction of the average of the ADF over the 4 floors is by 25% from 0.74% down to 0.56%.

| APP NO: 18F/0585 EXTANT APPROVAL | | | | | | | | | |
|----------------------------------|-------|-------|--------------------|--|--|--------------------|-------|-------|----------------------|
| L3 BLOCK ORIEL STREET | | | L3 COURTYARD SOUTH | | | L3 COURTYARD NORTH | | | PAUL STREET ADJACENT |
| OS 6D | | OS 6C | | | | PS 6B | | PS 6A | |
| OS 5D | 0.971 | OS 5C | 2.086 | | | PS 5B | 2.086 | PS 5A | 0.971 |
| OS 4D | 1.84 | OS 4C | 2.875 | | | PS 4B | 2.875 | PS 4A | 1.84 |
| OS 3D | 1.818 | OS 3C | 0.575 | | | PS 3B | 0.575 | PS 3A | 1.818 |
| OS 2D | 1.388 | OS 2C | 0.221 | | | PS 2B | 0.221 | PS 2A | 1.068 |
| OS 1D | 1.866 | OS 1C | 0.042 | | | PS 1B | 0.042 | PS 1A | 0.884 |
| OS GD | 0.839 | OS GC | 0.037 | | | PS GB | 0.037 | PS GA | 0.281 |
| Oriel Street | | | Courtyard | | | Paul Street | | | |
| | | | | | | | | | SFY 3 1.307 |
| | | | | | | | | | SFY 2 0.957 |
| | | | | | | | | | SFY 1 0.63 |
| | | | | | | | | | SFY G 0.071 |

| APP NO: 18F/0585 AMENDED APPLICATION | | | | | | | | | |
|--------------------------------------|-------|-------|--------------------|--|--|--------------------|-------|-------|----------------------|
| L3 BLOCK ORIEL STREET | | | L3 COURTYARD SOUTH | | | L3 COURTYARD NORTH | | | PAUL STREET ADJACENT |
| OS 9D | | OS 9C | | | | PS 9B | | PS 9A | |
| OS 8D | 2.565 | OS 8C | 2.565 | | | PS 8B | | PS 8A | |
| OS 7D | 1.393 | OS 7C | 2.05 | | | PS 7B | 2.087 | PS 7A | 2.565 |
| OS 6D | 1.393 | OS 6C | 0.423 | | | PS 6B | 1.424 | PS 6A | 1.393 |
| OS 5D | 1.393 | OS 5C | 0.125 | | | PS 5B | 0.051 | PS 5A | 1.393 |
| OS 4D | 1.393 | OS 4C | 0.051 | | | PS 4B | 0.051 | PS 4A | 1.393 |
| OS 3D | 1.393 | OS 3C | 0.051 | | | PS 3B | 0.051 | PS 3A | 1.301 |
| OS 2D | 1.393 | OS 2C | 0.051 | | | PS 2B | 0.051 | PS 2A | 0.972 |
| OS 1D | 1.393 | OS 1C | 0.051 | | | PS 1B | 0.051 | PS 1A | 0.691 |
| OS GD | | OS GC | | | | PS GB | | PS GA | |
| Oriel Street | | | Courtyard | | | Paul Street | | | |
| | | | | | | | | | SFY 3 1.005 |
| | | | | | | | | | SFY 2 0.694 |
| | | | | | | | | | SFY 1 0.454 |
| | | | | | | | | | SFY G 0.071 |



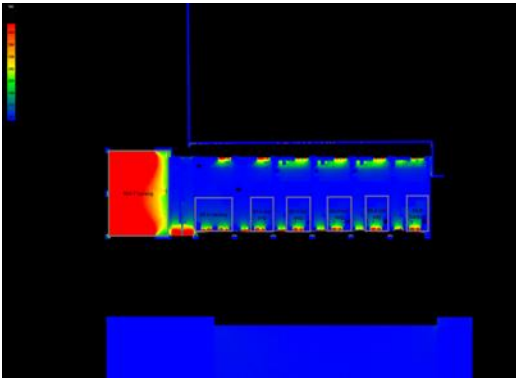
In the above coloured block diagram that represents a section through the extant permitted development and the amended proposed development, the existing Paul Street Building block can be seen coloured in a Green fill.

Each of the spaces assessed by ADF Calculation are typically bedrooms and returns results typically as below:

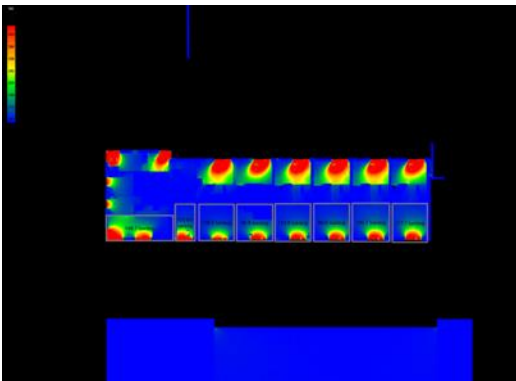
| Room Ref | ADF Extant | ADF Amended | % reduction in ADF Calculation Result with amendments |
|----------|------------|-------------|---|
| SFY 3 | 1.307 | 1.005 | 23% |
| SFY 2 | 0.957 | 0.694 | 27% |
| SFY 1 | 0.630 | 0.454 | 28% |
| SFY G | 0.071 | 0.071 | 0% reduction [this room has zero visible sky component] |

5.4.1 Internal Daylight Factor Analysis from Light Map Renders in Extant Permission Compared with Amended Application

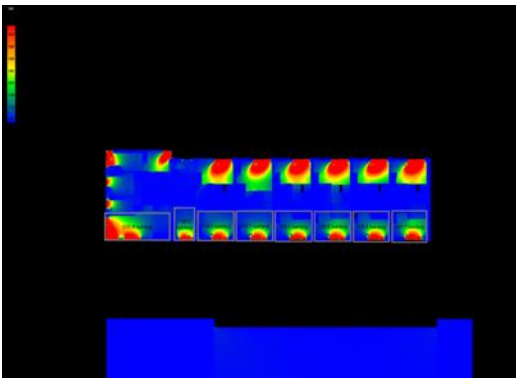
Ground Floor Extant Permission



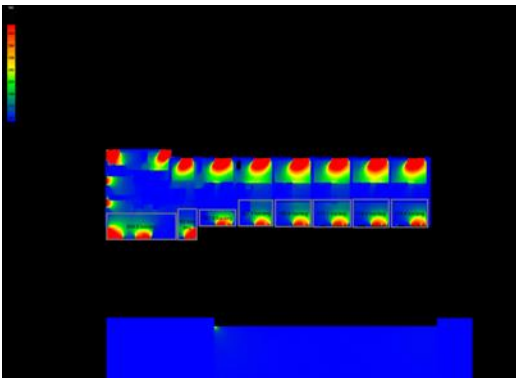
First Floor Extant Permission



Second Floor Extant Permission



Third floor Extant Permission



Through adopting the collaborative use of Constructive Thinking Studio BIM Model in the proprietary Daylighting Calculation Software [by Velux] we are able to calculate and describe the penetration of lighting levels at a working plane 850mm above finished floor level.

We ran the scenario testing for the extant planning permission, and also for the proposed amended planning application. Furthermore, we ran the calculations a third time to review how these 2 results differed from the legacy application for the Paul Street HMO Building that was completed adjacent to the proposed site of the new apartments.

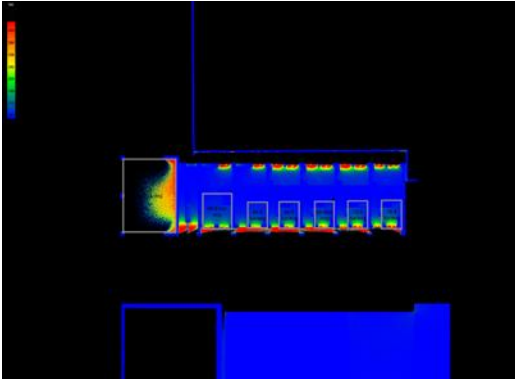
In considering the illuminance maps and working with an overcast sky illuminance of 10,000 lux, the extant permission demonstrates that on the floors above ground the illuminance in the bedrooms is borderline of the 50:50 rule.

When reviewing the calculated daylight factors within each room we have done so by referring to the calculated light maps produced by the Velux software. The so called 50:50 rule is another way to measure light levels and is sometimes adopted for rights to light cases.

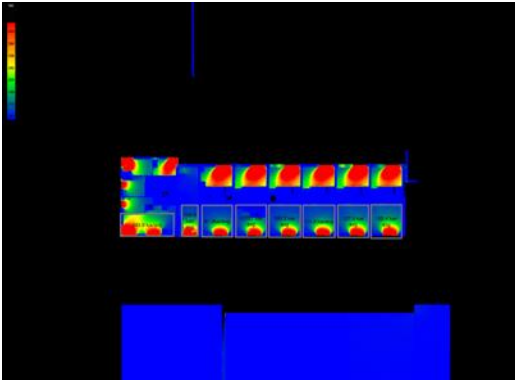
The 50:50 rule involves calculating the percentage of a room's area which can receive adequate light. The calculations are undertaken at a working plane 850mm above the finished floor level. A point on the working plane is considered adequately lit if it can receive at least 0.2% of the total illumination received from the sky [or 2% daylight factor]. The acceptable threshold is generally deemed to be where the area of a room receiving light from at least 0.2% of the sky is not reduced to less than 50%.

5.4.2 Internal Daylight Factor Analysis from Light Map Renders in Amended Application

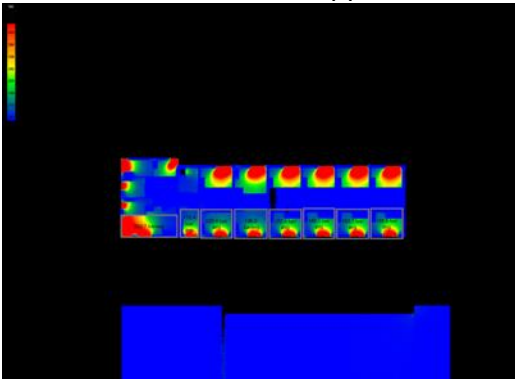
Ground Floor Amended Application



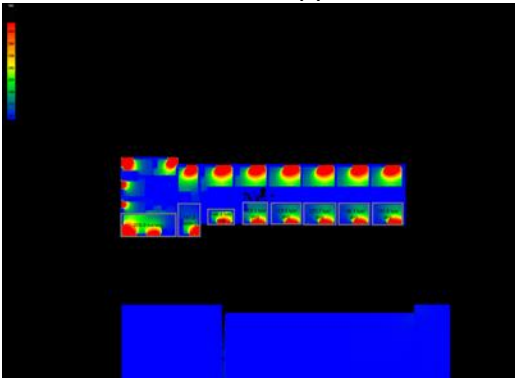
First Floor Amended Application



Second Floor Amended Application



Third floor Amended Application



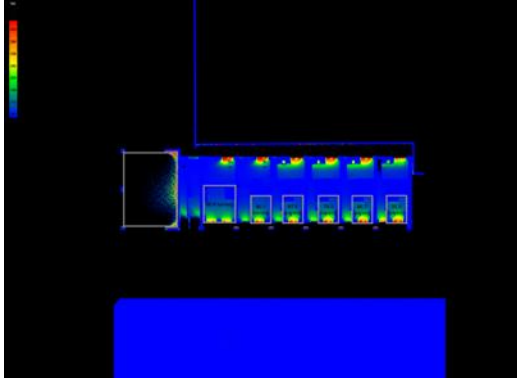
When considering the impact over and above the extant permission on internal daylighting levels within the existing Paul Street HMO development, it is demonstrated that the day lighting levels are still borderline of the 50:50 rule, and as such are not significantly worse than when compared to the extant planning permission on the site.

Thus, it has been demonstrated that light levels and light penetration into the existing bedrooms is not adversely affected to any significant degree.

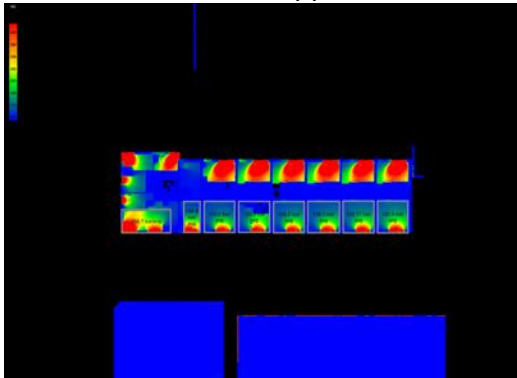
The Light Map render process and calculations offers more comparative detail in the quality and quantity of light than perhaps some of the other calculation methods that have been adopted in this report in the interests of completeness.

