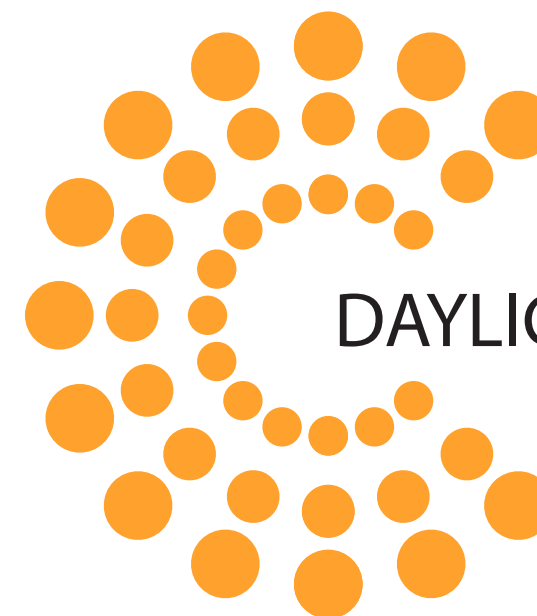


Internal Daylight and Sunlight Report

Camden Lock Village / Hawley Wharf - Area D - NMA
Project No: 2801

March 26, 2015



DAYLIGHT+SOLAR DESIGN



Client	Stanley Sidings Ltd
Architect	AHMM
Project Title	Camden Lock Village / Hawley Wharf - Area D - NMA
Project Number	2801
Report Title	Internal Daylight and Sunlight Report
Dated	March 26, 2015

Prepared by	GL/ML
Checked by	SP
Type	Planning

Revisions		Date:	Notes:	Signed:
	A	26.03.15	Comments review	GL

1. Executive Summary

The aim of this report is to ascertain whether the proposed development will provide future accommodation considered acceptable in terms of daylight and sunlight. This is a NMA supporting document following the amendments to the layouts and façades of Area D as a response to the addition of Area E which has been submitted as a stand alone planning application.

GIA has worked alongside AHMM in order to maximise the levels of daylight enjoyed by future occupants, taking into account the constraints inherent to the central London location.

All habitable rooms within Area D have been assessed for Average Daylight Factor (ADF), No Sky Line (NSL) and Room Depth Criterion (RDC).

The assessments have shown very good levels of daylight within this building with 82 out of 92 habitable rooms (90%) meeting or exceeding the BRE's recommendations for ADF and 92% meeting or exceeding the NSL criteria.

Four of the eight rooms falling short of BRE's recommendation for ADF are Living/Kitchen/Diners. Three of which exceed the NSL criteria (above 80%) while the remaining one, located on the lowest floor, falls slightly short the NSL recommendation but still achieving 69% NSL.

The remaining rooms falling short of BRE's guidance are four bedrooms. This is considered a technical failure as all of them see 0.9% ADF where 1% is recommended and the difference will not be perceptible.

BRE states that sunlight is most appreciated in living areas and therefore an assessment of Annual Probable Sunlight Hours (APSH) has been undertaken on all living rooms facing within 90 degrees of due south within the above selection of units.

The results have shown that the sunlight availability is very good across the whole building with all living rooms tested achieving levels of APSH in line with recommendation both throughout the year and during the winter months.

We can therefore conclude that the proposed scheme provide residential accommodation considered very good in terms of daylight and sunlight.

2. Introduction and Objective

GIA has been instructed to provide a report upon the potential availability of Daylight and Sunlight to the proposed accommodation within the residential scheme prepared by AHMM. GIA was specifically instructed to carry out the following:

- To create a 3D computer model of the proposal based upon drawings prepared by AHMM.
- Carry out a daylight assessment using the methodologies set out in the BRE guidelines for Average Daylight Factor, No-Sky Line and Room Depth Criterion.
- Carry out a sunlight assessment using the methodologies set out in the BRE guidelines for Annual Probable Sunlight Hours (APSH) to the fenestration facing within 90 degrees of due south.
- Prepare a report setting out the analysis and our findings.

