herrington
CONSULTING LIMITED

Client : Mr M Tabarrok

Daylight Assessment for 41 Fortress Road
London

June 2013

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Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Written by	Checked by
1	0	Draft report issued by email	28 Feb 2013	SPH	
2	1	Final	31 Jan 13	SPH	AB
3	2	Final with drawings	17 June 13	SPH	AB

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Contents

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1 Background and Scope of Appraisal

Herrington Consulting has been commissioned by Mr M Tabarrok to undertake a Daylight Assessment of the proposed redevelopment at 41 Fortress Road, London, NW5 1AD. The key objectives of the assessment are as follows:

- To assess the baseline conditions at the site;
- to analyse and quantify the provision for natural daylight within the identified habitable rooms of the proposed development;
- to comment on the potential for the proposed development to reduce the amount of available daylight to a neighboring building to a degree such that there is potential for an infringement of the owners Right of Light.

2 The Site and Development Proposals

2.1 Site Location

The site is located on the western side of Fortress road, which is an area of reasonably dense development. The location of the site is shown in Figure 2.1 and the site plan included in Appendix A.1 of this report gives a more detailed reference to the site location and layout.

Figure 2.1 – Location map (Contains Ordnance Survey data © Crown copyright and database right 2011)

2.2 The Development

The proposals for development are to demolish the rear extension and re-build with an additional basement and new rear extension to provide a total of 9 residential units . Drawings of the proposed scheme are included in Appendix A.1 of this report.

3 Policy and Guidance

In the absence of official national planning guidance / legislation on daylight and sunlight, the most recognised guidance document is published by the Building Research Establishment and entitled 'Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice', Second Edition, 2011; herein referred to as the 'BRE Guidelines'.

The BRE Guidelines are not mandatory and themselves state that they should not be used as an instrument of planning policy, however in practice they are heavily relied upon as they provide a good guide to approach, methodology and evaluation of daylight and sunlight impacts.

In conjunction with the BRE Guidelines further guidance is given within the British Standard (BS) 8206-2:2008: 'Lighting for buildings - Part 2: Code of practice for daylighting'.

In this assessment the BRE Guidelines have been used to establish the extent to which the Proposed Development meets current best practice guidelines. In cases where the Development is likely to reduce light to key windows the study has compared results against the BRE criteria.

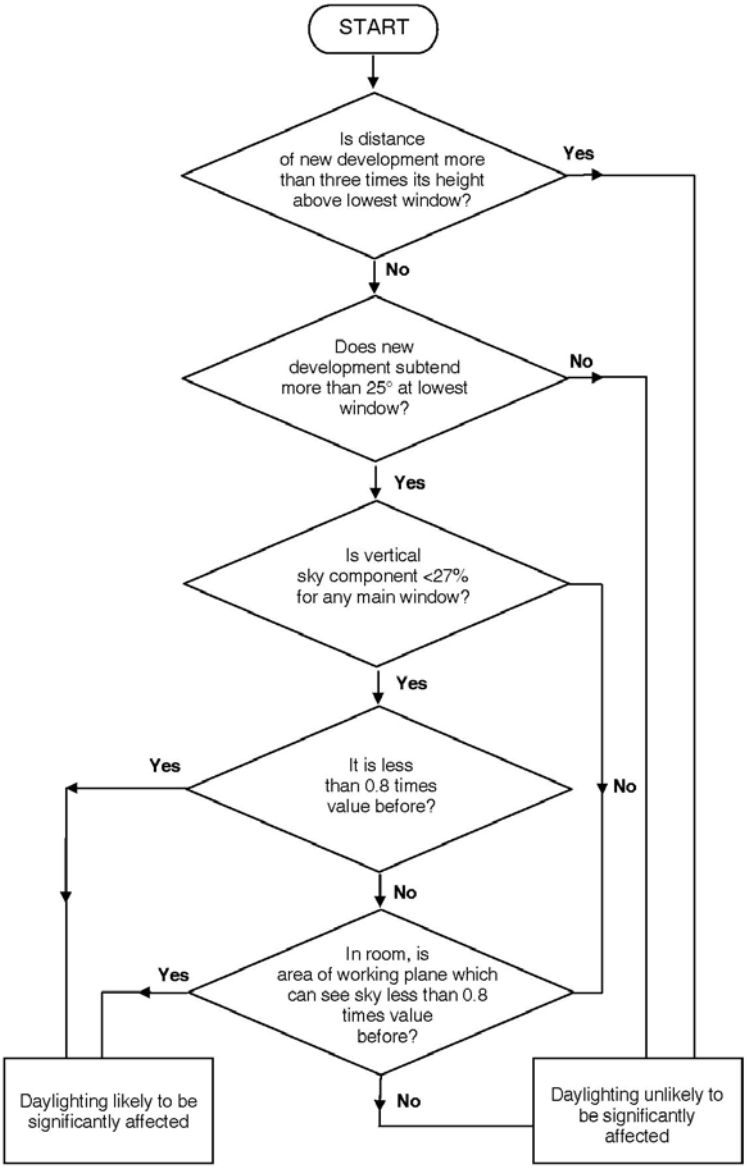
Whilst the BRE Guidelines provide numerical guidance for daylight, sunlight and overshadowing, these criteria should not be seen as absolute targets since, as the document states, the intention of the guide is to help rather than constrain the designer. The Guide is not an instrument of planning policy, therefore whilst the methods given are technically robust, it is acknowledged that some level of flexibility should be applied where appropriate.

4 Assessment Techniques

4.1 Background

Natural light refers to both daylight and sunlight. However, a distinction between these two concepts is required for the purpose of analysis and quantification of natural light in buildings. In this assessment, the term '*Daylight*' is used for natural light where the source is the sky in overcast conditions, whilst '*Sunlight*' refers specifically to the light coming directly from the sun.

The primary objective of this assessment is to quantify the impacts of the proposed development on the adjacent building and therefore the methods employed by this study are focussed on this objective. These methodologies are described in the following sections of this report and follow the hierarchical approach set out by the BRE Guidelines. The 'decision chart' outlining this process (Figure 20 of the Guidelines) has been reproduced below.



4.2 Vertical Sky Component (VSC)

The Vertical Sky Component (VSC) calculation is the ratio of the direct sky illuminance falling on the outside of a window, to the simultaneous horizontal illuminance under an unobstructed sky. The standard CIE (Commission Internationale d'Éclairage) Overcast Sky is used and the ratio is expressed as a percentage. For example, a window that has an unobstructed view over open fields would benefit from the maximum VSC, which would be close to 40%. For a window to be considered as having a reasonable amount of skylight reaching it, the BRE Guidelines suggests that a minimum VSC value of 27% should be achieved. When assessing the impact of a new development on an existing building the BRE Guidelines sets out the following specific requirement:

If the VSC with the new development in place is both less than 27% and less than 0.8 times its former value, then the reduction in light to the window is likely to be noticeable.

This means that a reduction in the VSC value of up to 20% its former value would be acceptable and thus the impact would be considered negligible. It is important to note that the VSC is a simple geometrical calculation, which provides an early indication of the potential for daylight entering the space. It does not, however, assess or quantify the actual daylight levels inside the rooms.

4.3 No Sky Line

The No Sky Line method describes the distribution of daylight within rooms by calculating the area of the 'working plane', which can receive a direct view of the sky and hence 'skylight'. The working plane height is generally set at 850mm above floor level within a residential property and 700mm within a commercial property.