5.4.3 Internal Daylight Factor Analysis from Light Map Renders in original Paul Street Historic HMO Application [existing warehouse – now removed from site]

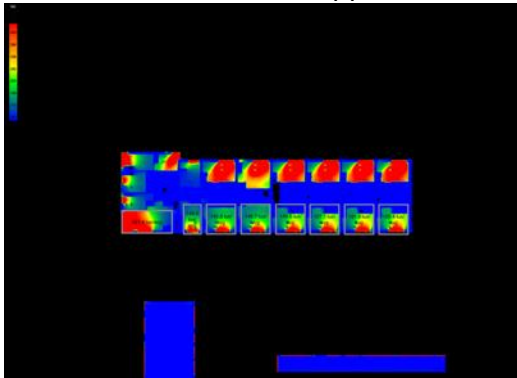
Ground Floor HMO Application



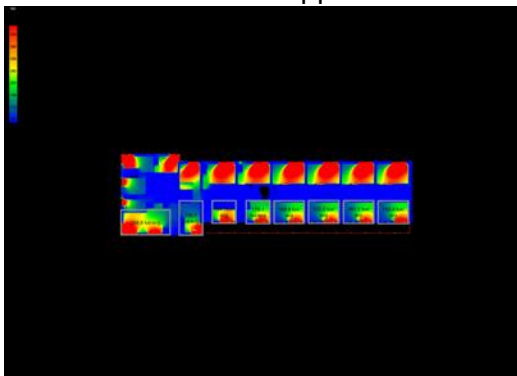
First Floor Amended Application



Second Floor Amended Application



Third floor Amended Application



Interestingly when the data from the legacy Paul street HMO Planning Application is modelled and includes the warehouse opposite side of Paul Street and within the Development site of the current application, we note that the light levels of the original development are only marginally improved over the extant planning permission.

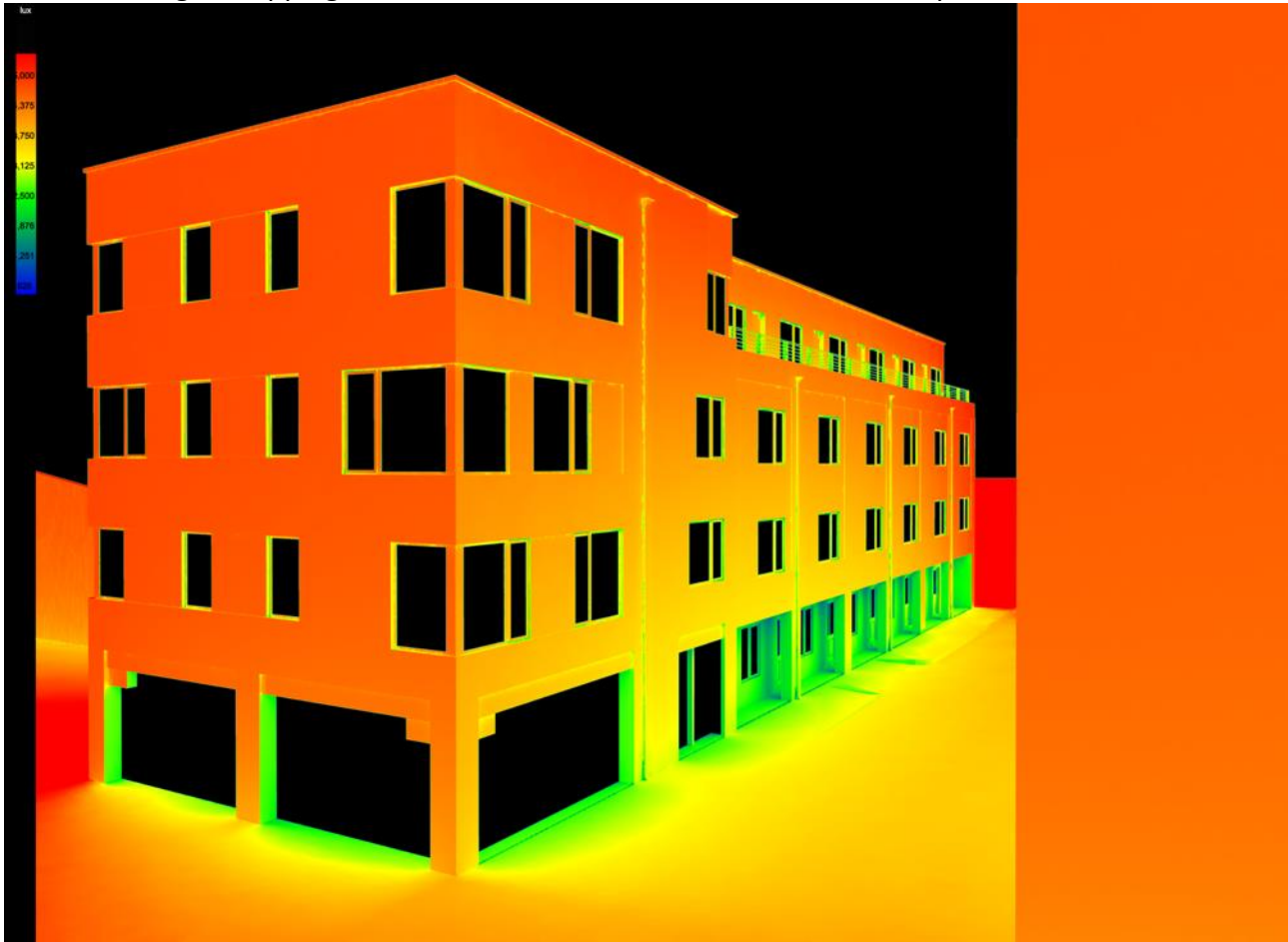
The warehouse building that stood on the site at the time of the planning application is in similar proximity to the extant permissions and the amended applications, and as such all three calculations return similar daylighting results irrespective of variances in vertical scale.

We believe that the extant proposals, the legacy warehouse, and the amended proposals all share a common environment of somewhat limited sky views from the original Paul Street HMO that is adjacent to the development site. This is in no small part reinforced by the narrow street, providing a reasonable density of permitted buildings of an urban grain in relatively close proximity to one another.

The results of this analysis reinforce the assertion that light levels of the existing Paul Street HMO Building will not be significantly adversely affected by loss of light, when reviewed in the context of the history of the neighbourhood and the impacts of adjacent buildings, now demolished, that had on daylighting levels in the building when originally constructed.

5.4 External Daylight Factor Analysis from Light Map Renders

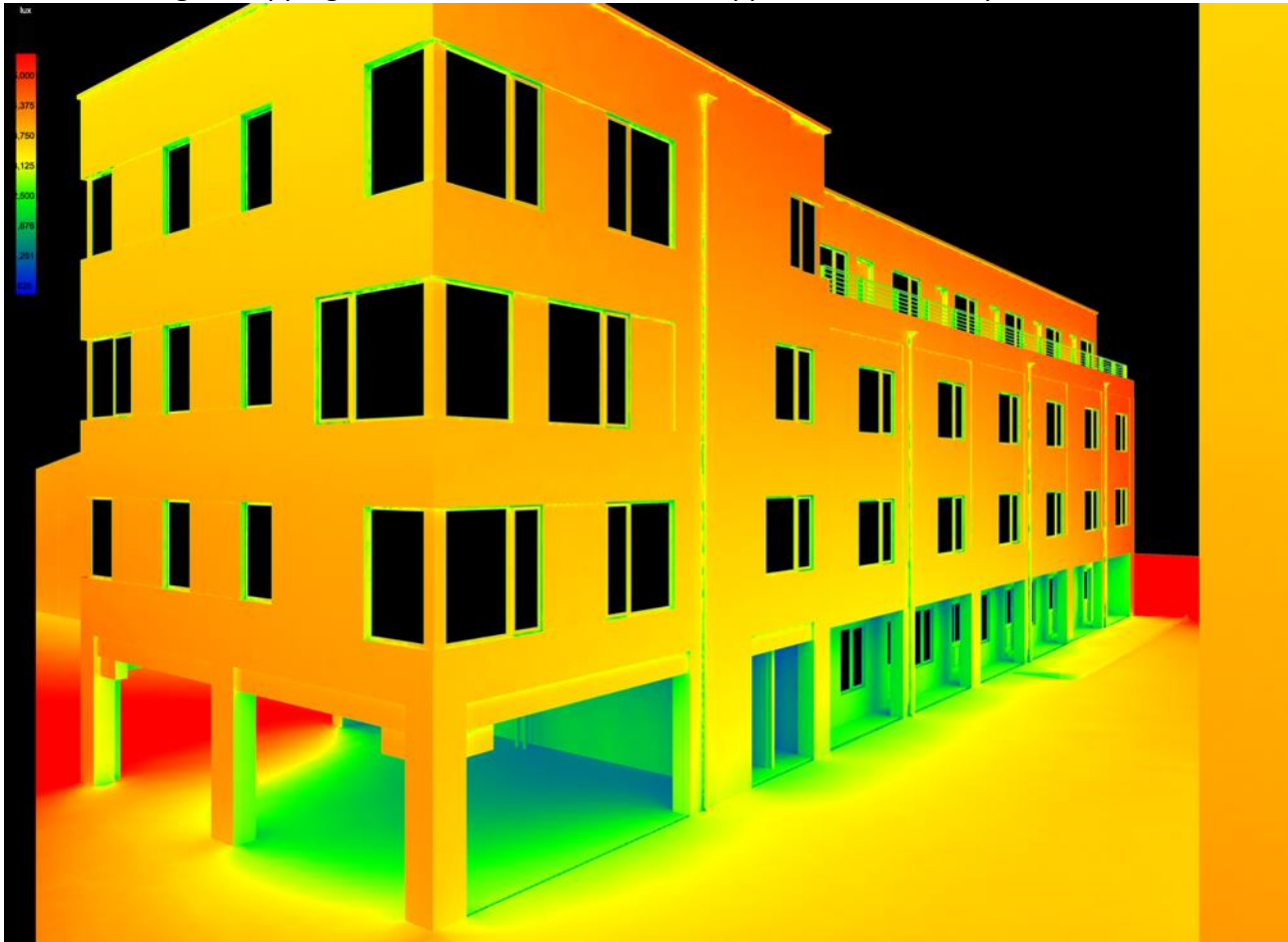
Paul Street Light Mapping Elevation View of Extant Permission March Equinox



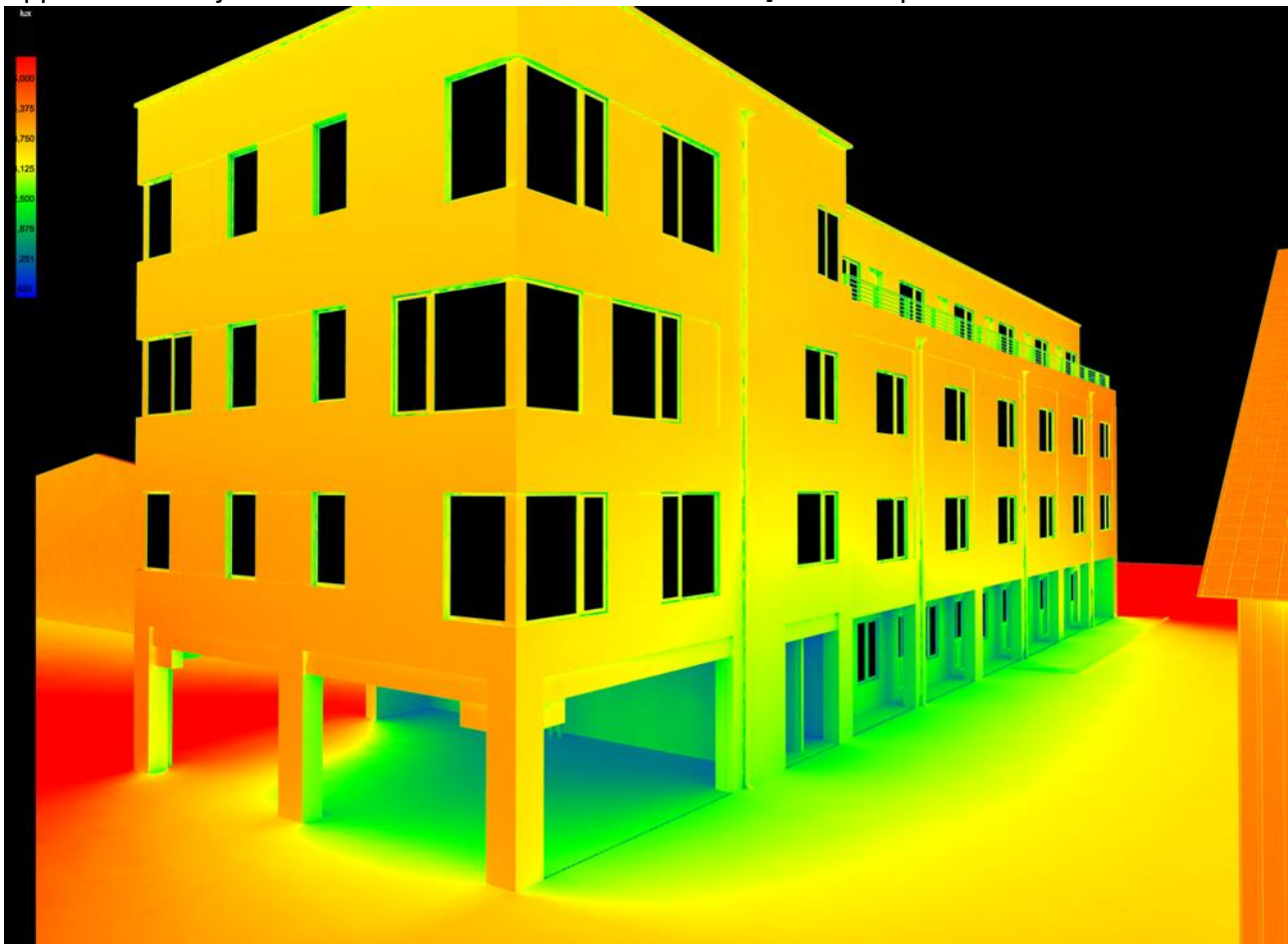
The external light mapping of the three scenario calculation simulations for extant planning approval, amended proposals, and legacy historic condition of the HMO in close proximity to the warehouse all show a correlation of external illuminance that is consistent across all three scenarios.