3. BRE guidelines

The Building Research Establishment (BRE) have set out in their handbook *Site Layout Planning for Daylight and Sunlight a Guide to Good Practice (2011)*, guidelines and methodology for the measurement and assessment of daylight and sunlight within proposed buildings. This document states that it is also intended to be used in conjunction with the interior daylight recommendations found within the *British Standard BS8206-2:2008* and *The Applications Manual on Window Design* of the Chartered Institution of Building Services Engineers (CIBSE).

The guide also provides advice on site layout planning to determine the quality of daylight and sunlight within open spaces between buildings.

It is important to note, however, that this document is a guide whose stated aim *"is to help rather than constrain the designer"*.

The document provides advice, but also clearly states that it *"is not mandatory and this document should not be seen as an instrument of planning policy."* The report acknowledges also in its introduction that *"in special circumstances the developer or planning authority may wish to use different target values. For example, in a historic City centre a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings."*

It is an inevitable consequence of the built up urban environment that daylight and sunlight will be more limited in these areas. It is well acknowledged that in such situations there may be many other conflicting and potentially more important planning and urban design matters to consider other than just the provision of ideal levels of daylight and sunlight.

3.1. Daylight

The BRE set out various methods for assessing the daylight within a proposed building within section 2.1 and Appendix C of the handbook. The summary of this, given at the end of section 2.1 of the guide, states as follows:

"In general, a building will retain the potential for good interior diffused daylighting provided that on all its main faces:

A. No obstruction, measured in a vertical section perpendicular to the main face, from a point two metres above ground level, subtends an angle of more than 25 degrees to the horizontal;

Or

B. If (A) is not satisfied, then all points on the main face on a line two metres above ground level are within four metres (measured sideways) of a point which has a vertical sky line component of 27% or more."

3.1.1. Vertical Sky Component (VSC)

This method of assessment can be undertaken using a skylight indicator or a Waldram diagram. It measures from a single point, at the centre of the window if known at the early design stage, the quantum of sky visible taking into account all external obstructions. Whilst these obstructions can be either other

buildings or the general landscape, trees are usually ignored unless they form a continuous or dense belt of obstruction.

The VSC method is a useful 'rule of thumb' but has some significant limitations in determining the true quality of daylight within a proposed building. It does not take into account the size of the window, any reflected light off external obstructions, any reflected light within the room, or the use to which that room is put. Appendix C of the guide goes into more detail on these matters and sets forward alternative methods for assessment to overcome these limitations.

Appendix C of the BRE guide: Interior Daylighting Recommendations, states:

"The British Standard for daylighting, and the CIBSE Applications manual: window design, contain advice and guidance on interior daylighting. This guide to good practice is intended to be used in conjunction with them, and its guidance is intended to fit in with their recommendations."

For skylight, the British Standard and the CIBSE manual put forward three main criteria, based on the average daylight factor, room depth, and the position of the no skyline."

These assessments are set out below.

3.1.2. Average Daylight Factor (ADF)

"If a predominantly daylit appearance is required, then df should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. There are additional recommendations for dwellings, of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms. These last are minimum values of Average Daylight Factor, and should be attained even if a predominantly daylit appearance is not required."

This method of assessment takes into account the total glazed area to the room, the transmittance quality of the glazing proposed, the total area of the room surfaces including ceilings and floors, and the internal average reflectance for the room being assessed. The method also takes into account the Vertical Sky Component and the quantum of reflected light off external surfaces.

This is, therefore, a significantly more detailed method of assessment than the Vertical Sky Component method set out above.

3.1.3. Room Depth Criterion (RDC)

Where it has access to daylight from windows in one wall only, the depth of a room can become a factor in determining the quantity of light within it. The BRE guidance provides a simple method for examining the ratio of room depth to window area. However, whilst it does take into account internal surface reflections, this method also has significant limitations in that it does not take into account any obstructions outside the window and therefore draws no input from the quantity of light entering the room.