The BRE Guidelines state that if following the construction of a new development the No Sky Line moves so that the area of existing room that does not receive direct skylight is reduced to less than 0.8 times its former value, the impact will be noticeable to the occupants. This is also true if the No Sky Line encroaches onto key areas like kitchen sinks and worktops.

This method can, however, only be accurately used to examine the impact of new development on the daylight distribution within existing buildings when the internal room layout is known.

4.4 Overshadowing

The BRE Guidance suggests that where a large building is proposed, which may affect a number of gardens or an area of open space, then analysis can be undertaken to quantify the loss of sunlight resulting from overshadowing. The Guidance suggests that at least half of the amenity area should receive at least two hours of sunlight on the 21st March. These impacts have been assessed using the numerical models discussed in the following section of this report.

4.5 Annual Probable Sunlight Hours

It is also possible to quantify the amount of sunlight available to a new development and the recognised methodology for undertaking this analysis is the Annual Probable Sunlight Hours (APSH) method.

In the case of sunlight, the assessment is equally applied to adjoining dwellings and any existing non-domestic buildings where there is a particular requirement for sunlight. The BRE Guidelines set out a hierarchy of tests to determine whether the proposed development will have a significant impact. These are set out in order of complexity below:

Test 1 – Assess whether the windows to main living rooms and conservatories of the buildings surrounding the site are situated within 90° of due south. Obstruction to sunlight may become an issue if some part of the new development is situated within 90° of due south of a main window wall of an existing building.

Test 2 - Draw a section perpendicular from the centre of the window in any window walls identified by Test 1. If the angle subtended between the horizontal line drawn from the centre of the lowest window of the existing building and the proposed development is less than 25°, then the proposed development is unlikely to have a substantial effect on the direct sunlight enjoyed by the existing window.

Test 3 – If the window wall faces within 20° of due south and the reference point has a VSC of 27% or more, then the room is considered to receive sufficient sunlight.

Test 4 – If all of the above tests have been failed, then a more detailed analysis is required to determine the obstruction level to the existing building. In such cases, the BRE Guidance recommends the use of the Annual Probable Sunlight Hours (APSH) test to assess the impact on the availability of sunlight. To pass this test the centre point of the window will need to receive more than one quarter of APSH, including at least 5% APSH in the winter months between 21st September and the 21st March. The BRE Guidelines state that if 'post-development' the available sunlight hours are both less than the amount above and less than 0.8 times their 'pre-development' value, either over the whole year or just within the winter months, then the occupants of the existing building will notice the loss of sunlight. In addition, if the overall annual loss is greater than 4% of APSH, the room may appear colder and less pleasant.

4.6 Average Daylight Factor

The Average Daylight Factor (ADF) method calculates the average illuminance within a room as a proportion of the illuminance available to an unobstructed point outdoors under a sky of known luminance and luminance distribution. This is the most detailed of the daylight calculations and considers the physical nature of the room behind the window, including; window transmittance, and surface reflectivity.

This method of quantifying the availability of daylight within a room does, however, require the internal layout to be known and is generally only used for establishing daylight provision in new rooms. The BRE Guide sets out the following guidelines for the assessment of the ADF:

If a predominantly daylit appearance is required, then the ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. In dwellings, the following minimum average daylight factors should be achieved: 1% in bedrooms, 1.5% in living rooms and 2% in kitchens.

5 Assessment Methodology

5.1 Identification of Key Sensitive Receptors

The first step in this process is to determine the key sensitive receptors, i.e. which windows may be affected by the proposed development. Key receptors are those windows that face, or are located broadly perpendicular to the proposed development.

If a window falls into this category, the second step is to measure the obstruction angle. This is the angle at the level of the centre of the lowest window between the horizontal plane and the line joining the highest point of nearest obstruction formed from any part of the proposed development. If this angle is less than 25° then it is unlikely to have a substantial effect on the diffuse daylight enjoyed by the existing window and the window is not deemed to be a sensitive receptor. A graphical representation of the 25° rule is illustrated in Figure 5.1 below.

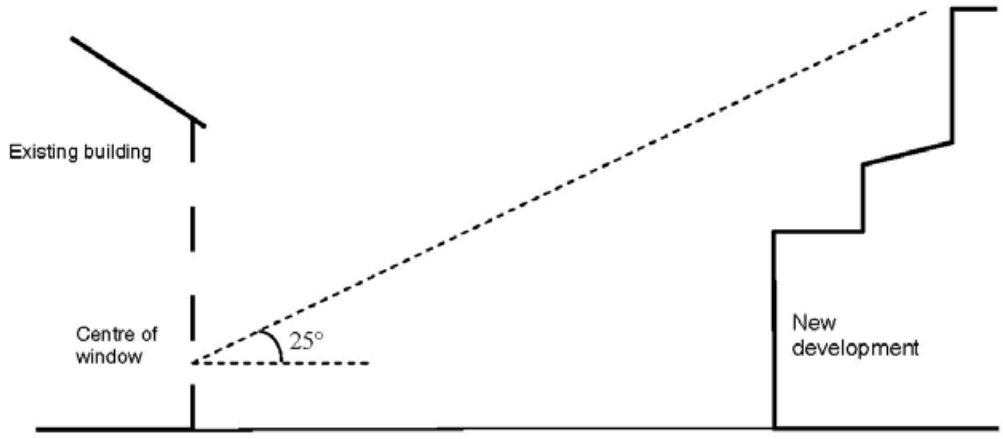


Figure 5.1 – Graphical representation of the 25° Rule

Based on the client's assessment of the proposed new massing of the rear extension, the impact of the development on the buildings to the rear will not require assessment. The building to the north (number 43-45) does have a window that will be affected, however, this does not serve a habitable room and therefore the BRE Assessment criteria are not applied. This window is examined under later sections of this report with regards to Right of Light issues.

5.2 Method of Baseline Data Collation

The following data and information has been used to inform this study:

- OS Mastermap mapping
- Measured survey data (KND Surveys – Nov 2012)
- Photographic information

5.3 Numerical Modelling

The numerical analysis used in this assessment has been undertaken using the software packages within the IES Virtual Environment suite (Version 6.0.4.6). The packages/models used are described below:

ModelIT - ModelIT is the model-building component of the Virtual Environment and allows the user to create the 3D models required by other components within the Virtual Environment. ModelIT is designed to enable appropriate levels of complexity to be incorporated within a model across the entire design spectrum.

SunCast - SunCast can be used at any stage of the design process to perform shading and solar insolation studies and can generate images and animations quickly and easily from a model created by the IES model builder (ModelIT). SunCast can be used to investigate:

- External obstruction and self-shading of a building
- Solar mapping through windows and openings
- The effects of changing orientation of building

SunCast generates shadows and internal solar insolation from any sun position defined by date, time, orientation, site latitude and longitude.

Radiance - Radiance is a software package developed by the Lighting Systems Research group at the Lawrence Berkeley Laboratory in California, USA. It was developed as a research tool for predicting the distribution of visible radiation in illuminated spaces. A three-dimensional geometric model of the physical environment is used, and a default material or map file detailing the spectral radiance values into a “photo-realistic” colour image. It can be used to calculate lighting levels, Daylight Factors or Glare for daylight and/or artificial lighting. Radiance is internationally recognised as one of the leading lighting simulation tools available and for this appraisal has been used to calculate both the Daylight Factor and the Vertical Sky Component.