We believe that this multi scenario testing proves the hypothesis that external light levels are not adversely affected by either the extant permission or the amended application that we consider is supported by the documented evidence within this report, and the other supplementary reports submitted for review and approval as part of this application

Paul Street Light Mapping Elevation View of Amended Application March Equinox



Paul Street Light Mapping Elevation View of Original Paul Street HMO Permission [Legacy Application – Adjacent Warehouse now removed from site] March Equinox



6.0 Conclusion

We tested the hypothesis that the amended application does not adversely affect lighting levels within the adjacent residential developments, or the external environment. In testing the quality of daylighting resulting from the proposed design we have adopted a variety of methods to test the daylighting performance of the urban design.

External Sunpath Shadow Studies show some level of winter overshadowing that is consistent with lower sun angles and azimuth, and that this correlates with a similar data set between the extant planning permission and the amended planning application, with little discernable impact on the adjacent buildings of the increase in storey height.

The Vertical Sky Component Analysis indicated an average reduction in the VSC of between 25% and 31%, which when considered with the urban location of the building, close proximity to neighbouring buildings that characterise higher urban densities, we believe does not show a marked or dramatic decrease in the daylight provision in the bedrooms to the HMO on Paul Street.

Average Daylight Factor Analysis shows that there is perhaps a 20% reduction in calculated average daylight provision in the sampled rooms typical of the development. Our reading of the BRE Guidance is that this is within acceptable limits, however we acknowledge the limitations of the calculation where there is no Vertical Sky Component visible from the rooms window.

Internal Lux Mapping Analysis provides a more detailed graphical image of penetration of light levels into the bedrooms on the existing Paul Street HMO, and confirms that the impact on internal light levels is to provide a marginal 50:50 rule that is consistent across the extant approval scenario and also the amended application that seeks to provide a limited increase in vertical scale. It should be noted at this point that the floor to floor height of the extant approval is taller than that of the amended submission, and that this mitigates any impact on scale and limits the height of the building – this promoting a marginal increase in overall height, at a greater efficiency of floor to floor height.

External Lux mapping Analysis confirms that the external realm of the street and light falling upon the external façade of the building is not adversely affected by an increase in the number of stories provided. A correlation and comparable light level have been demonstrated across a number of development scenarios of the building and that proves a limited impact of external lighting levels.

We believe that this report supports the hypothesis that the amended application does not significantly affect daylighting levels within the adjacent properties, and that the test results across a number of differing scenarios concurs with this statement.

Appendix A.1- External Sunpath Studies – Extant Permission
[View West From St Bartholomew Street]