3.1.4. No Sky Line (NSL)

This third method of assessment is a simple test to establish where within the proposed room the sky will be visible through the windows, taking into account external obstructions. The assessment is undertaken at working plane

2801 - Camden Lock Village / Hawley Wharf - Area D - NMA

Internal Daylight and Sunlight Report

Sources of information:	Issue No:	IS10-2801
	Page No:	5
	Date:	March 26, 2015

- IR152| Rel_33_2801_DSD

height (850mm above floor level) and the method of calculation is set out in Appendix D of the BRE handbook.

Appendix C of the BRE handbook states *"if a significant area of the working plane lies beyond the no skyline (i.e., it receives no direct skylight), then the distribution of daylight in the room will look poor and supplementary electric lighting will be required."* To guarantee a satisfactory daylight uniformity, the area which does not receive direct skylight should not exceed 20% of the floor area, as quantified in the BS 8206 Part2 2008.

3.1.5. Summary

The Average Daylight Factor gives a more detailed assessment of the daylight within a room and takes into account the highest number of factors in establishing a quantitative output.

However, the conclusion of Appendix C of the BRE guide states:

"All three of the criteria need to be satisfied if the whole of the room is to look adequately daylight. Even if the amount of daylight in a room (given by the Average Daylight Factor) is sufficient, the overall daylight appearance will be impaired if its distribution is poor."

In most urban areas it is important to recognise that the distribution of daylight within a room may be difficult to achieve, given the built up nature of the environment. Consequently, most local authorities seek to ensure that there is sufficient daylight within the room as determined by the Average Daylight Factor calculation. However, the additional recommendations of the BRE and British Standard for residential accommodation, set out above, ought not to be overlooked.

3.2. Sunlight

The BRE provide guidance in respect of sunlight quality for new developments within section 3.1 of the handbook. It is generally acknowledged that the presence of sunlight is more significant in residential accommodation than it is in commercial, and this is reflected in the BRE document.

It states, *"in housing, the main requirement for sunlight is in living rooms, where it is valued at any time of the day, but especially in the afternoon. Sunlight is also required in conservatories. It is viewed as less important in bedrooms and in kitchens where people prefer it in the morning rather than the afternoon."*

The BRE guide considers the critical aspects of orientation and overshadowing in determining the availability of sunlight at a proposed development site.

The guide proposes minimizing the number of dwellings whose living room face solely north unless there is some compensating factor such as an appealing view to the north, and it suggests a number of techniques to do so. Further to this it discusses massing solutions with a sensitive approach to overshadowing, so as to maximize access to sunlight.

At the same time it acknowledges that the site's existing urban environment may impose orientation or overshadowing constraints which may not be possible to overcome.

So as to quantify sunlight access for interiors where sunlight is expected, it refers to the BS 82606-2 criterion of Annual Probable Sunlight Hours. APSH is defined as *"the total number of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness at the location in question."* In line with the recommendation, APSH is measured from a point on the inside face of the window, should the locations have been decided. If these are unknown, sunlight availability is checked at points 1.6m above the ground or the lowest storey level on each main window wall, and no more than 5m apart. If a room has multiple windows on the same wall or on adjacent walls, the highest value of APSH should be taken into account. If a room has two windows on opposite walls, the APSH due to each can be added together.

The summary of section 3.1 of the guide states as follows:

"In general, a dwelling or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided that:

At least one main window faces within 90 degrees of due south;

and

The centre of at least one window to a main living room can receive 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours in the winter months between 21 September and 21 March."

In paragraph 3.1.11 the BRE guidance suggests that if a room faces significantly North of due East or West it is unlikely to meet the recommended levels proposed by the BS 8206-2. As such, it is clear that only windows facing within 90 degrees of due South can be assessed using this methodology.