The numerical modelling has been used to examine the scenarios described below.

‘Without Development’ Scenario: This is simply an accurate replication of the existing buildings, with the results of the analysis being used as a baseline against which to compare the proposed development.

’With Development’ Scenario: The Proposed Development is representative of the buildings that would be present once the development is complete. The model includes the existing adjoining properties.

5.4 Calculation Assumptions

Detailed daylight calculations to determine the ADF have been performed for the habitable rooms indicated in Section 5.2 above. The following assumptions have been made when undertaking the analysis:

- When assessing the VSC the calculation is based on the centre point of the window position
- When assessing the ADF for internal rooms, the glazing type is assumed to be double clear glazing with a light transmittance of 0.8 and the Frame Factor is taken as 0.8
- In the absence of internal room layouts of the adjacent property, best estimates as to room layout and size have been made in order to undertake the ADF calculations
- In areas where survey data has not been provided or needs to be supplemented with additional information, photographs, OS mapping and brick counts have been used in the process of building the 3D model of the surrounding and existing buildings.
- When analysing the effect of the new building on the existing buildings, the shading effect of the existing trees has been ignored. This is the recommended practice where deciduous trees that do not form a dense belt or tree line are present (BRE Guidelines – Appendix H). This is because daylight is at its scarcest and most valuable in the winter when most trees will not be in leaf.

6 Daylight Provision Within New Rooms

6.1 Assessment of Average Daylight Factor

Using the analytical techniques discussed in Section 4.6, the ADF for the rooms identified as potentially having a low provision of daylight has been calculated.

The results are summarised in Table 6.1 below.

Unit	Room & use	ADF	Recommended minimum value	Achieve BRE minimum value?
Flat 8 - studio	Living/kitchen/ bedroom	1.5%	2.0%	No
Flat 8 - studio	Kitchen area only	3.0%	2.0%	Yes
Flat 9	Living/kitchen	2.1%	2.0%	Yes
Flat 6	Living/kitchen/ dining	1.4%	2.0%	No
Flat 6	Kitchen area only	1.9%	2.0%	No
Flat 6	Bedroom 1	1.2%	1.0%	Yes
Flat 7	Living/kitchen/ dining	2.7%	2.0%	Yes
Flat 7	Bedroom 1	1.3%	1.0%	Yes
Flat 1 - studio	Living/kitchen/ bedroom	2.4%	2.0%	Yes
Flat 2	Living/kitchen/ dining	2.4%	2.0%	Yes

Table 6.1 – Calculated ADF Values

From the above it can be seen that of the eight rooms that have been assessed, with the exception of two, all of these achieve the recommended minimum ADF values.

In accordance with the guidance set out in both the BRE Guidelines and the BS 8206-2:2008 document, rooms that have a dual use, i.e. an open plan kitchen and lounge, can be assessed as a single room and assessed against the room use with the highest daylighting requirement. This is the approach that has been adopted in the initial analysis, however, for the combined living/kitchen/bedroom areas of Flats 6 and 8, achieving an ADF value of 2.0% is very onerous given that both of these flats are below ground level.

However, when the kitchen areas are assessed in isolation, it can be seen that these are located in the areas of each flat that receive the greatest amount of daylight. Consequently, when the ADF value is calculated for the kitchen area only, it can be seen from Table 6.1 that for Flat 8 the

kitchen receives significantly more light than the required minimum. The average value for the whole area achieves the minimum value for living and bedroom areas.

When the same approach is adopted for Flat 6 it can be seen that the ADF value fall marginally below the minimum requirements for each room use. However, when the subterranean nature of this Flat is taken into consideration then the values achieved are very good.

In addition, usually, if a kitchen is less than 13m^2 then it is considered to be a non-habitable room and the daylight tests need not be applied. The kitchen area of Flat 6 is less than 8m^2 and the kitchen for Flat 8 is around 11m^2, therefore in this instance, if the kitchen is not taken to be a habitable room, then the daylighting levels are considered to be adequate.

An example of the way in which the ADF is calculated spatially within each room is shown in Figure 6.1

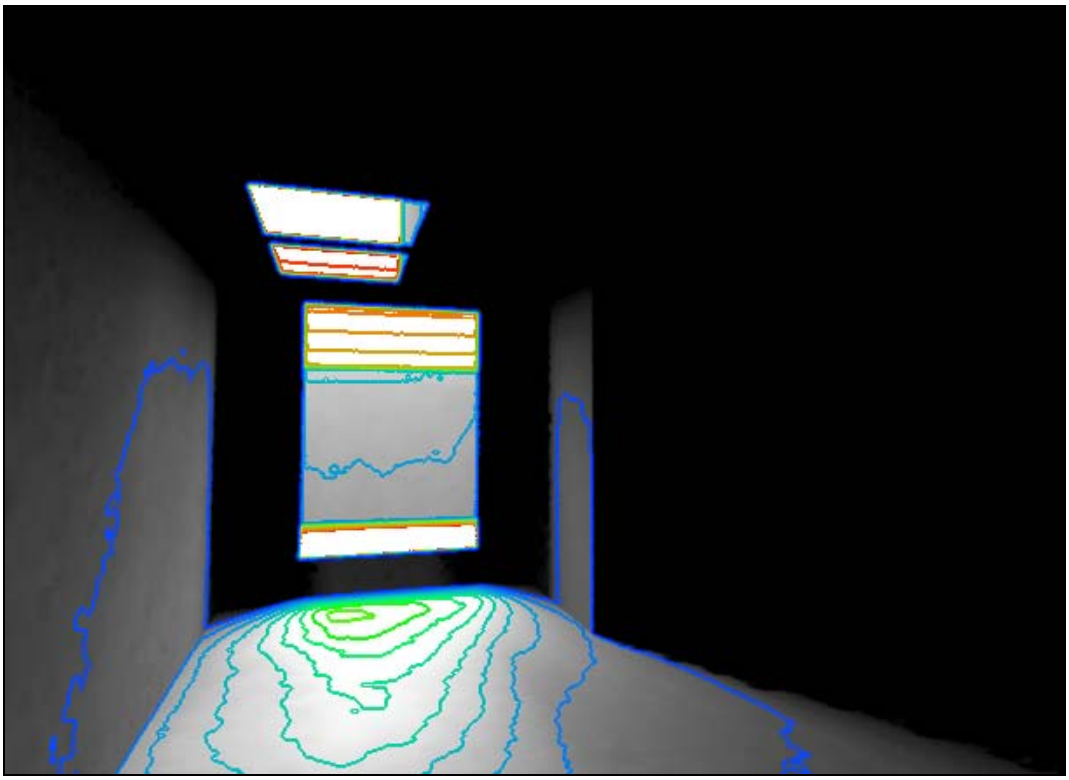


Figure 6.1 – Plot showing ADF distribution within 3D model

7 Right of Light Scoping Assessment

7.1 Background

A right of light is the right to receive light over another person's land to a particular window in a building. It is a right to preserve light to the room served by the window such that light to the room served by the window is sufficient for its "comfortable or beneficial use". What would be considered to be sufficient in this context may vary depending on whether the affected property is used for commercial or for domestic purposes. As a broad rule, it is generally accepted that a right of light action will arise if the result of the obstruction is that it will leave less than 50% of the affected room adequately lit. For these purposes, adequate lighting is considered to be one lumen at table height, which is equivalent to 0.2% of the light available from the whole dome of the sky.