December 21st Winter Solstice

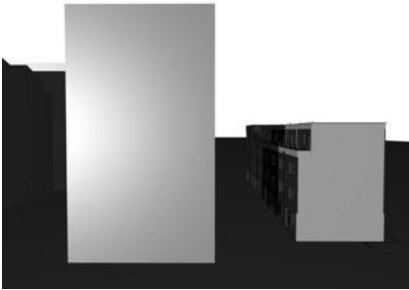


Fig A1. 8.00am

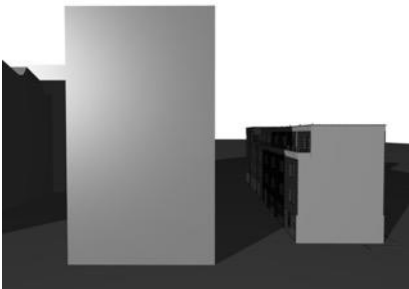


Fig.A2 9.00am

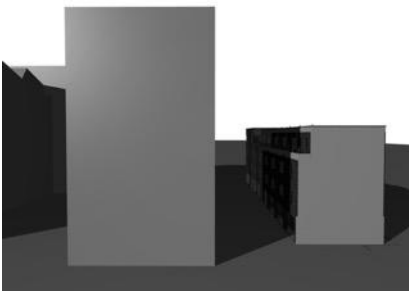


Fig.A3 10.00am

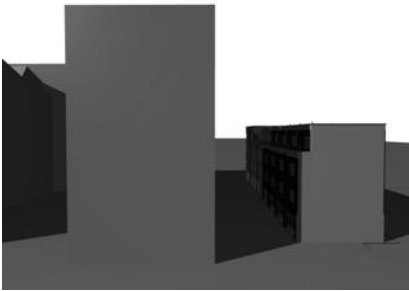


Fig.A4 11.00am

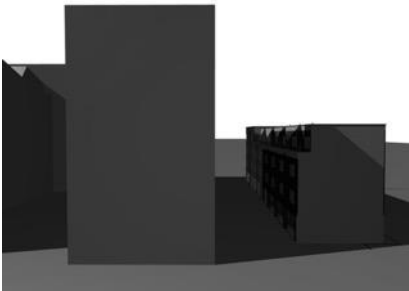


Fig.A5 12.00 midday

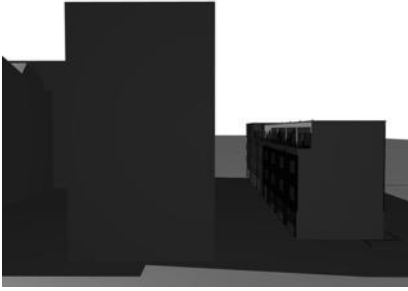


Fig.A6 13.00 pm



Fig.A7 14.00 pm



Fig.A8 15.00 pm



Fig.A9 16.00 pm

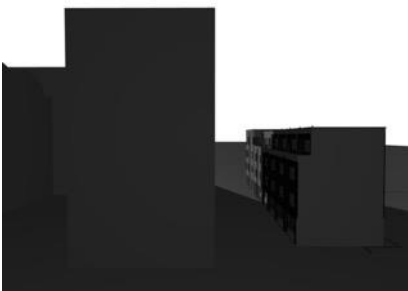


Fig.A10 17.00 pm



Fig.A11 18.00 pm

March 20th Spring Equinox

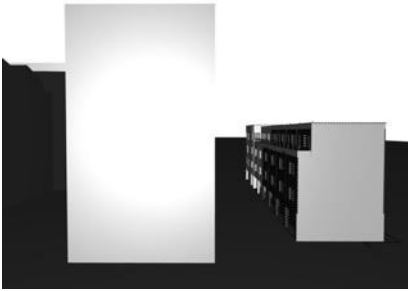


Fig.A12 07.00 am

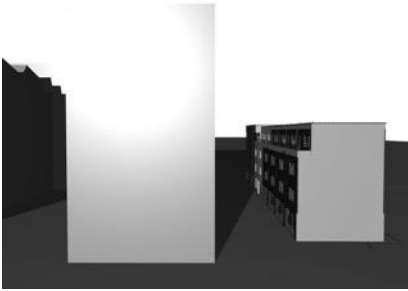


Fig.A13 08.00 am

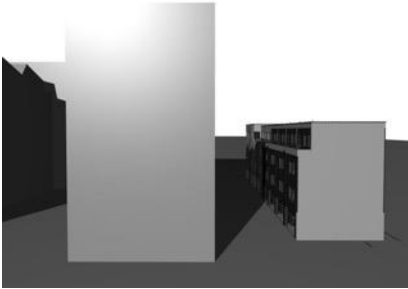


Fig.A14 09.00 am

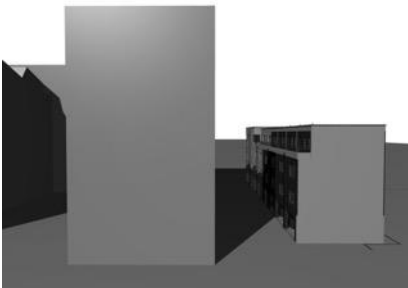


Fig.A15 10.00 am

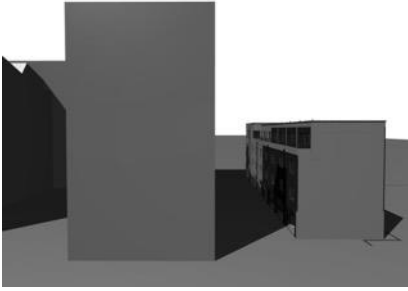


Fig.A16 11.00 am

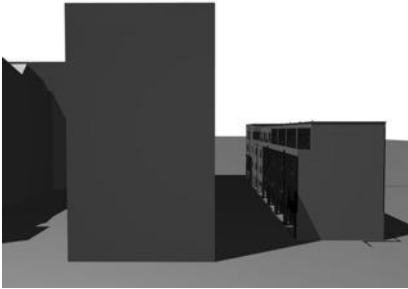


Fig.A17 12.00 midday

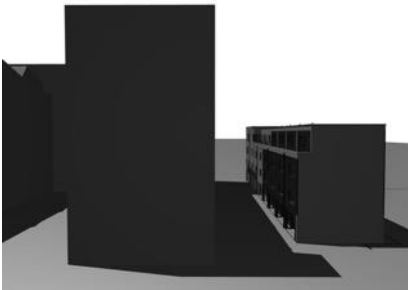


Fig.A18 13.00 pm

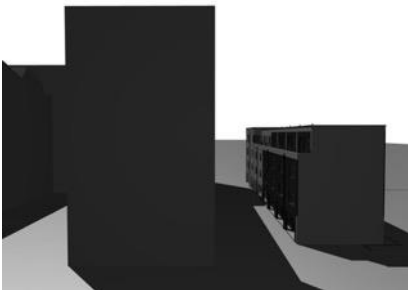


Fig.A19 14.00 pm

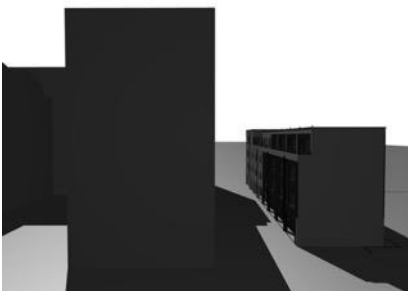


Fig.A20 15.00 pm

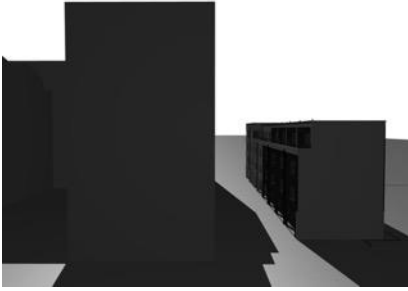


Fig.A21 16.00 pm

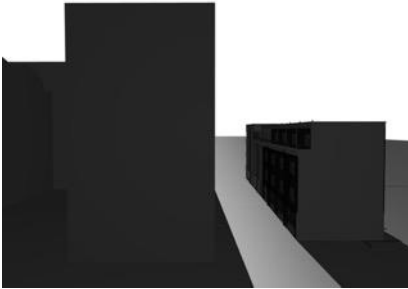


Fig.A22 17.00 pm

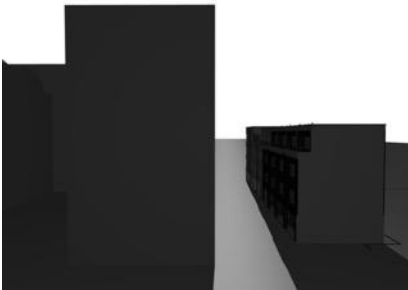


Fig.A23 18.00 pm

June 21st Summer Solstice

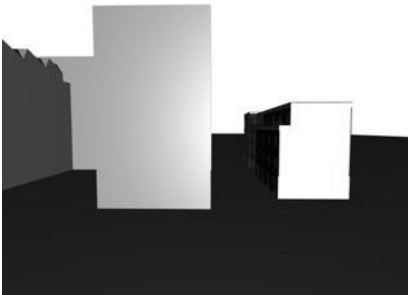


Fig.A24 07.00 am

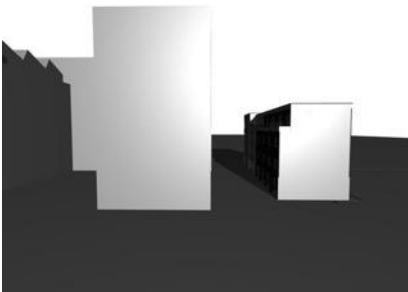


Fig.A25 08.00 am

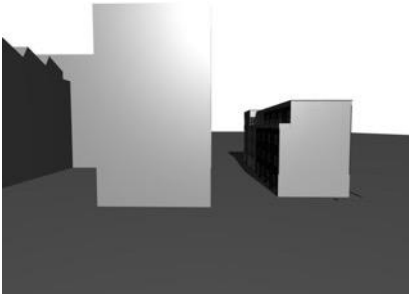


Fig.A26 09.00 am

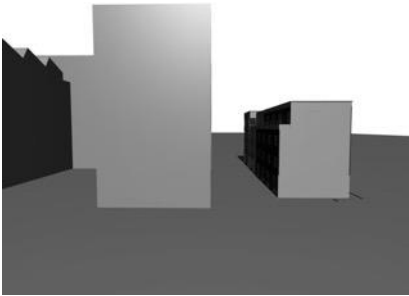


Fig.A27 10.00 am

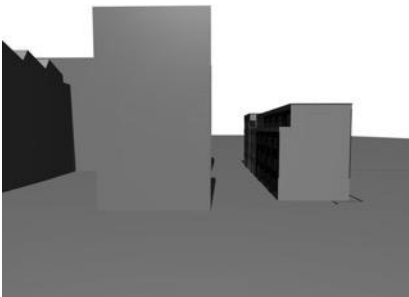


Fig.A28 11.00 am

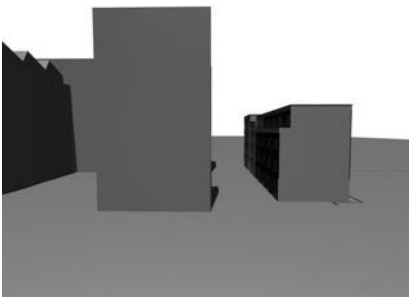


Fig.A29 12.00 midday

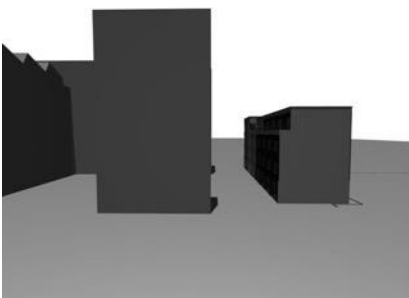


Fig.A30 13.00 pm

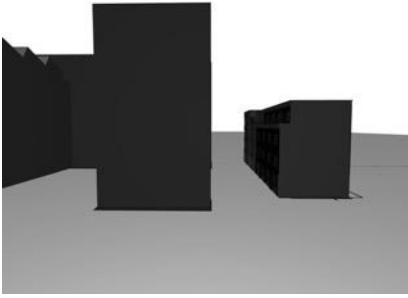


Fig.A31 14.00 pm

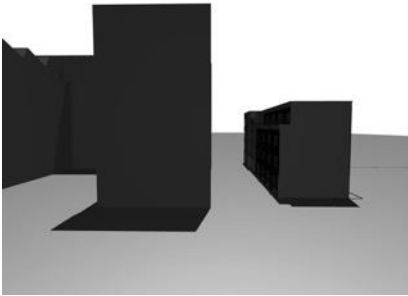


Fig.A32 15.00 pm

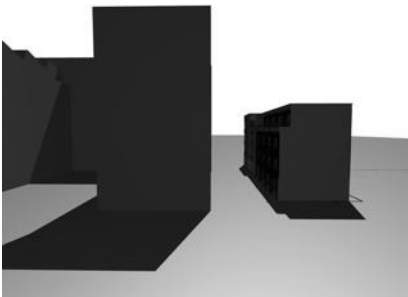


Fig.A33 16.00 pm

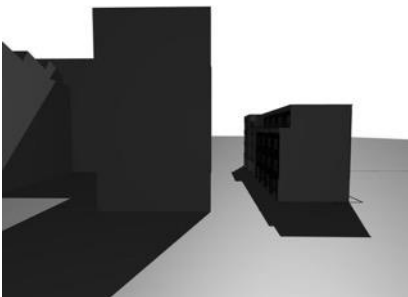


Fig.A34 17.00 pm

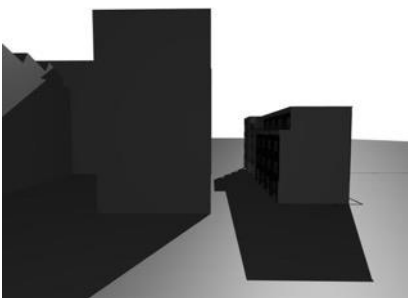


Fig.A35 18.00 pm

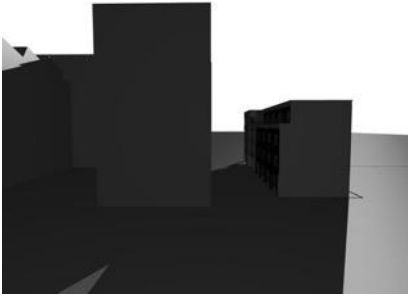


Fig.A35 19.00 pm

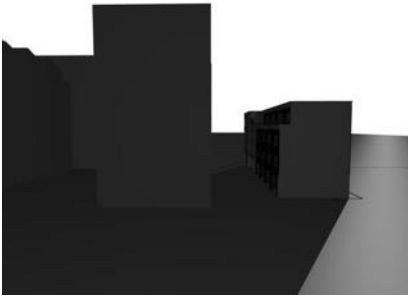


Fig.A36 20.00 pm

Sept 23rd Autumn Equinox

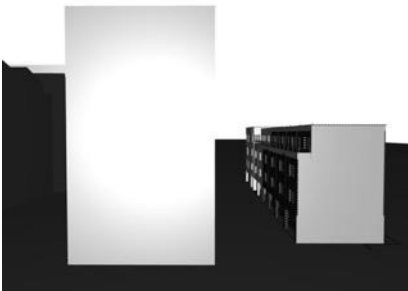


Fig.A37 07.00 am

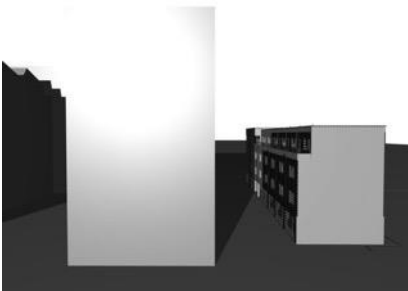


Fig.A38 08.00 am

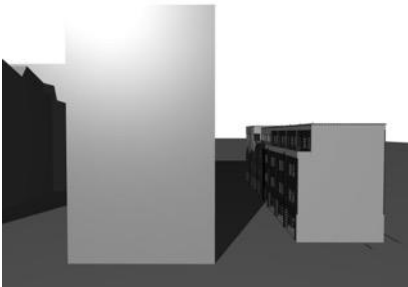


Fig.A39 09.00 am

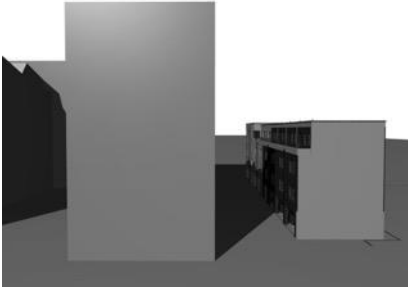


Fig.A40 10.00 am

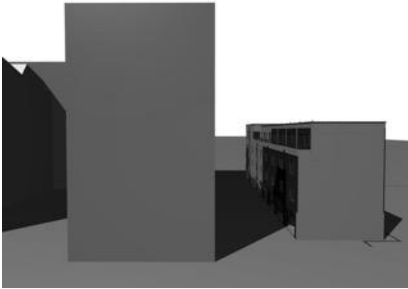


Fig.A41 11.00 am

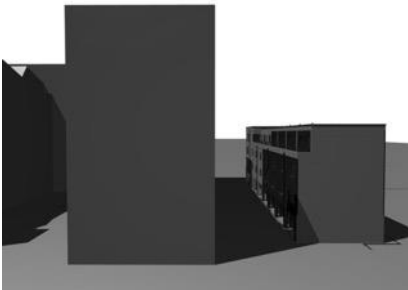


Fig.A42 12.00 midday

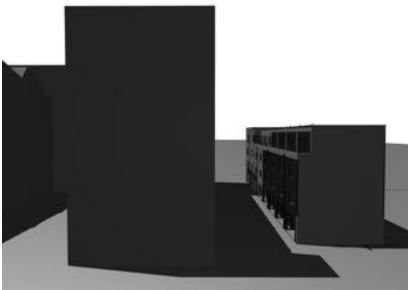


Fig.A43 13.00 pm

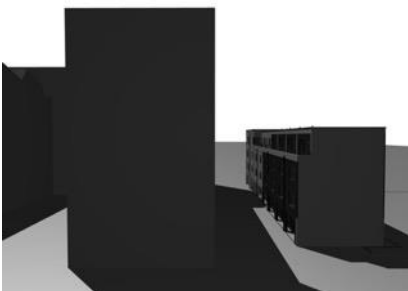


Fig.A44 14.00 pm

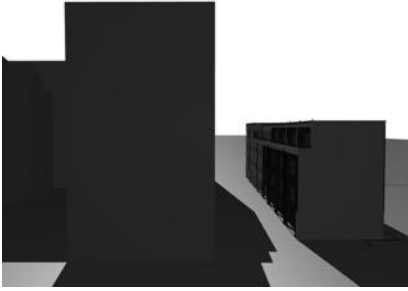


Fig.A45 15.00 pm



Fig.A46 16.00 pm



Fig.A47 17.00 pm



Fig.A48 18.00 pm

Appendix A.2- External Sunpath Studies – Amended Application
[View West From St Bartholomew Street]