It is also worth noting how paragraph 5.3 of the BS 8206-2 suggests that with regards to sunlight duration "the degree of satisfaction is related to the expectation of sunlight if a room is necessarily north facing or if the building is in a densely-built urban area, the absence of sunlight is more acceptable than when its exclusion seems arbitrary."

3.3. Overshadowing

The BRE guidance in respect of overshadowing of amenity spaces is set out in section 3.3 of the handbook. Here it states as follows:

"Sunlight in the spaces between buildings has an important impact on the overall appearance and ambiance of a development. It is valuable for a number of reasons:

- *To provide attractive sunlit views (all year)*
- *To make outdoor activities, like sitting out and children's play more pleasant (mainly during the warmer months)*
- *To encourage plant growth (mainly in spring and summer)*
- *To dry out the ground, reducing moss and slime (mainly during the colder months)*
- *To melt frost, ice and snow (in winter)*

- To dry clothes (all year)"

Again, it must be acknowledged that in urban areas the availability of sunlight on the ground is a factor which is significantly controlled by the existing urban fabric around the site in question and so may have very little to do with the form of the development itself. Likewise there may be many other urban design, planning and site constraints which determine and run contrary to the best form, siting and location of a proposed development in terms of availability of sun on the ground.

The summary of section 3.3 of the guide states as follows:

"3. 3 .17 It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March."

3.4. Further relevant information

Further information can be found in *The Daylight in Urban Areas Design Guide* (Energy Saving Trust CE257, 2007) which provides the following recommendation with regards to VSC levels in urban areas:

"If 'theta' (Visible sky angle) is greater than 65° (obstruction angle less than 25° or VSC at least 27 percent) conventional window design will usually give reasonable results.

If 'theta' is between 45° and 65° (obstruction angle between 25° and 45°, VSC between 15 and 27 percent), special measures such as larger windows and

changes to room layout are usually needed to provide adequate daylight.

If 'theta' is between 25° and 45° (obstruction angle between 45° and 65°, VSC from 5 to 15 percent), it is very difficult to provide adequate daylight unless very large windows are used.

If 'theta' is less than 25° (obstruction angle more than 65°, VSC less than 5 percent) it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed."

4. Methodology

In order to undertake the daylight and sunlight assessments set out above, we have prepared a three dimensional computer model and used specialist lighting simulation software.

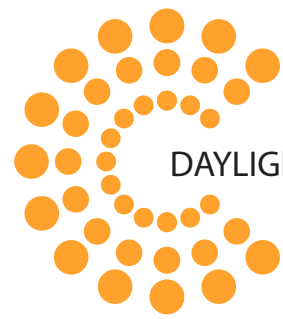
The three dimensional representation of the proposed development has been modelled using the scheme drawings provided to us by AHMM. This has been placed in the context of its surrounding buildings which have been modelled from survey information, photogrammetry, OS and site photographs. This allows for a precise model, which in turn ensures that analysis accurately represents the amount of daylight and sunlight available to the building facades, internal and external spaces, considering all of the surrounding obstructions and orientation.

4.1. Simulation assumptions

Where no values for reflectance, transmittance and maintenance factor were specified by the designer the following values from *BS 8206-2:2008, Annex A, tables A.1-A.6* were used for the calculation of Average Daylight Factor values. These values are shown in table 1.