A right of light can be acquired by prescription, i.e., by twenty years enjoyment of the right or by express grant. It may also arise by implication, e.g., under section 62 of the Law of Property Act 1925 or under what is known as the rule in Wheeldon v. Burrows. In practice, prescription is the most common means by which rights of light come into being. With concern to the basement window on the southern elevation of No. 43 Fortress Road, it is assumed that a right of light has been acquired by prescription.

7.2 Methodology

In order to establish whether right of light action will arise, by convention, expert witnesses regard a room as well lit as long as 50% of its area, measured at working plane height, continues to receive a sky factor of 0.2%. The 0.2% sky factor is often referred to as the 'grumble point' and is the percentage of the illuminance available outside from an unobstructed overcast sky.

The way in which this is determined is to establish the 0.2% contour for the 'before' and 'after' scenarios and the area of the room outside of the 0.2% sky factor threshold is calculated. Regardless of the amount of light before, if the 'after' proportion is less than 50% of the room area, it is conventionally accepted that there is a likelihood of an actionable injury to the light. However, it should be noted that the grumble point, although conventionally used, is not a rule of law and the courts preside over its interpretation.

7.3 Qualifications

This assessment is <u>not</u> a Right of Light study, it is simply a scoping assessment to examine the potential for the proposed development to reduce light levels to a point that a right of light action could arise. In order to carry out a detailed right of light assessment it is necessary to have fully dimensioned plans of the affected room. In this situation no such plans are available and therefore room dimensions have been assumed.

7.4 Sky Factor Threshold Analysis

The dimensions of the window and its location have been taken from the Survey Drawings provided and for the purposes of this assessment, room dimensions of 6m by 6m have been assumed.

In applying the methodology described above, the results are summarised in Table 7.1 below are achieved.

Window	Room & use	EXISTING % area receiving =>0.2% sky factor	PROPOSED % area receiving =>0.2% sky factor
Basement window (southern elevation) 43 Fortress Road	Unknown	1.7%	1.4%

Table 7.1 – Percentage area of room with Sky Factor greater than 0.2%

From the above it can be seen that the under the proposed development conditions the room has an extremely small area that received greater than a 0.2% sky factor. However, this is only marginally less that the pre-development condition.

It is generally considered that, regardless of the amount of light before, if the 'after' proportion is less than 50% of the room area, it is conventionally accepted that there is a likelihood of an actionable injury to the light. In this case the 'after' proportion is significantly less than 50% of the room area. There may well be an argument that even under existing conditions this room does not receive light that could be considered sufficient for its 'comfortable or beneficial use' and as such the injury to light is negligible. This is, however, a matter that would need to be assessed as part of a full and detailed Right of Light Assessment.

8 Conclusions

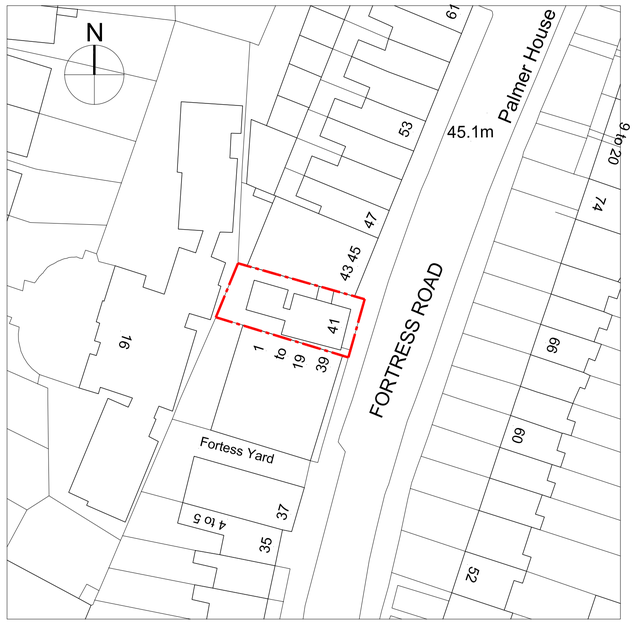
The detailed analysis undertaken as part of this assessment has examined the provision of daylight to the habitable rooms within the development. In line with the assessment criteria prescribed by the BRE Guideline, it has been shown that the predicted levels of daylight will achieve the minimum Average Daylight Factor (ADF) values prescribed by the BRE Guidelines for all habitable rooms.