December 21st Winter Solstice

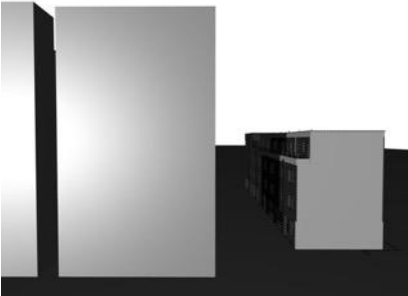


Fig.A49 08.00 am

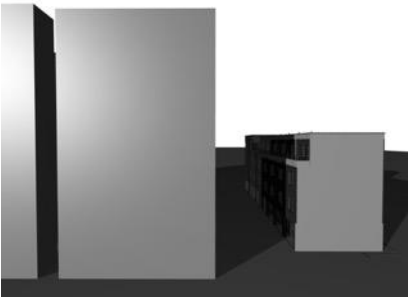


Fig.A50 09.00 am

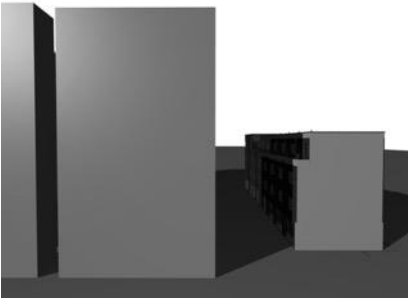


Fig.A51 10.00 am

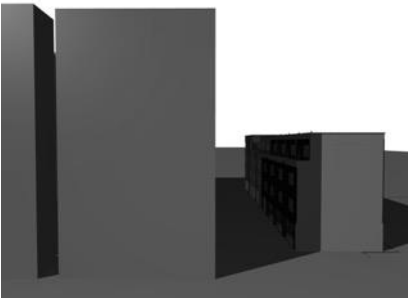


Fig.A52 11.00 am

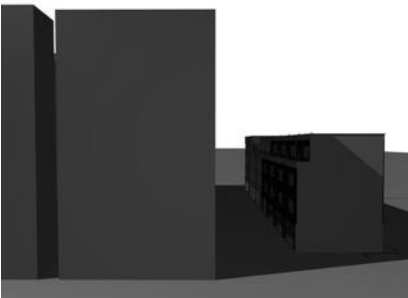


Fig.A53 12.00 midday



Fig.A54 13.00 pm

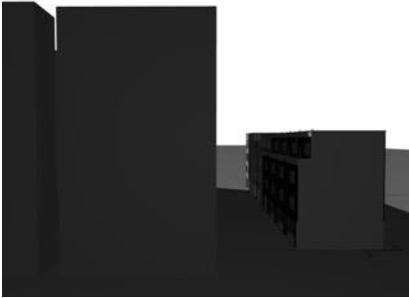


Fig.A55 14.00 pm

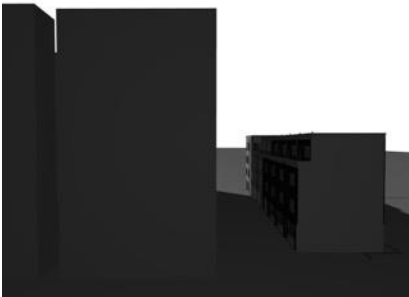


Fig.A56 15.00 pm

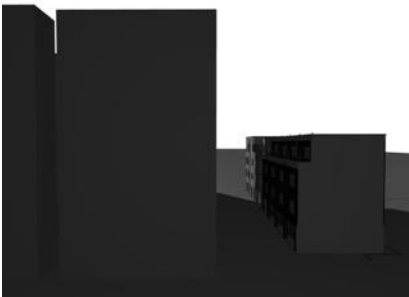


Fig.A57 16.00 pm



Fig.A58 17.00 pm



Fig.A59 18.00 pm

March 20th Spring Equinox

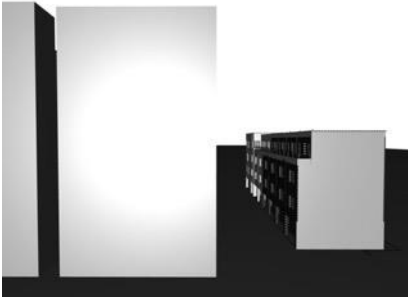


Fig.A60 07.00 am

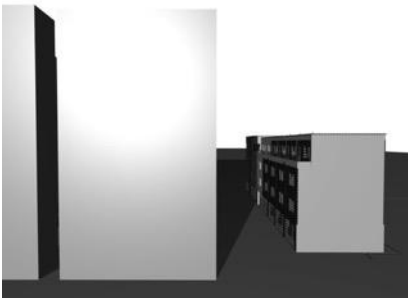


Fig.A61 08.00 am

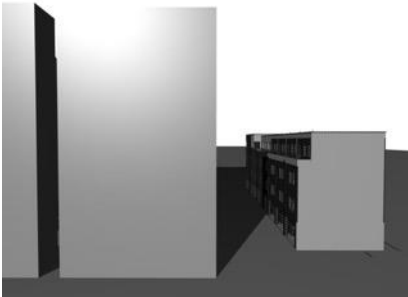


Fig.A62 09.00 am

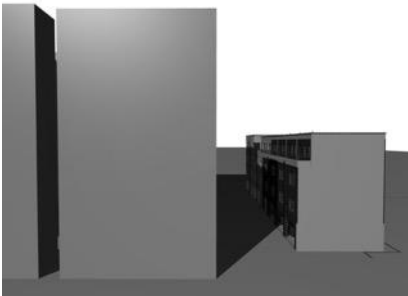


Fig.A63 10.00 am

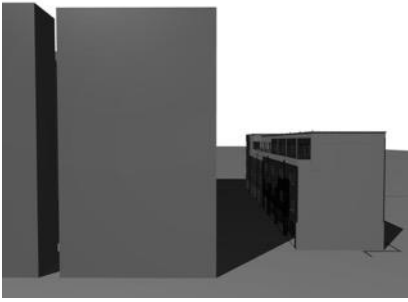


Fig.A64 11.00 am

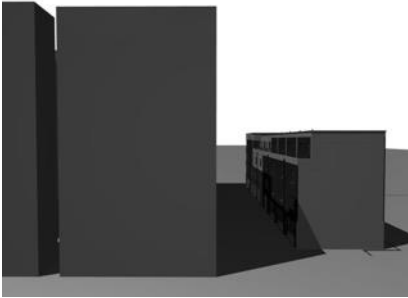


Fig.A65 12.00 midday

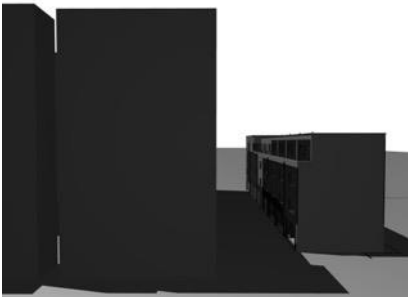


Fig.A66 13.00 pm

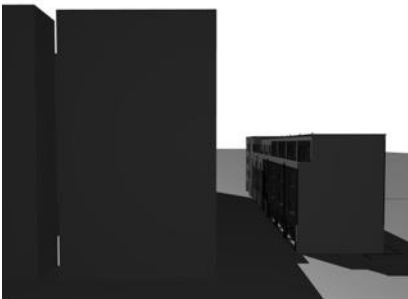


Fig.A67 14.00 pm

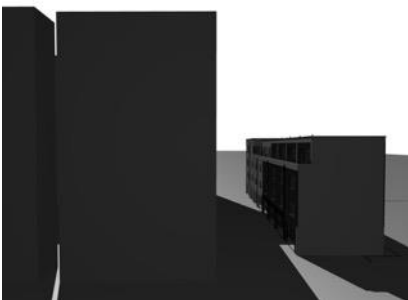


Fig.A68 15.00 pm



Fig.A69 16.00 pm

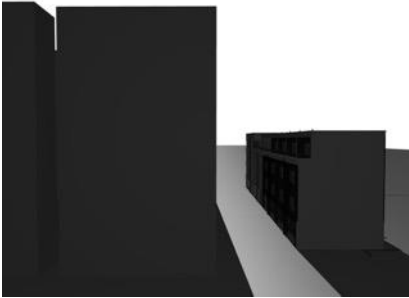


Fig.A70 17.00 pm

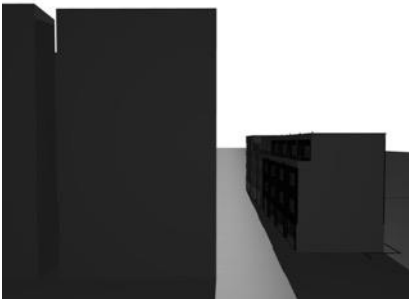


Fig.A71 18.00 pm

June 21st Summer Solstice

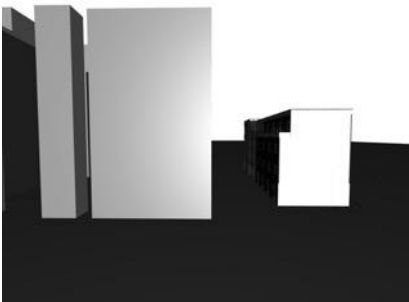


Fig.A72 07.00 am

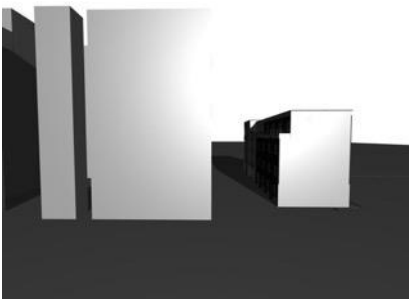


Fig.A73 08.00 am

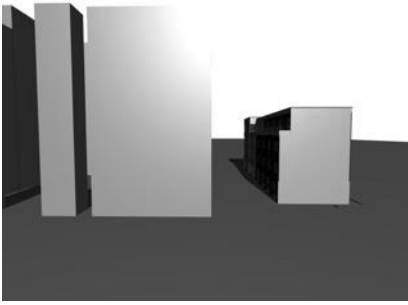


Fig.A74 09.00 am

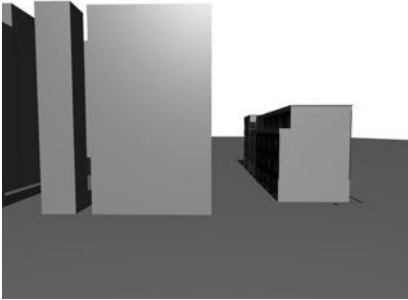


Fig.A75 10.00 am

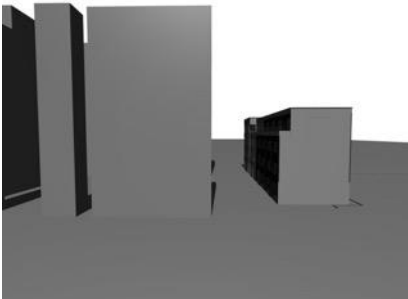


Fig.A76 11.00 am