Reflectance values:		Maintenance factors:		Tv(normal)	A.3	A.4	A.5	A.6	Tv(total)
Surrounding	0.2	Double Low-E (frames modelled)		0.75	8	1	1	1	0.69
Pavement	0.2	Double Low-E (frames not modelled)		0.75	8	1	1	0.8	0.55
Grass	0.1	Double Low-E (inclined, frames modelled)		0.75	8	2	1	1	0.63
Yellow brick	0.3	Double Low-E (inclined, frames not modelled)		0.75	8	2	1	0.8	0.50
Red brick	0.2	Double Low-E (horizontal, frames modelled)		0.75	8	3	1	1	0.57
Concrete	0.4	Double Low-E (horizontal, frames not modelled)		0.75	8	3	1	0.8	0.46
Internal walls (light grey)	0.68								
Internal ceiling (white paint)	0.85	Single (frames modelled)		0.9	8	1	1	1	0.83
Internal floor (medium to light veneer)	0.3	Single (frames not modelled)		0.9	8	1	1	0.8	0.66
		Single (inclined, frames modelled)		0.9	8	2	1	1	0.76
		Single (inclined, frames not modelled)		0.9	8	2	1	0.8	0.60
		Single (horizontal, frames modelled)		0.9	8	3	1	1	0.68
		Single (horizontal, frames not modelled)		0.9	8	3	1	0.8	0.55
Double glazing:									
Pilkington K Glass 4/16/4 Argon filled 90%	Tv= 0.75								
		Double Translucent Low-E (frames modelled)		0.74	8	1	1	1	0.68
Single glazing:		Double Translucent Low-E (frames not modelled)		0.74	8	1	1	0.8	0.54
Pilkington Optifloat Clear, Annealed, 4mm	Tv=0.90	Double Translucent Low-E (inclined, frames modelled)		0.74	8	2	1	1	0.62
		Double Translucent Low-E (inclined, frames not modelled)		0.74	8	2	1	0.8	0.50
Translucent glazing:		Double Translucent Low-E (horizontal, frames modelled)		0.74	8	3	1	1	0.56
Pilkington Optifloat Opal - 4mm K /16/4mm Opal	Tv= 0.74	Double Translucent Low-E (horizontal, frames not modelled)		0.74	8	3	1	0.8	0.45

Table 1: Typical reflectance, transmittance and maintenance factors



5. Conclusions

5.1. Conclusion on Daylight

This report illustrates the daylight and sunlight performance of Area D following the amendments to the internal layouts and facades in order to accommodate the massing of Area E.

In order to ascertain the levels of daylight within Area D of the Camden Lock Village development, technical assessments of Average Daylight Factor (ADF), No Sky Line (NSL) and Room Depth Criterion (RDC) have been undertaken within all proposed habitable rooms. The results can be seen in pages 9 to 13 of this report.

As the development faces the typical constraints of a densely built environment and is located in close proximity of an existing viaduct, GIA has worked alongside AHMM in order to maximise the levels of daylight enjoyed by future occupants.

The assessments undertaken within Area D have shown that 82 (90%) of the 92 habitable rooms meet or exceed the recommended levels of ADF and 92% meet or exceed the NSL criteria. This result is considered very good especially taking into account the constraints mentioned above.

Four Living/Kitchen/Diners (rooms 1, 22, 42 and 62) fall short of BRE's recommendation for ADF. However, three of them exceed the NSL criteria (above 80%) while the remaining one, located on the lowest floor, falls slightly short the NSL recommendation but still sees 69% NSL. It is worth noting that where the kitchen is located at the back of the room, it will be more reliant on supplementary artificial lighting, whilst the living area at the front will be better daylit. These rooms can therefore be considered acceptably daylit living areas.

The remaining rooms falling short of BRE's guidance are four bedrooms. This is considered a technical failure as all of them see 0.9% ADF where 1% is recommended and the difference will not be perceptible. Moreover, all bedrooms meet or exceed the recommended levels of NSL.

All habitable rooms within this building have been designed in accordance with the RDC when applicable.

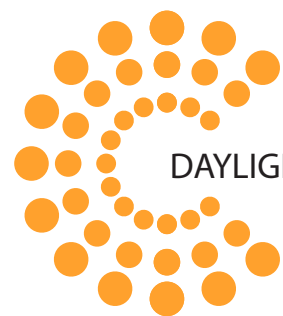
We can therefore conclude that the proposed scheme will provide high quality accommodation in terms of daylight especially considering the constraints typical of a central London location.

5.2. Conclusion on Sunlight

An assessment of Annual Probable Sunlight Hours (APSH) has been undertaken on all windows serving living areas facing within 90 degrees of due south.