A Appendices

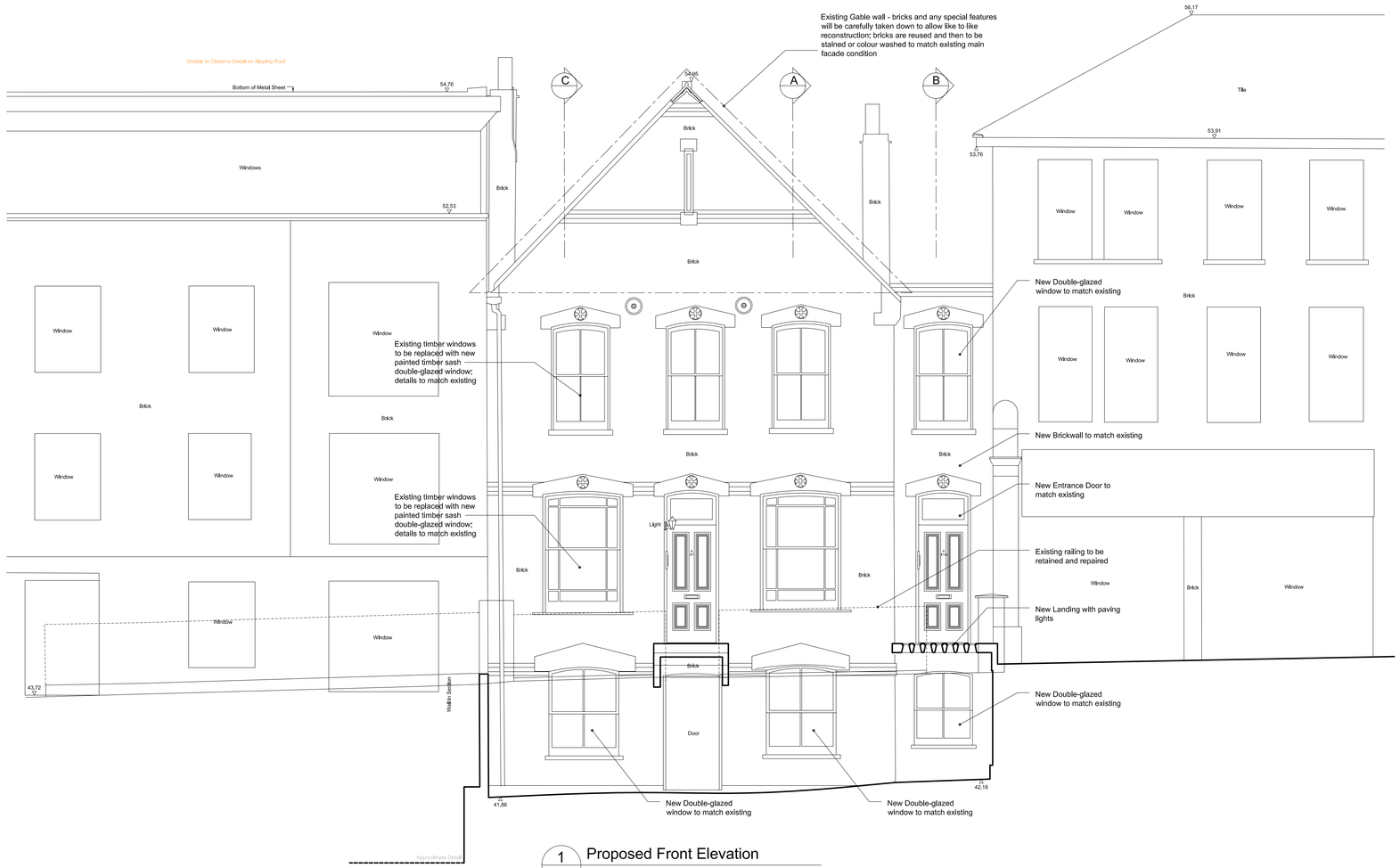
A.1 Appendix A.1 – Scheme Drawings

A.2 Appendix A.2 – ADF Analysis Outputs

Appendix A.1 – Scheme Drawings



Location Plan
scale 1:500



1 Proposed Front Elevation

GENERAL NOTES

All dimensions are in millimetres

REVISION

A	MAY 13	Add annotation of the work to gable wall
B	JUN 13	Add annotation of the work to existing railing

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Project: 41 Fortress Road, London NW5 1AD