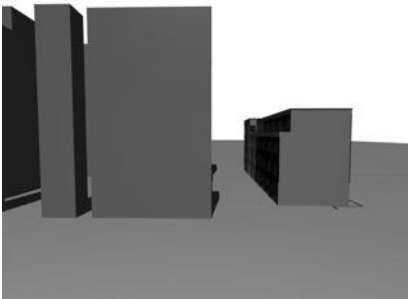


Fig.A77 12.00 midday

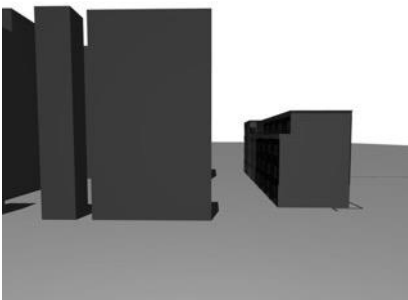


Fig.A78 13.00 pm

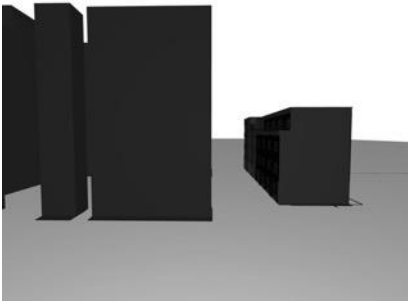


Fig.A79 14.00 pm

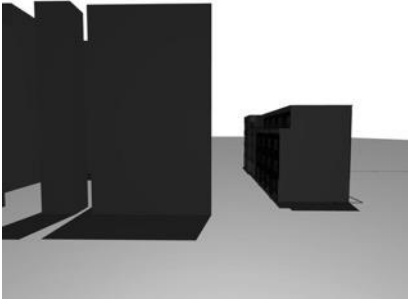


Fig.A80 15.00 pm

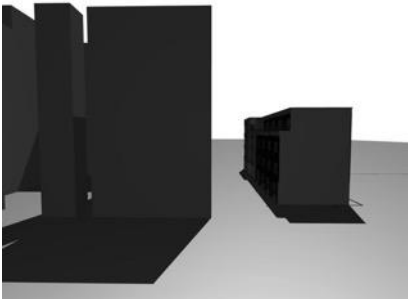


Fig.A81 16.00 pm

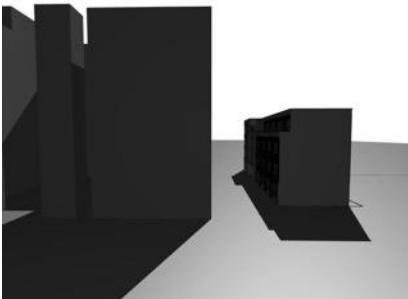


Fig.A82 17.00 pm

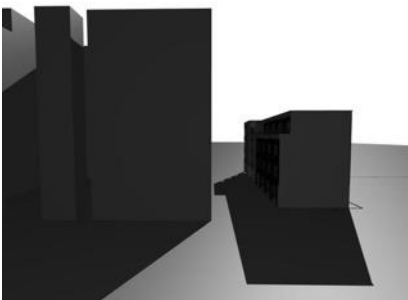


Fig.A83 18.00 pm

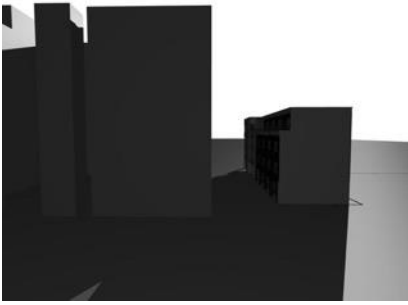


Fig.A84 19.00 pm

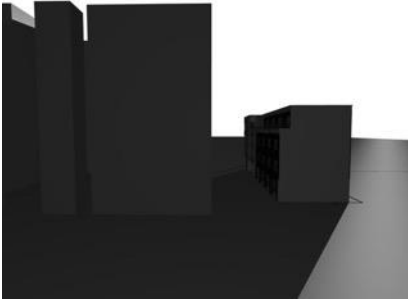


Fig.A85 20.00 pm

Sept 23rd Autumn Equinox

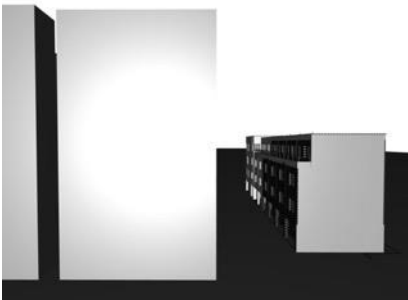


Fig.A86 07.00 am

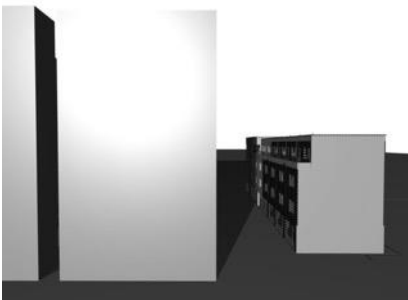


Fig.A87 08.00 am

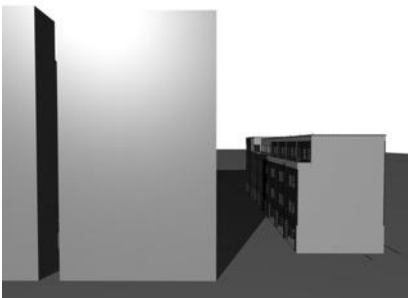


Fig.A88 09.00 am

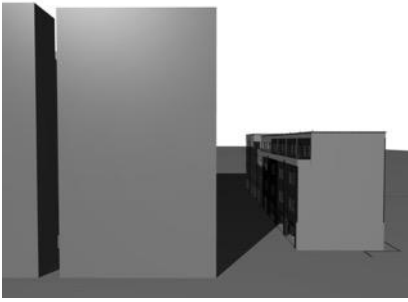


Fig.A89 09.00 am

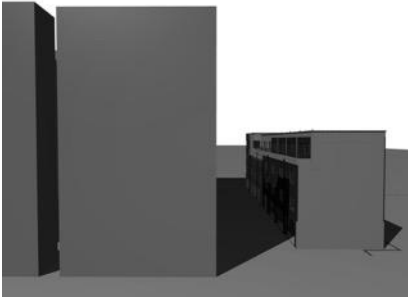


Fig.A90 10.00 am

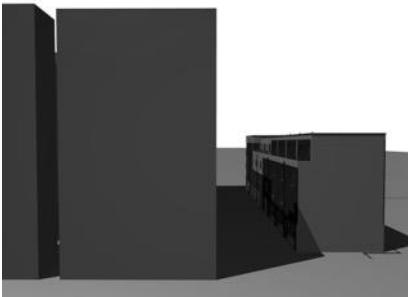


Fig.A91 11.00 am

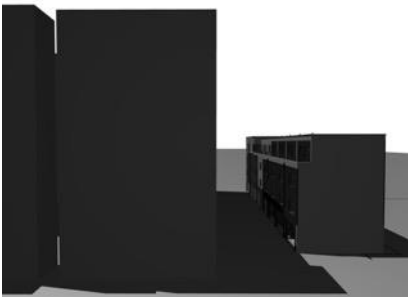


Fig.A92 12.00 midday



Fig.A93 13.00 pm

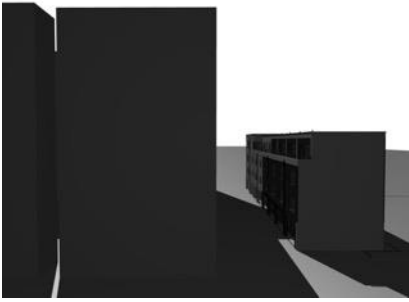


Fig.A94 14.00 pm

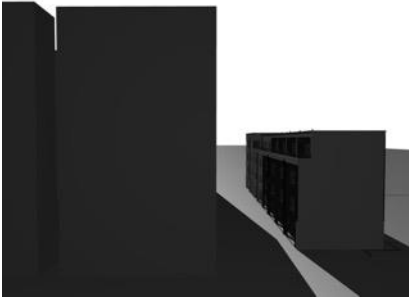


Fig.A95 15.00 pm

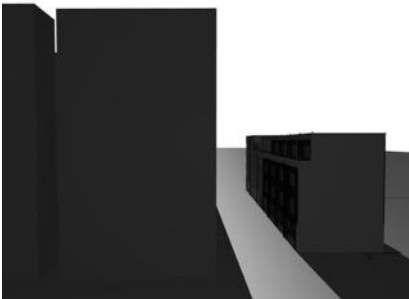


Fig.A96 16.00 pm

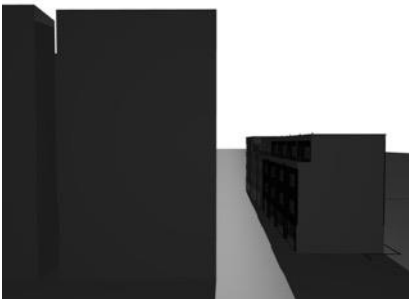


Fig.A97 17.00 pm

Appendix A.3 – Vertical Sky Component Comparison

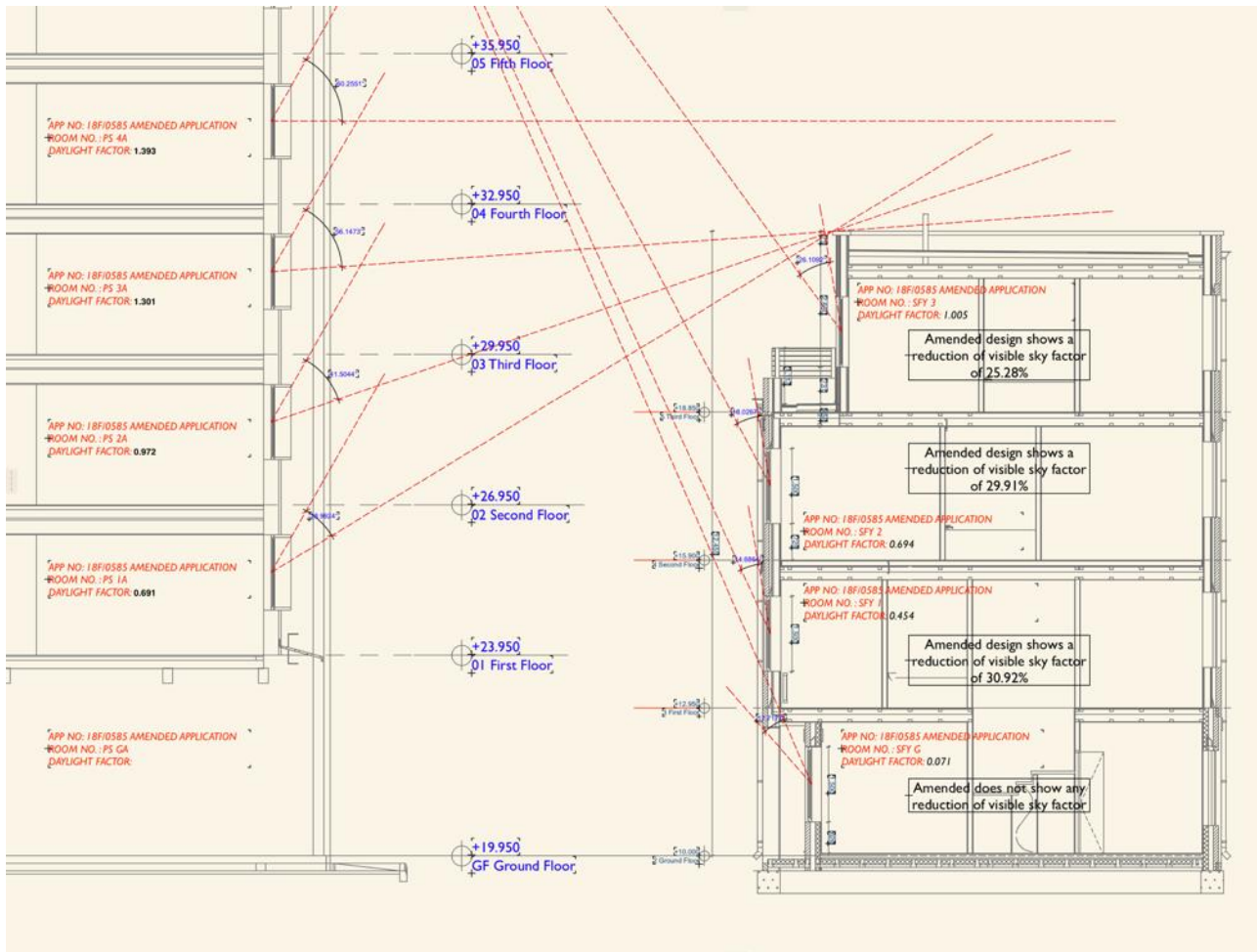


Fig.A98 Paul Street Existing HMO VSC Study

Appendix A.4 – Average Daylight Factor Calculation and Comparison

Fig.A99 Paul Street Section Extant Permission Daylight Study

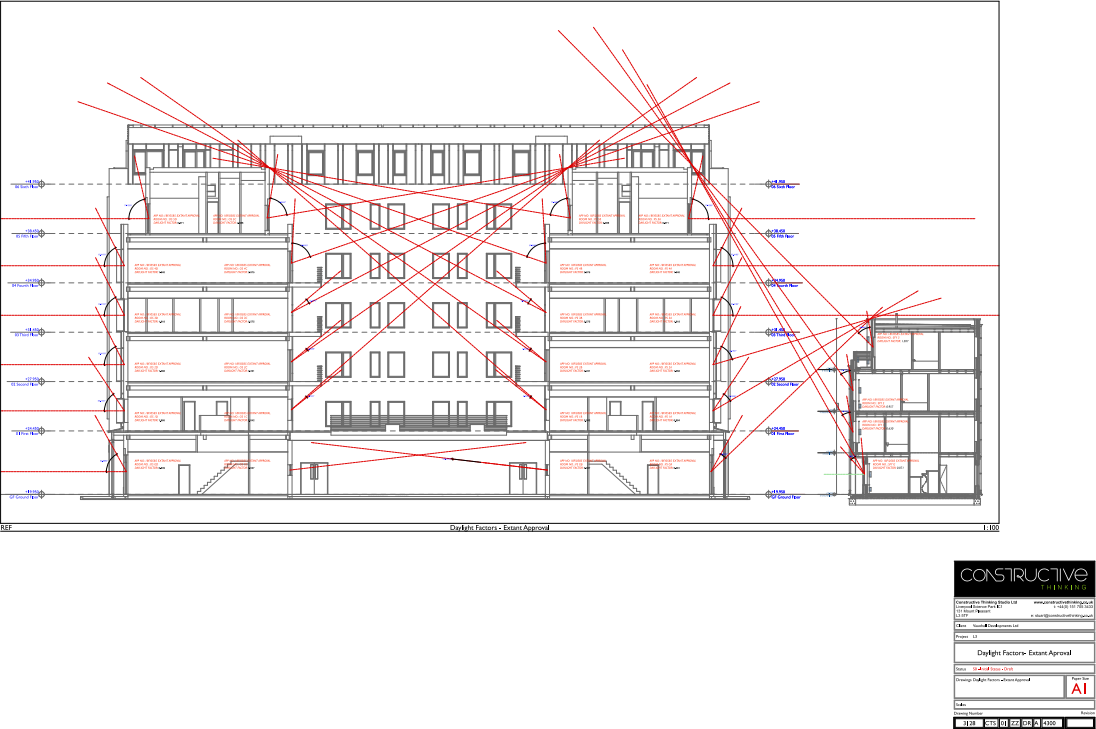
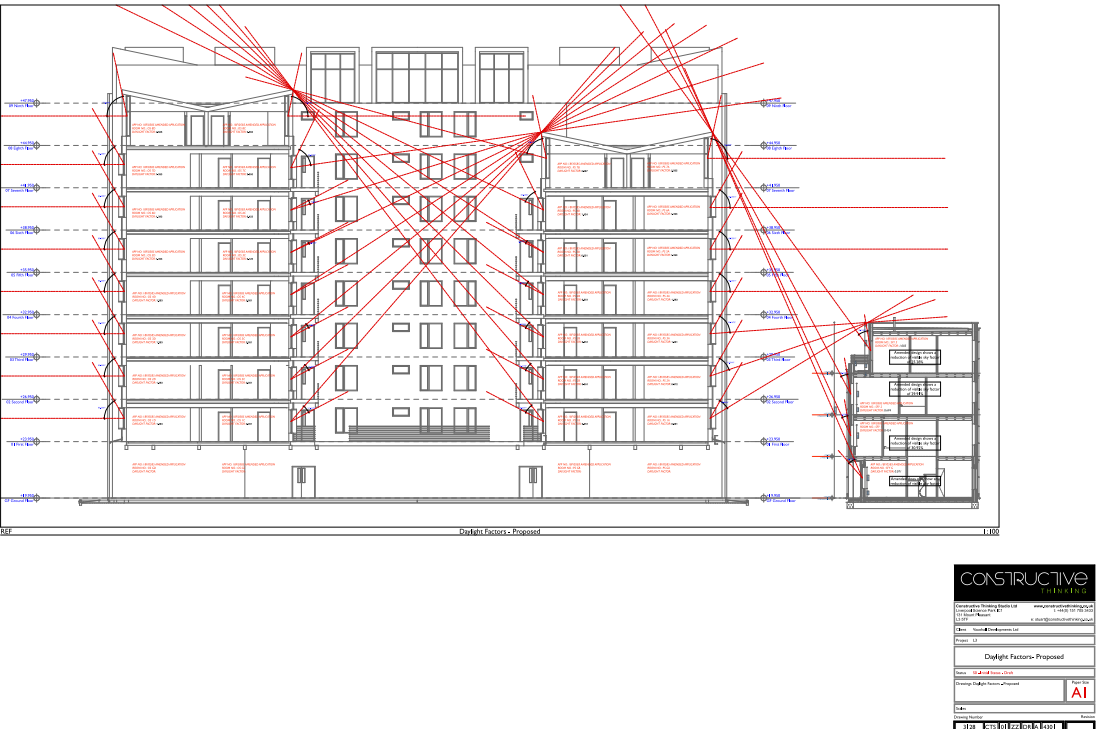