The results, presented on pages 14 and 15 of this report, have shown that excellent levels of sunlight are achieved within Area D, with all the living areas tested seeing levels of APSH in line with those recommended both for the whole year and for the winter months.

Overall we consider that the proposed design will provide future occupants with very good levels of sunlight.



DAYLIGHT+SOLAR DESIGN



2801 - Camden Lock Village / Hawley Wharf - Area D - NMA Internal Daylight and Sunlight Report

Site Overview

Sources of information:

- IR152| Rel_33_2801_DSD

Issue No: IS10-2801

Page No: 8

Date: March 26, 2015

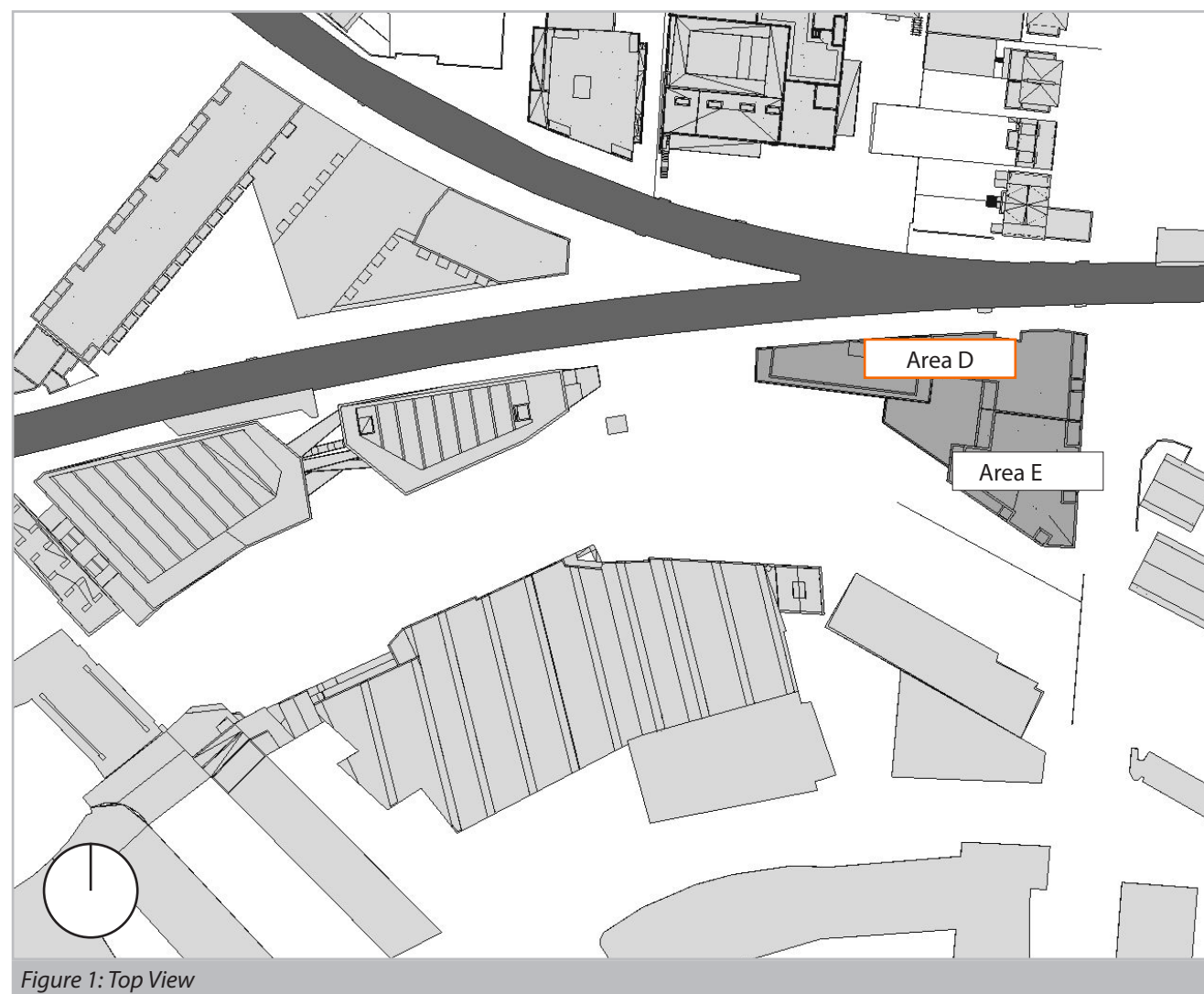


Figure 1: Top View

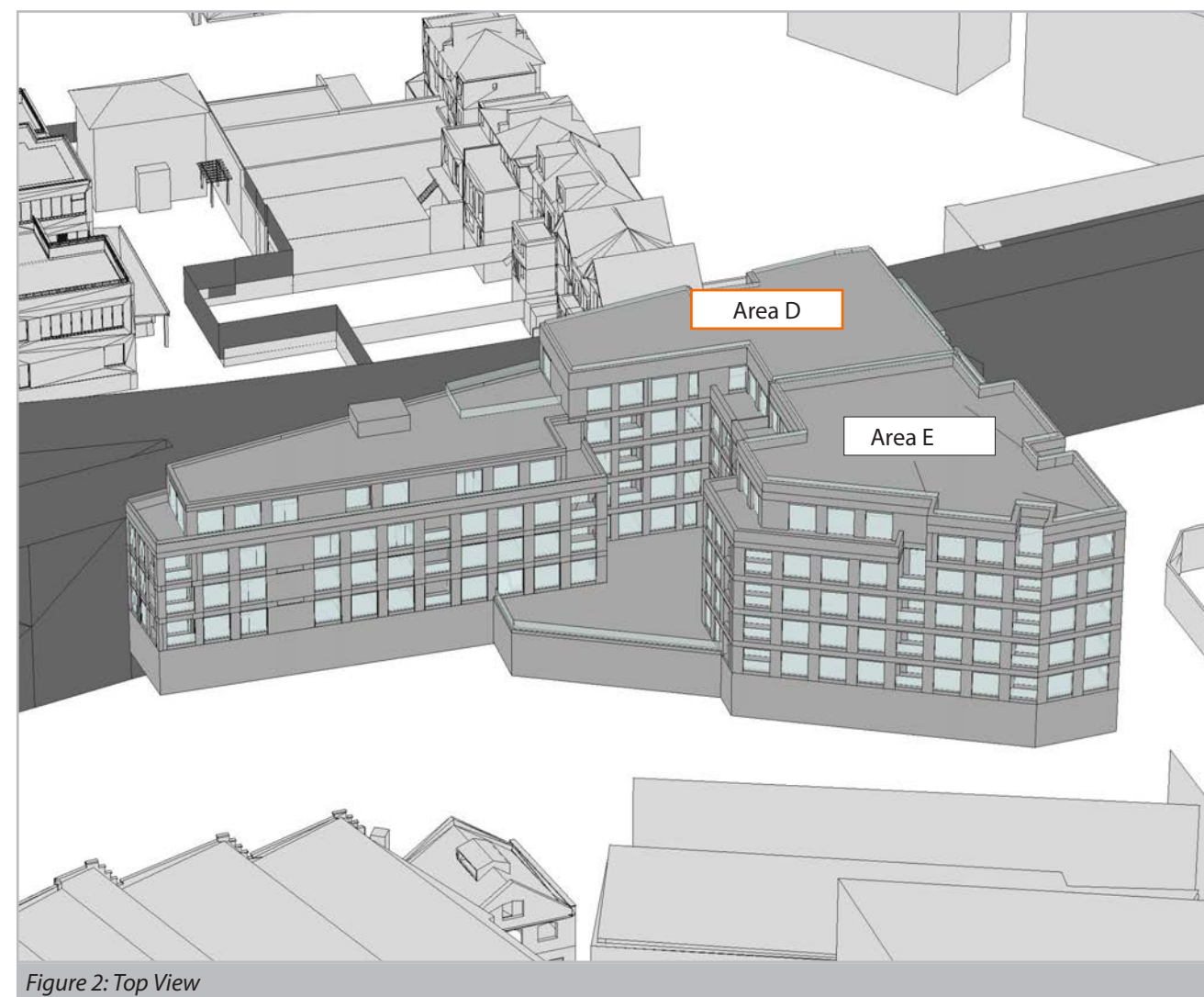


Figure 2: Top View



Sources of information:

- Issue No:** IS10-2801

Page No: 9

Date: March 26, 2015

Table 2: Assessment Data



Daylight Assessments - 2nd Floor

Sources of information:

- IR152| Rel_33_2801_DSD

Issue No: IS10-2801

Page No: 10

Date: March 26, 2015

Table 3: Assessment Data



Daylight Assessments - 3rd Floor

Sources of information:

- IR152| Rel_33_2801_DSD

Issue No:

IS10-2801

Page No:

11

Date:

March 26, 2015

Table 4: Assessment Data



Daylight Assessments - 4th Floor