FOR APPROVAL

LOCATION PLAN & PROPOSED FRONT ELEVATION

394-A-001

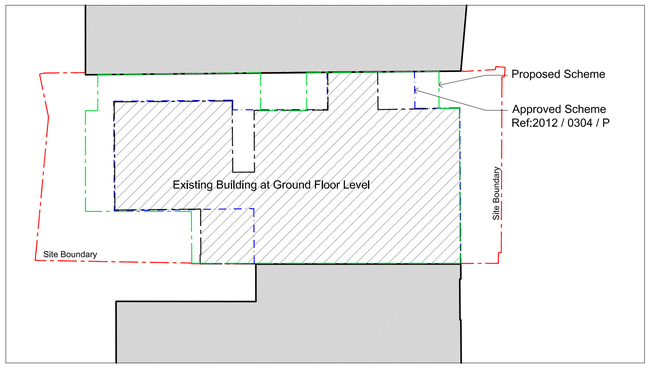
Date: JUN 2013

Revision: B

Scale: 1:50@A1

Client: **Leycam Ltd**

2 Diagram shows existing and proposed buildings



GENERAL NOTES

All dimensions are in millimetres

REVISION

A	JUN 13	Add Site Boundary and Analytical Diagram	

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PROPOSED GROUND FLOOR PLAN

394-A-002

Date: JUN 2013

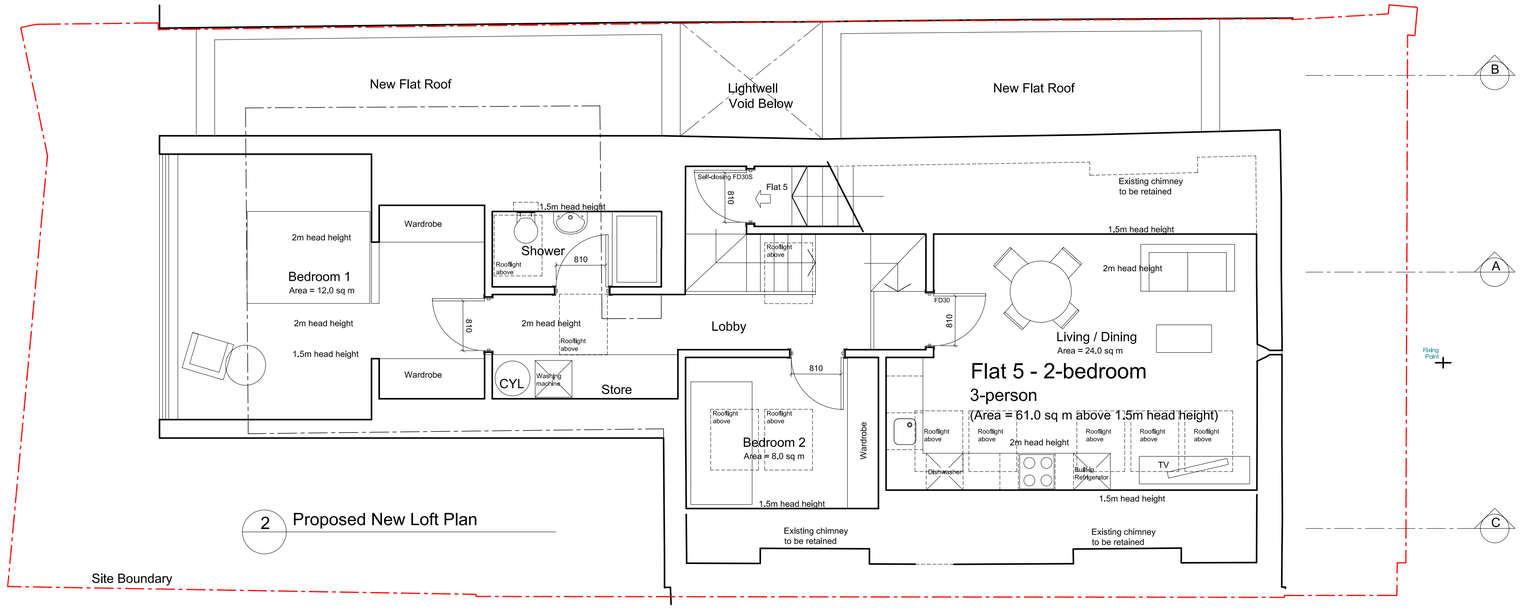
Revision: A

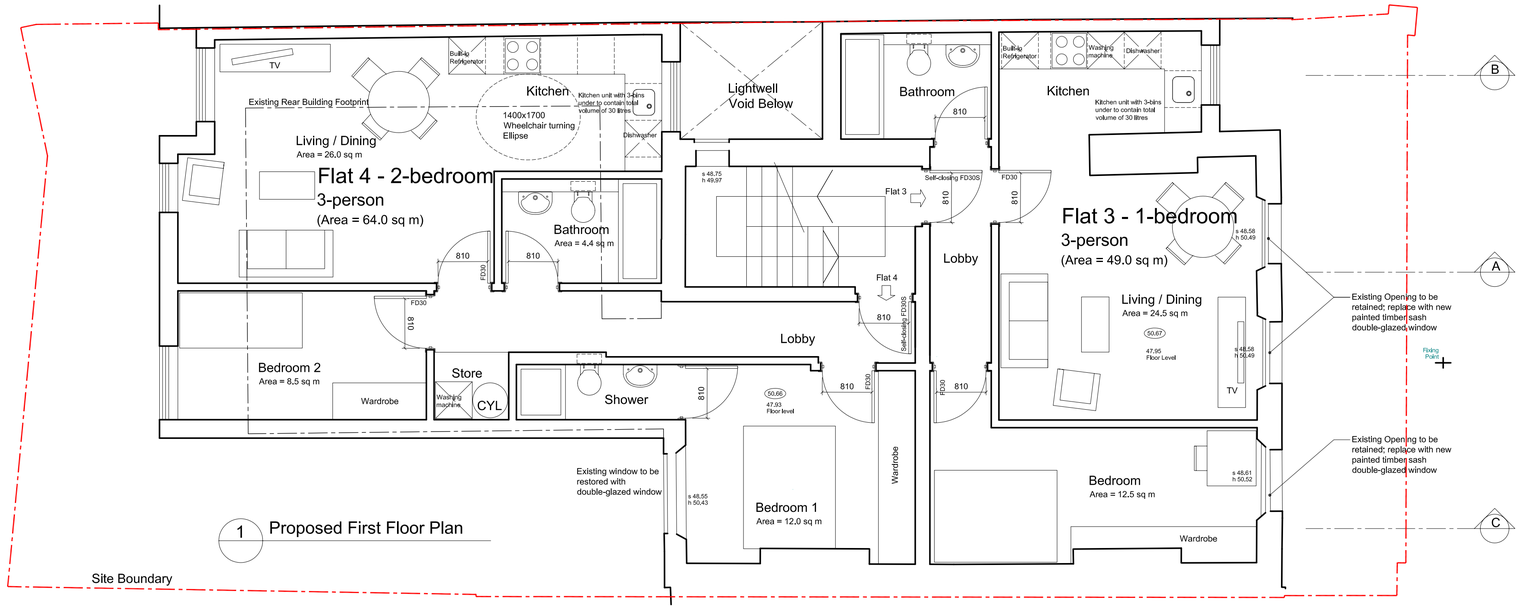
Scale: 1:50@A1

FOR APPROVAL

Client: **Leycam Ltd**

No.43





No.39

GENERAL NOTES

All dimensions are in millimetres

REVISION

A	JUN 13	Add Site Boundary and Anotation	

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Project: 41 Fortress Road, London NW5 1AD

PROPOSED FIRST FLOOR AND LOFT PLANS

394-A-003

Date: JUN 2013

Revision: A

Scale: 1:50@A1

FOR APPROVAL

Client: **Leycam Ltd**

GENERAL NOTES

All dimensions are in millimetres

REVISION

A	MAR 13	Add rooflights to flat 8 & 9 living area
B	JUN 13	Add Site Boundary

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Project: 41 Fortress Road, London NW5 1AD

FOR APPROVAL

PROPOSED LOWER GROUND AND BASEMENT FLOOR PLANS

394-A-004

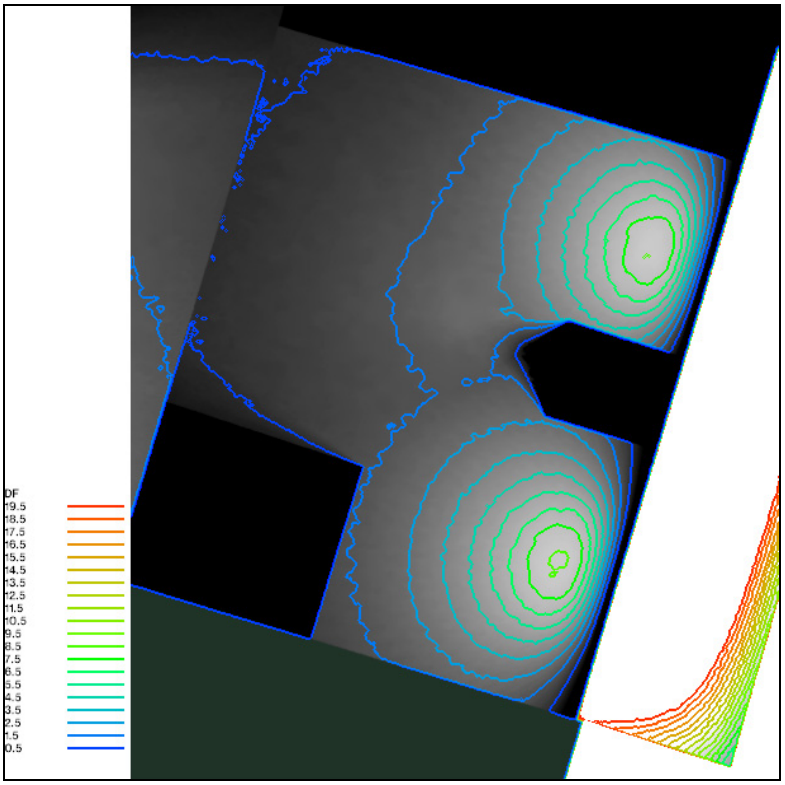
Date: JUN 2013

Revision: B

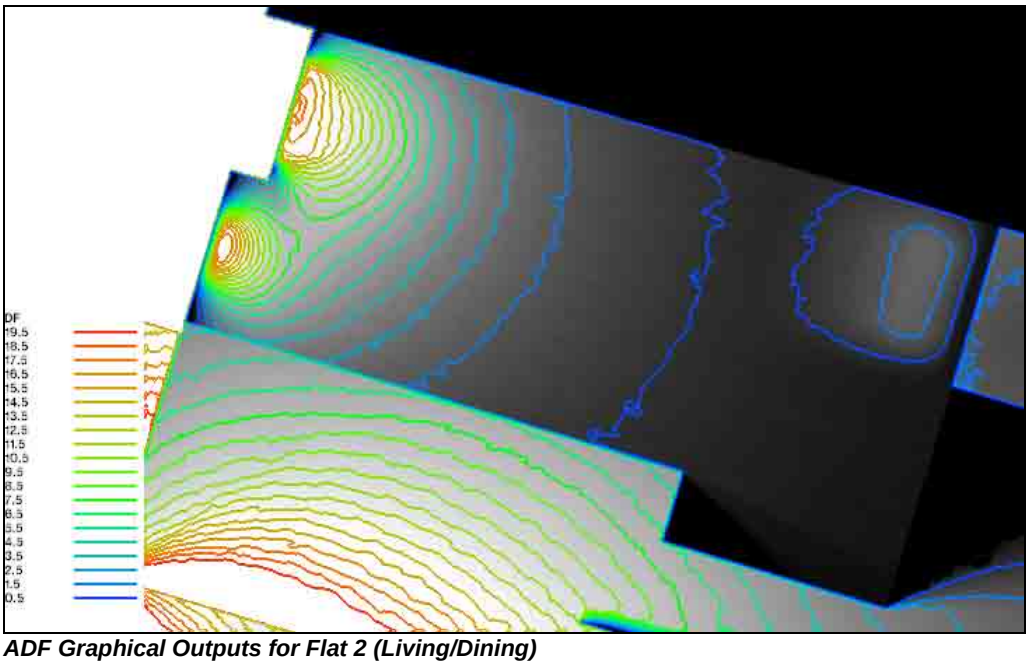
Scale: 1:50@A1

Client: **Leycam Ltd**

Appendix A.2 – ADF Analysis Outputs



ADF Graphical Outputs for Flat 1 (Studio)



ADF Graphical Outputs for Flat 2 (Living/Dining)