Fig.A100 Paul Street Section Amended Application Daylight Study



| APP NO: 18F/0585 EXTANT APPROVAL | | | | | | | | | |
|----------------------------------|-------|-------|--------------------|-----------|--|--------------------|-------|-------------|----------------------|
| L3 BLOCK ORIEL STREET | | | L3 COURTYARD SOUTH | | | L3 COURTYARD NORTH | | | PAUL STREET ADJACENT |
| OS 6D | | | OS 6C | | | PS 6B | | | |
| OS 5D | 0.971 | OS 5C | 2.086 | | | PS 5B | 2.086 | PS 5A | 0.971 |
| OS 4D | 1.84 | OS 4C | 2.875 | | | PS 4B | 2.875 | PS 4A | 1.84 |
| OS 3D | 1.818 | OS 3C | 0.575 | | | PS 3B | 0.575 | PS 3A | 1.818 |
| OS 2D | 1.388 | OS 2C | 0.221 | | | PS 2B | 0.221 | PS 2A | 1.068 |
| OS 1D | 1.866 | OS 1C | 0.042 | | | PS 1B | 0.042 | PS 1A | 0.884 |
| OS GD | 0.839 | OS GC | 0.037 | | | PS GB | 0.037 | PS GA | 0.281 |
| Oriel Street | | | | Courtyard | | | | Paul Street | |
| | | | | | | | | | SFY 3 1.307 |
| | | | | | | | | | SFY 2 0.957 |
| | | | | | | | | | SFY 1 0.63 |
| | | | | | | | | | SFY G 0.071 |

| APP NO: 18F/0585 AMENDED APPLICATION | | | | | | | | | |
|--------------------------------------|-------|-------|--------------------|-----------|--|--------------------|-------|-------------|----------------------|
| L3 BLOCK ORIEL STREET | | | L3 COURTYARD SOUTH | | | L3 COURTYARD NORTH | | | PAUL STREET ADJACENT |
| OS 9D | | | OS 9C | | | PS 9B | | | |
| OS 8D | 2.565 | OS 8C | 2.565 | | | PS 8B | | PS 8A | |
| OS 7D | 1.393 | OS 7C | 2.05 | | | PS 7B | 2.087 | PS 7A | 2.565 |
| OS 6D | 1.393 | OS 6C | 0.423 | | | PS 6B | 1.424 | PS 6A | 1.393 |
| OS 5D | 1.393 | OS 5C | 0.125 | | | PS 5B | 0.051 | PS 5A | 1.393 |
| OS 4D | 1.393 | OS 4C | 0.051 | | | PS 4B | 0.051 | PS 4A | 1.393 |
| OS 3D | 1.393 | OS 3C | 0.051 | | | PS 3B | 0.051 | PS 3A | 1.301 |
| OS 2D | 1.393 | OS 2C | 0.051 | | | PS 2B | 0.051 | PS 2A | 0.972 |
| OS 1D | 1.393 | OS 1C | 0.051 | | | PS 1B | 0.051 | PS 1A | 0.691 |
| OS GD | | OS GC | | | | PS GB | | PS GA | |
| Oriel Street | | | | Courtyard | | | | Paul Street | |
| | | | | | | | | | SFY 3 1.005 |
| | | | | | | | | | SFY 2 0.694 |
| | | | | | | | | | SFY 1 0.454 |
| | | | | | | | | | SFY G 0.071 |



Fig.A101 Paul Street Section Comparison Daylight Study

Appendix A.5 – Internal Lux Mapping Analysis

Fig.A102 Paul Street Ground Floor Extant Permission

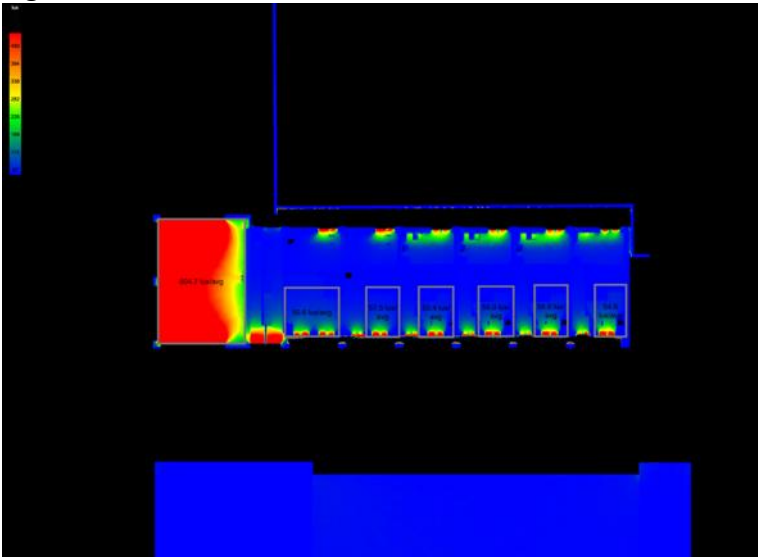


Fig.A103 Paul Street Ground Floor Amended Application

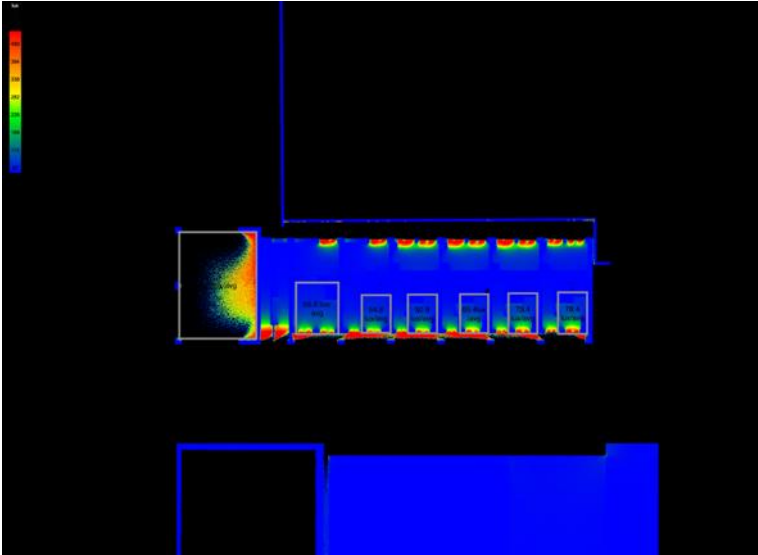


Fig.A104 Paul Street Ground Floor Legacy Application [Warehouse now removed from site]

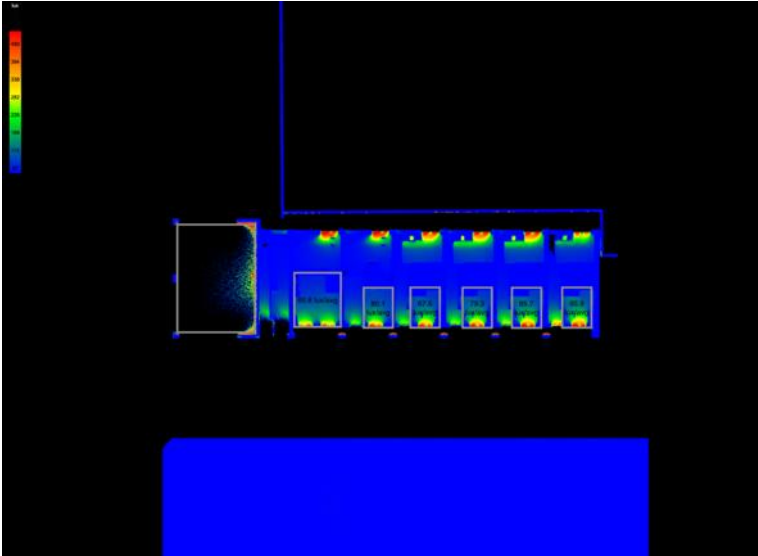


Fig.A105 Paul Street First Floor Extant Permission

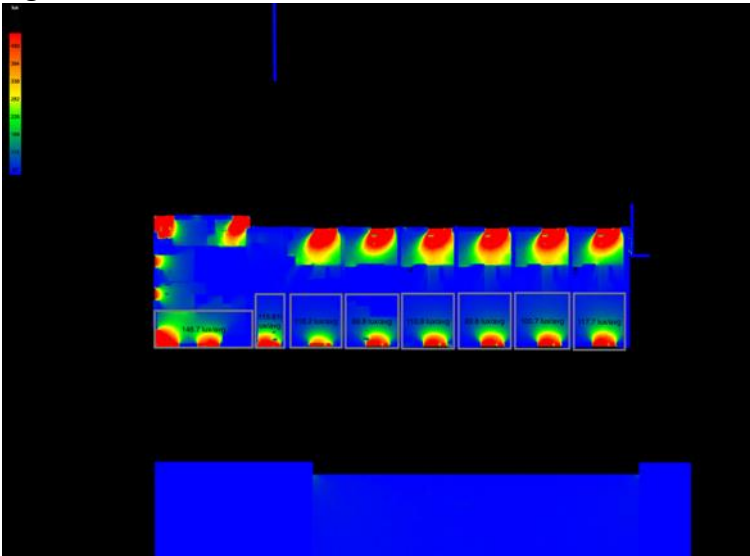


Fig.A106 Paul Street First Floor Amended Application

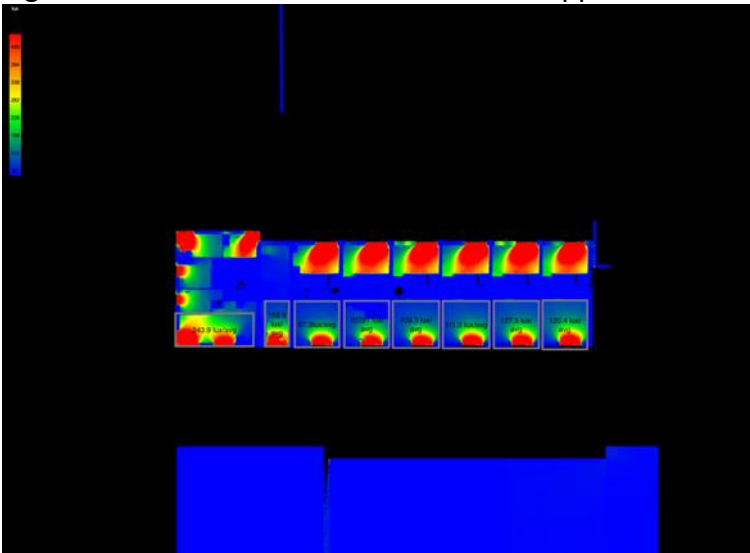


Fig.A107 Paul Street First Floor Legacy Application [Warehouse now removed from site]

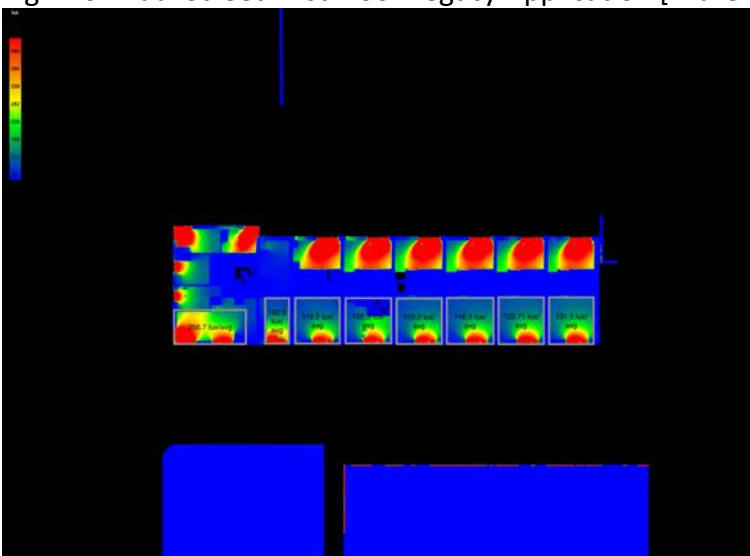


Fig.A108 Paul Street Second Floor Extant Permission

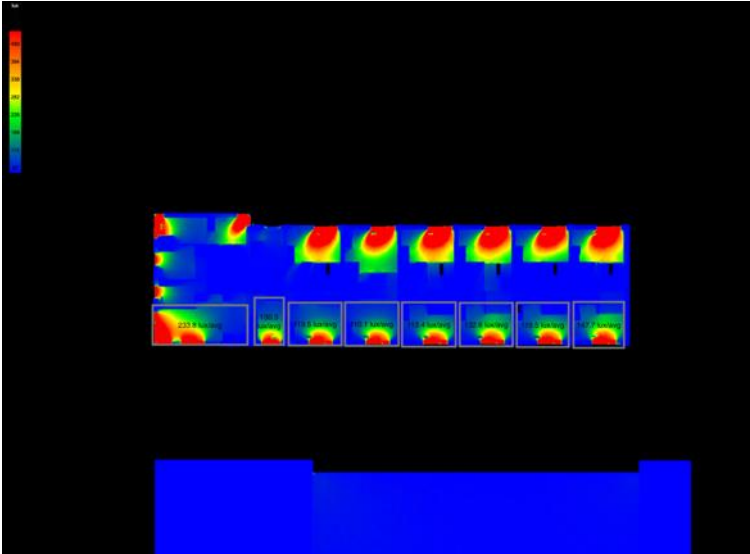


Fig.A109 Paul Street Second Floor Amended Application

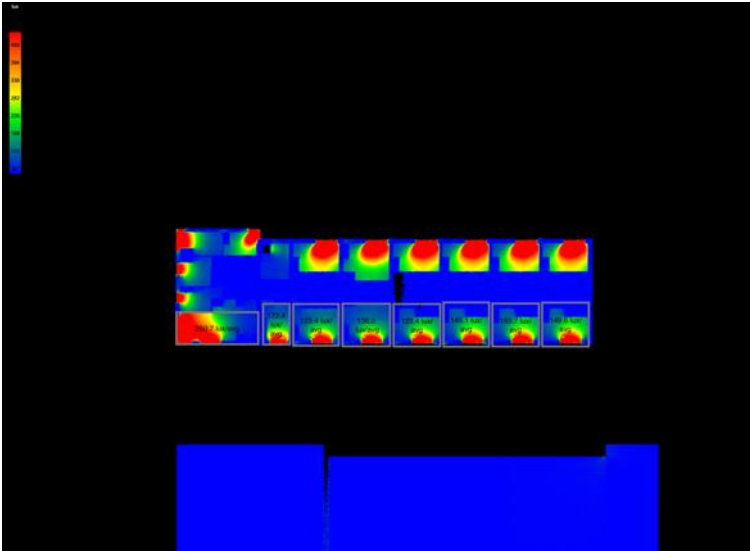


Fig.A110 Paul Street Second Floor Legacy Application [Warehouse now removed from site]