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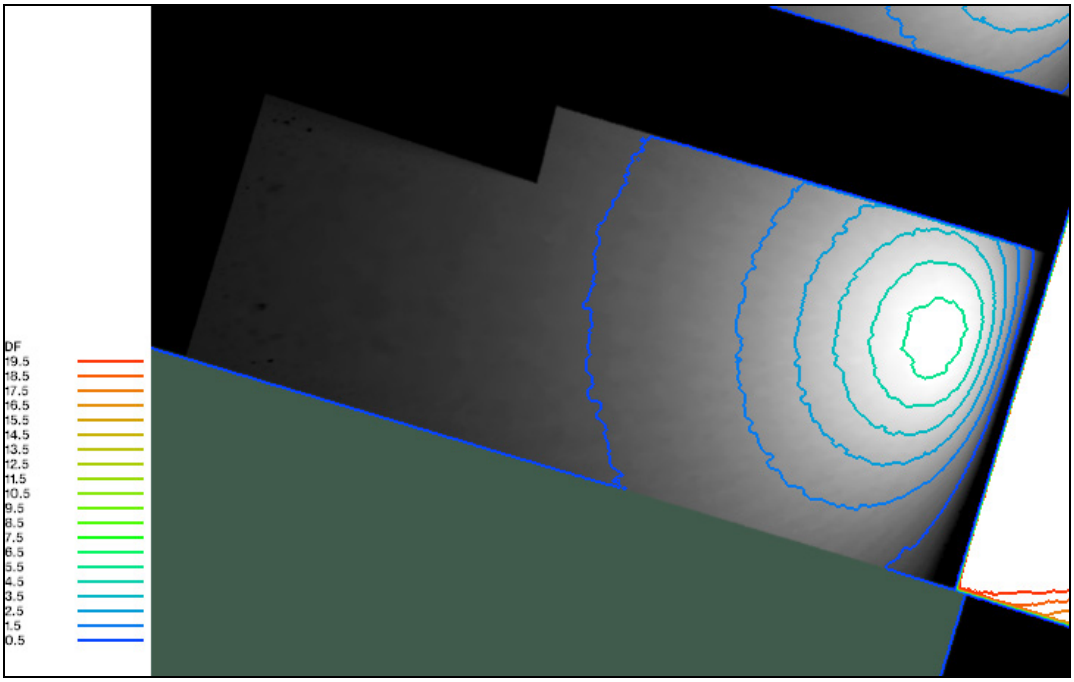
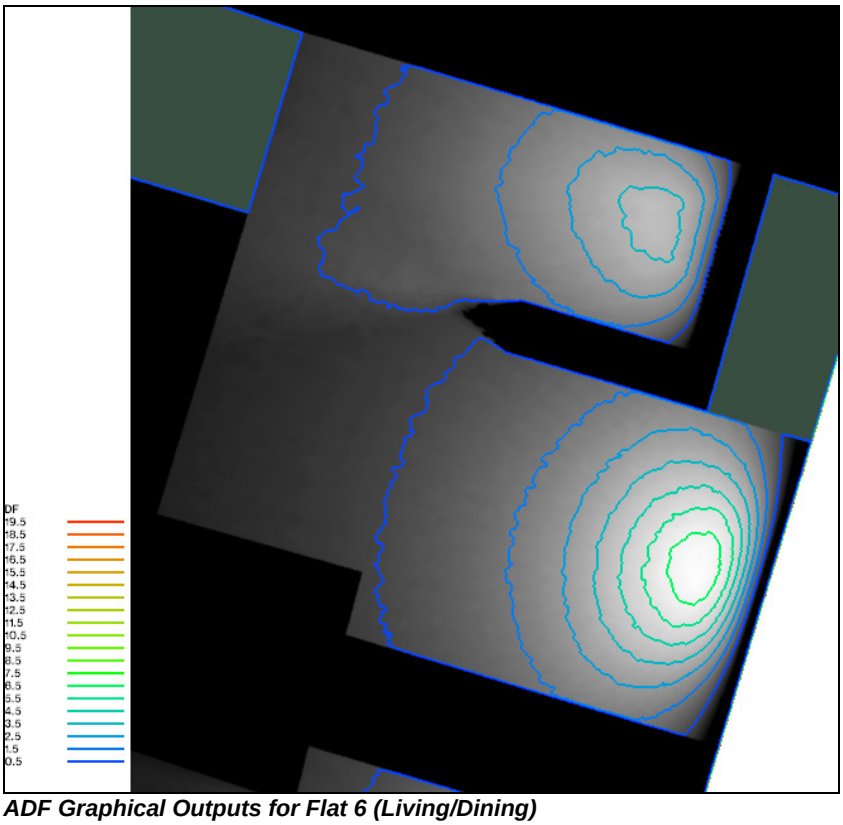
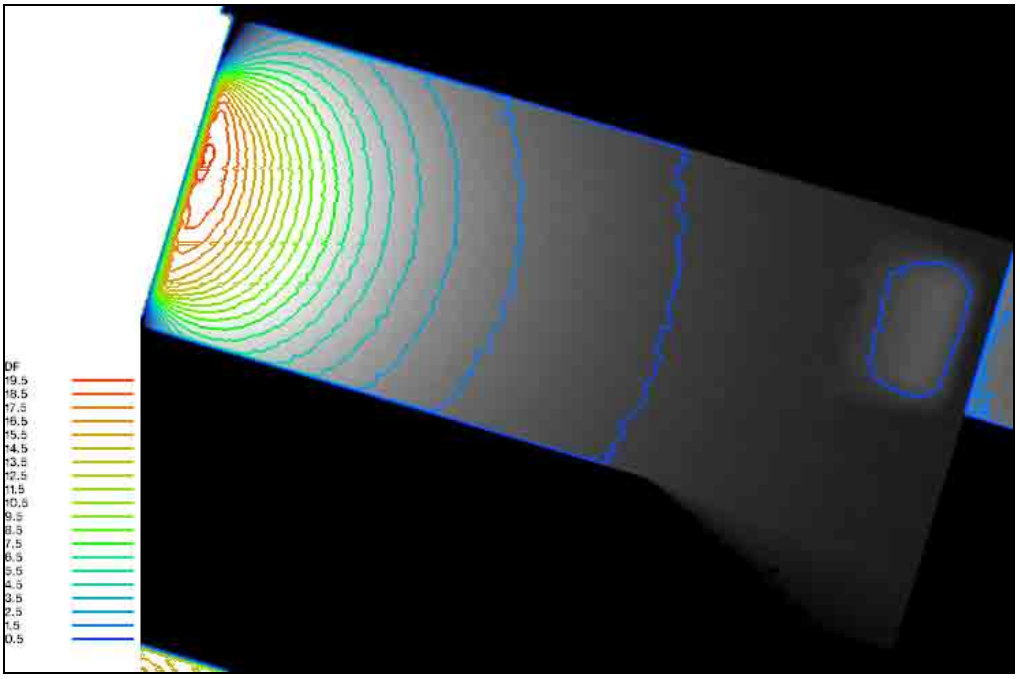


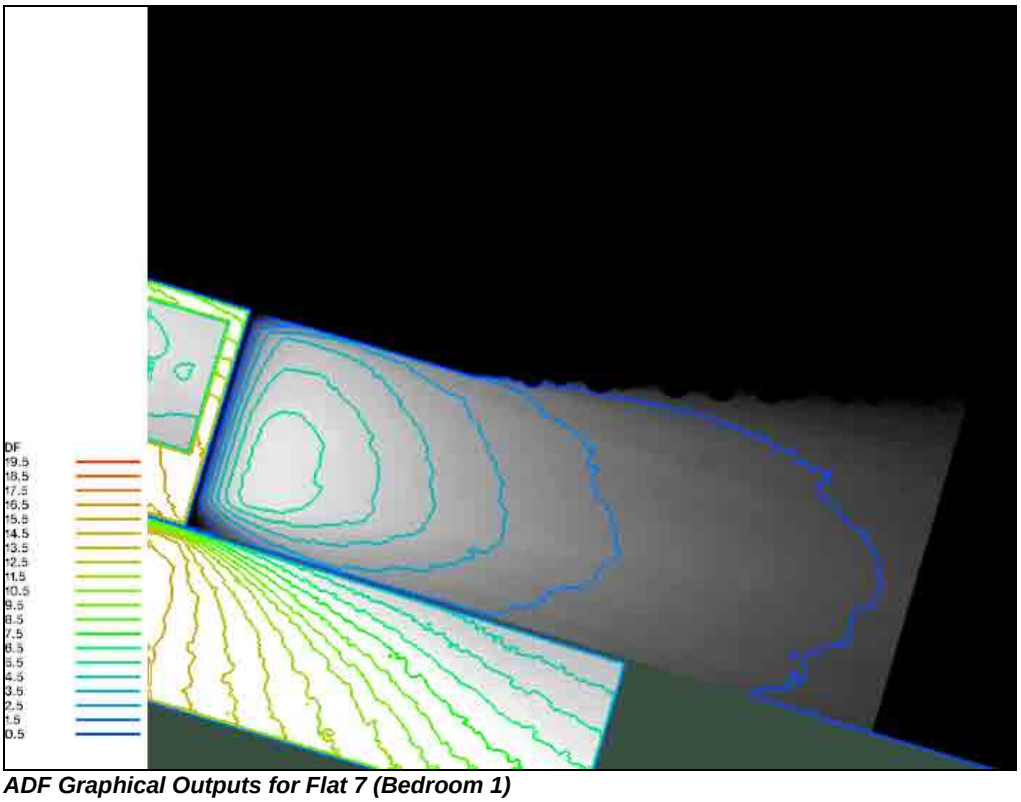
ADF Graphical Outputs for Flat 6 (Bedroom 1)



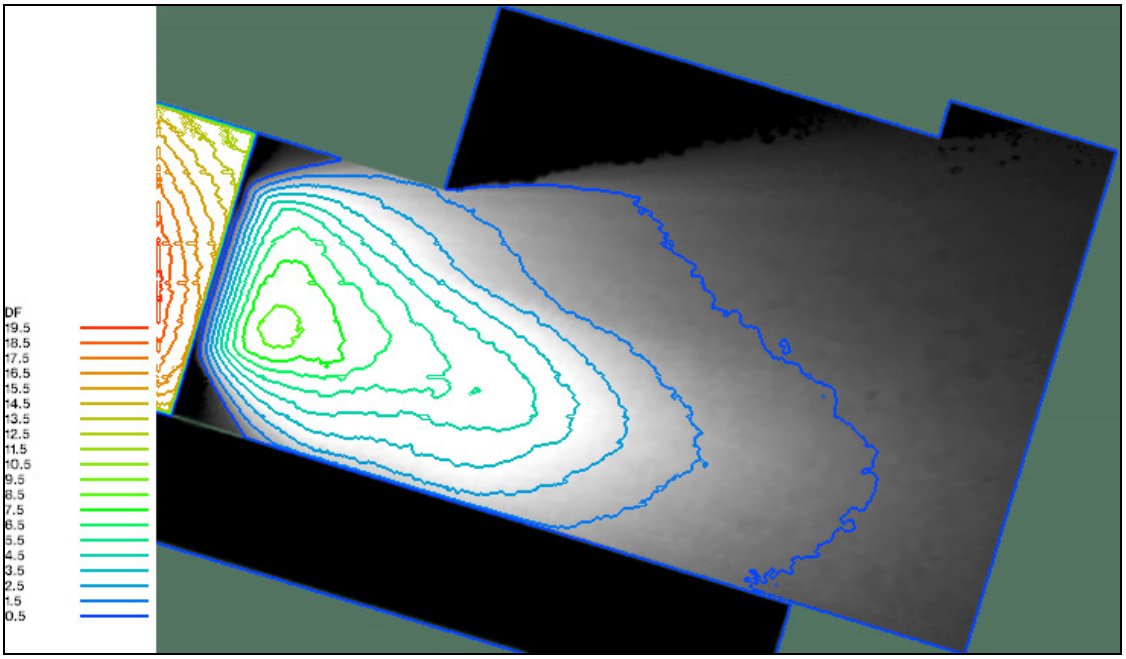
ADF Graphical Outputs for Flat 6 (Living/Dining)



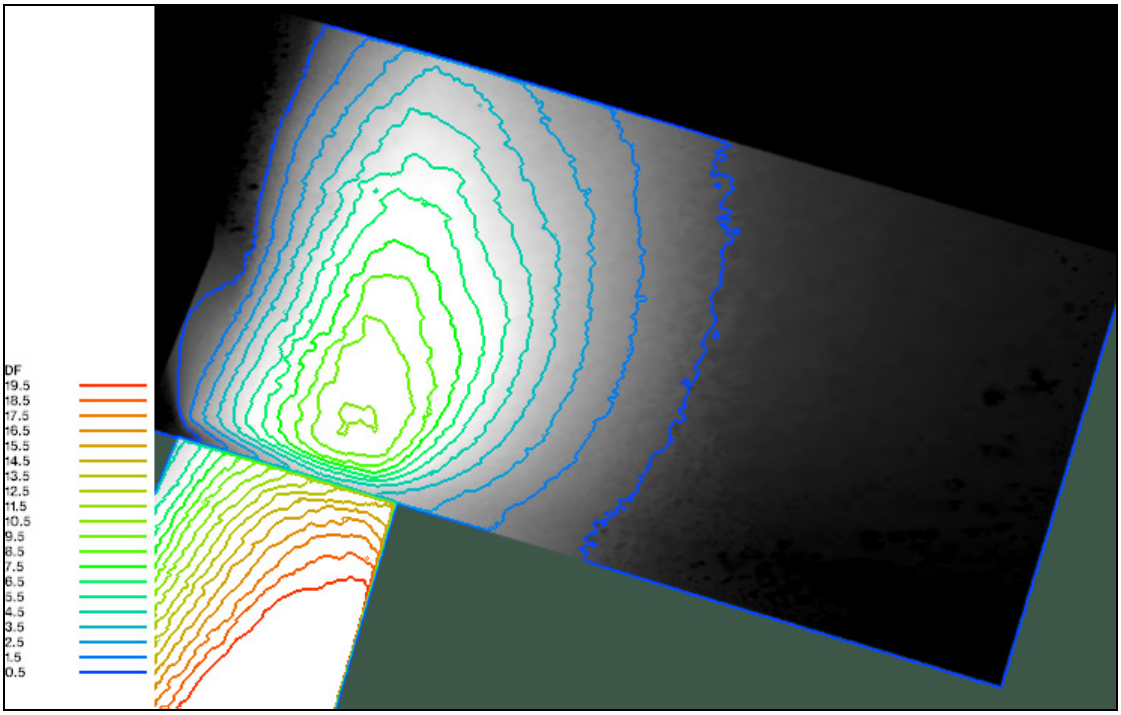
ADF Graphical Outputs for Flat 7 (Kitchen)



ADF Graphical Outputs for Flat 7 (Bedroom 1)



ADF Graphical Outputs for Flat 8 (Studio)



ADF Graphical Outputs for Flat 9 (Living/dining)

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