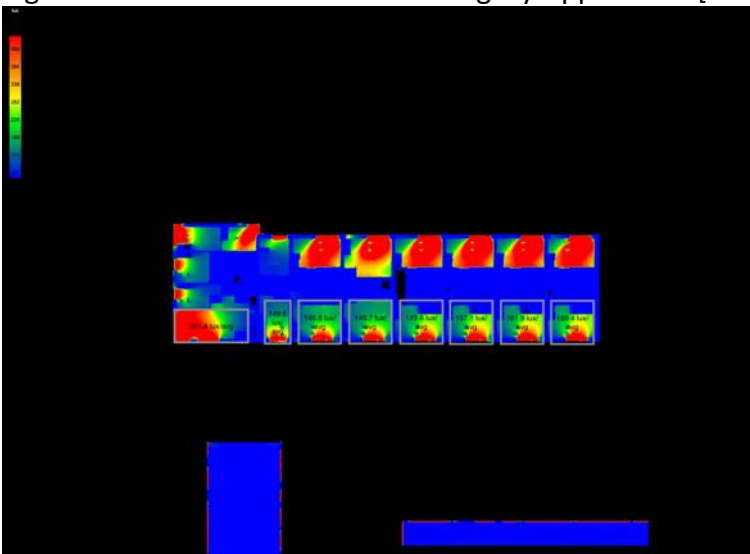


Fig.A111 Paul Street Third Floor Extant Permission

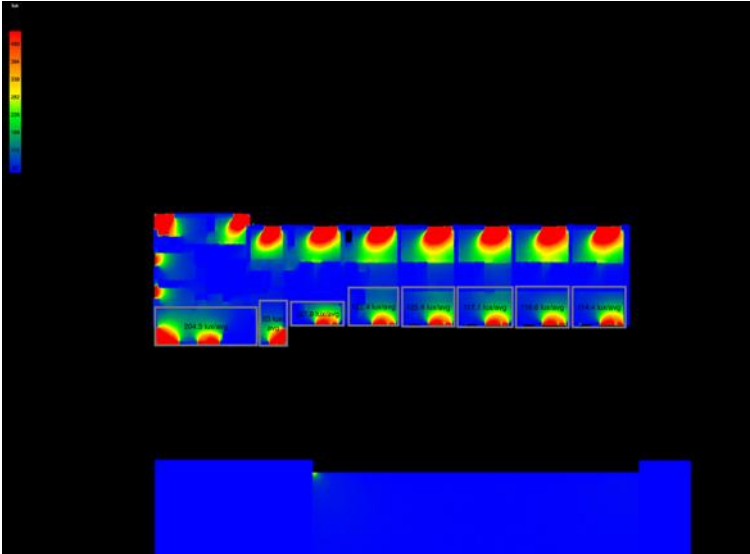


Fig.A112 Paul Street Third Floor Amended Application

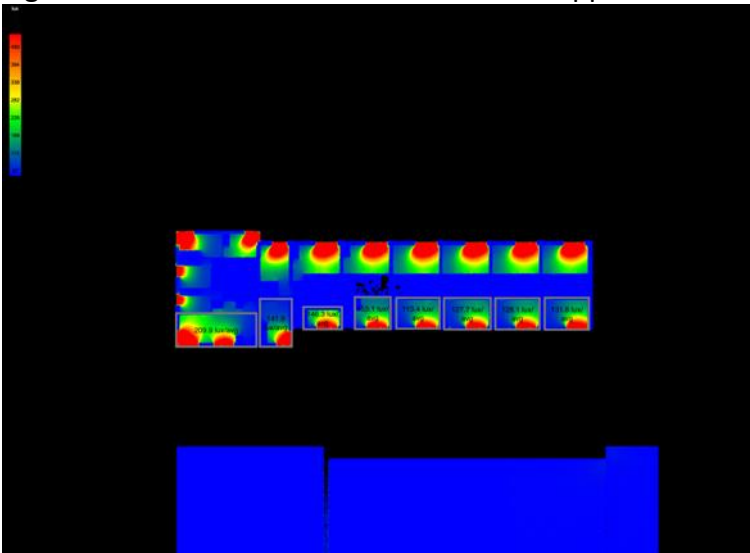
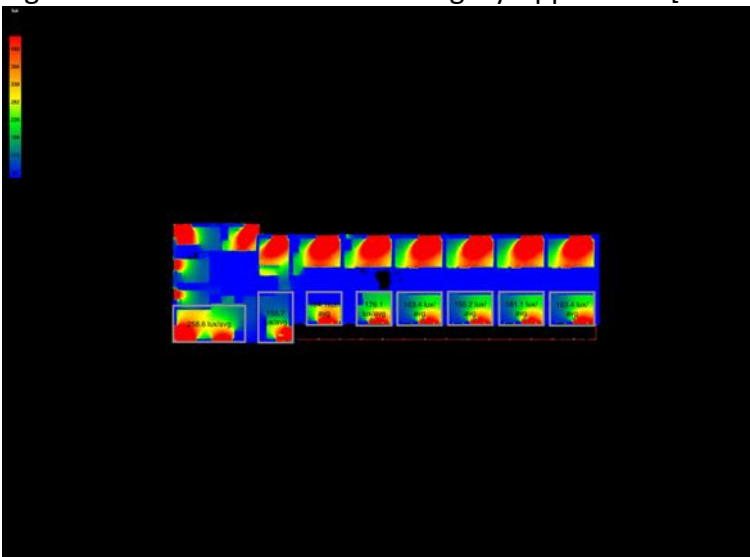


Fig.A113 Paul Street Third Floor Legacy Application [Warehouse now removed from site]



Appendix A.6 – External Lux Mapping Analysis

Fig.A114 Paul Street Elevation Study March Extant Permission

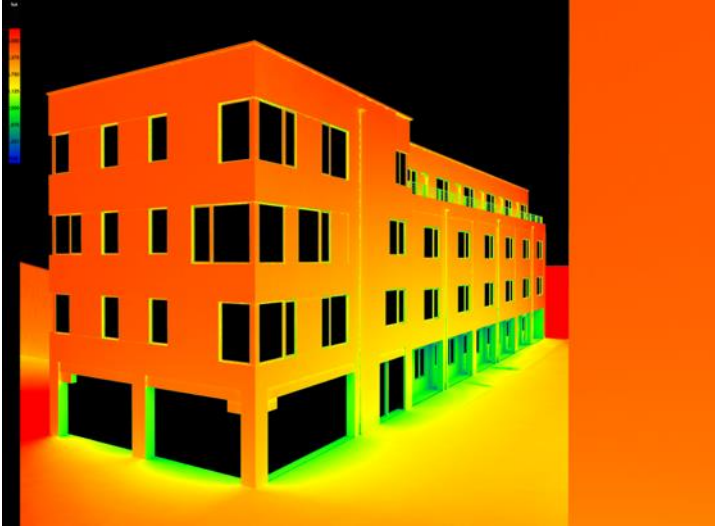


Fig.A115 Paul Street Elevation Study March Amended Application

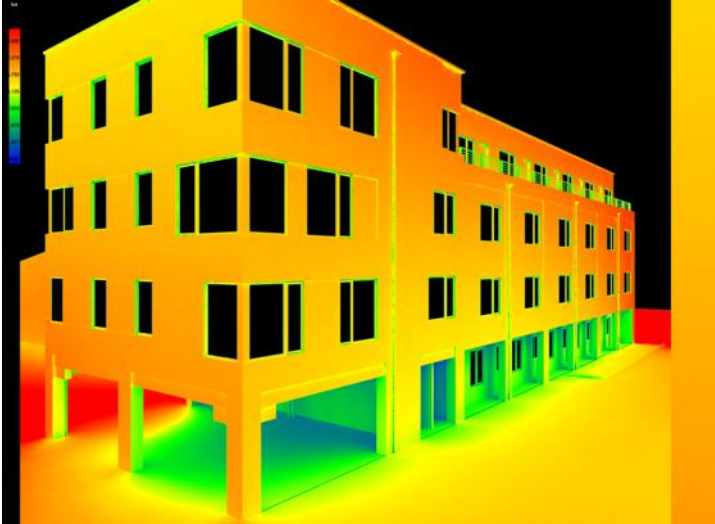
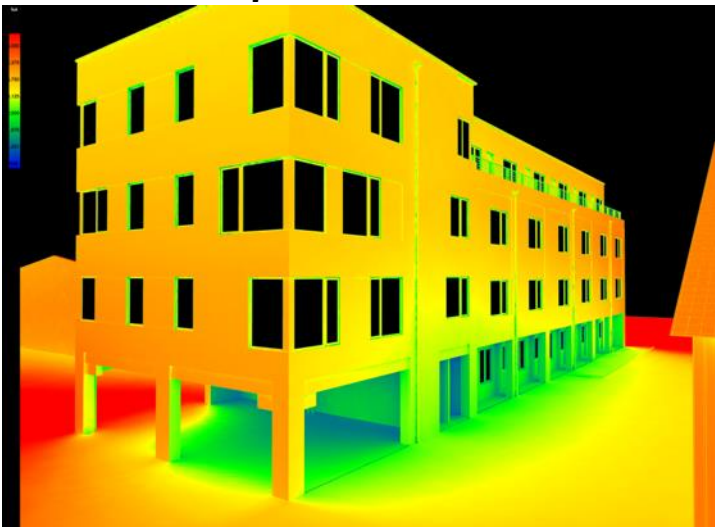


Fig.A116 Paul Street Elevation Study March Legacy Application [Adjacent Warehouse Now Removed from Site]



Appendix A.7 – Image Credits

Report Images:

- i. P3. Google Street View Image of Vauxhall Road looking towards existing Paul Street HMO development © 2019
- ii. P4. Ordnance Survey Mapping Extract [License No:100048957] © 2019
- iii. P7-P8. Sunpath Analysis - images produced by Constructive Thinking Studio Ltd © 2019
- iv. P9. VSC Calculation Drawing extract - images produced by Constructive Thinking Studio Ltd © 2019
- v. P11. Average Daylight Factor Comparison tables - images produced by Constructive Thinking Studio Ltd © 2019
- vi. P12, 13, 14. Lux Mapping of Internal Daylight Levels - images produced by Constructive Thinking Studio Ltd © 2019 using Velux Daylighting Visualiser tool v3.0
- vii. P15, 16, 17. Lux Mapping of External Daylight Levels - images produced by Constructive Thinking Studio Ltd © 2019 using Velux Daylighting Visualiser tool v3.0

Appendix images:

- viii. Fig A1.- Fig A97. Sunpath Analysis - images produced by Constructive Thinking Studio Ltd © 2019, Images produced in ArchiCAD BIM Software by Graphisoft
- ix. Fig A98. VSC Calculation Drawing extract - images produced by Constructive Thinking Studio Ltd © 2019, Images produced in ArchiCAD BIM Software by Graphisoft
- x. Fig A99.-Fig 100. ADF Sections - images produced by Constructive Thinking Studio Ltd © 2019, Images produced in ArchiCAD BIM Software by Graphisoft
- xi. Fig A101. ADF Calculation Sheet - images produced by Constructive Thinking Studio Ltd © 2019
- xii. Fig A102 – Fig A113 Lux Mapping of Internal Daylight Levels - images produced by Constructive Thinking Studio Ltd © 2019 using Velux Daylighting Visualiser tool v3.0
- xiii. Fig A114 – Fig A116 Lux Mapping of External Daylight Levels - images produced by Constructive Thinking Studio Ltd © 2019 using Velux Daylighting Visualiser tool v3.0