Sources of information:

- IR152| Rel_33_2801_DSD

Issue No:

IS10-2801

Page No:

12

Date:

March 26, 2015



Table 5: Assessment Data

Daylight Assessments - 5th Floor

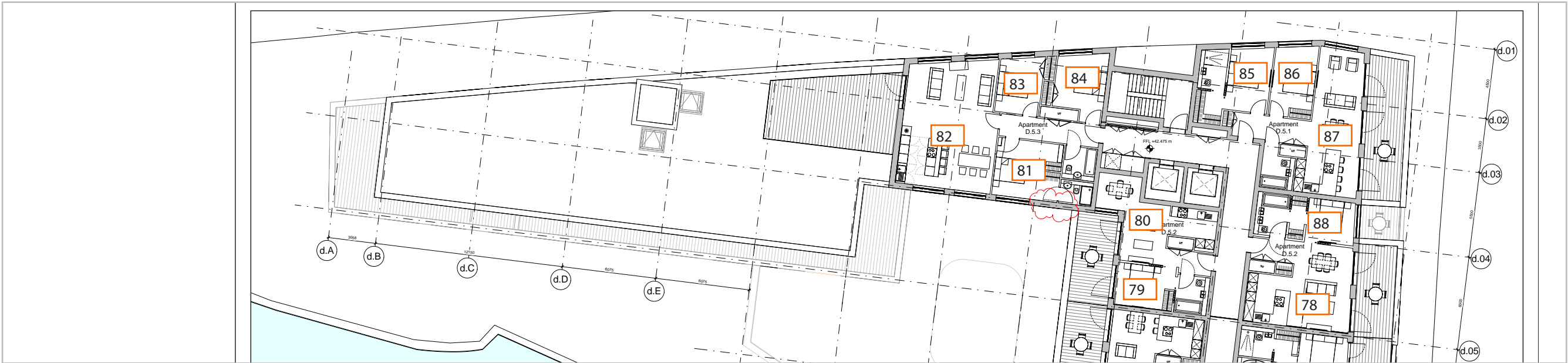


Figure 7: Floor Plan

Daylight Quantum			Distribution of Daylight	
Room Ref.	Room Use	ADF (%)	NSL (%)	RDC
5th floor				
78	L/K/D	4.1	100	N/A
79	Bedroom	5.3	100	Met
80	L/K/D	3.7	99	N/A
81	Bedroom	4.5	99	Met
82	L/K/D	6.2	100	N/A
83	Bedroom	3.5	99	Met
84	Bedroom	4.6	99	Met
85	Bedroom	4.7	100	Met
86	Bedroom	4.9	100	Met
87	L/K/D	7.7	100	N/A
88	Bedroom	6.0	99	Met

Table 6: Assessment Data

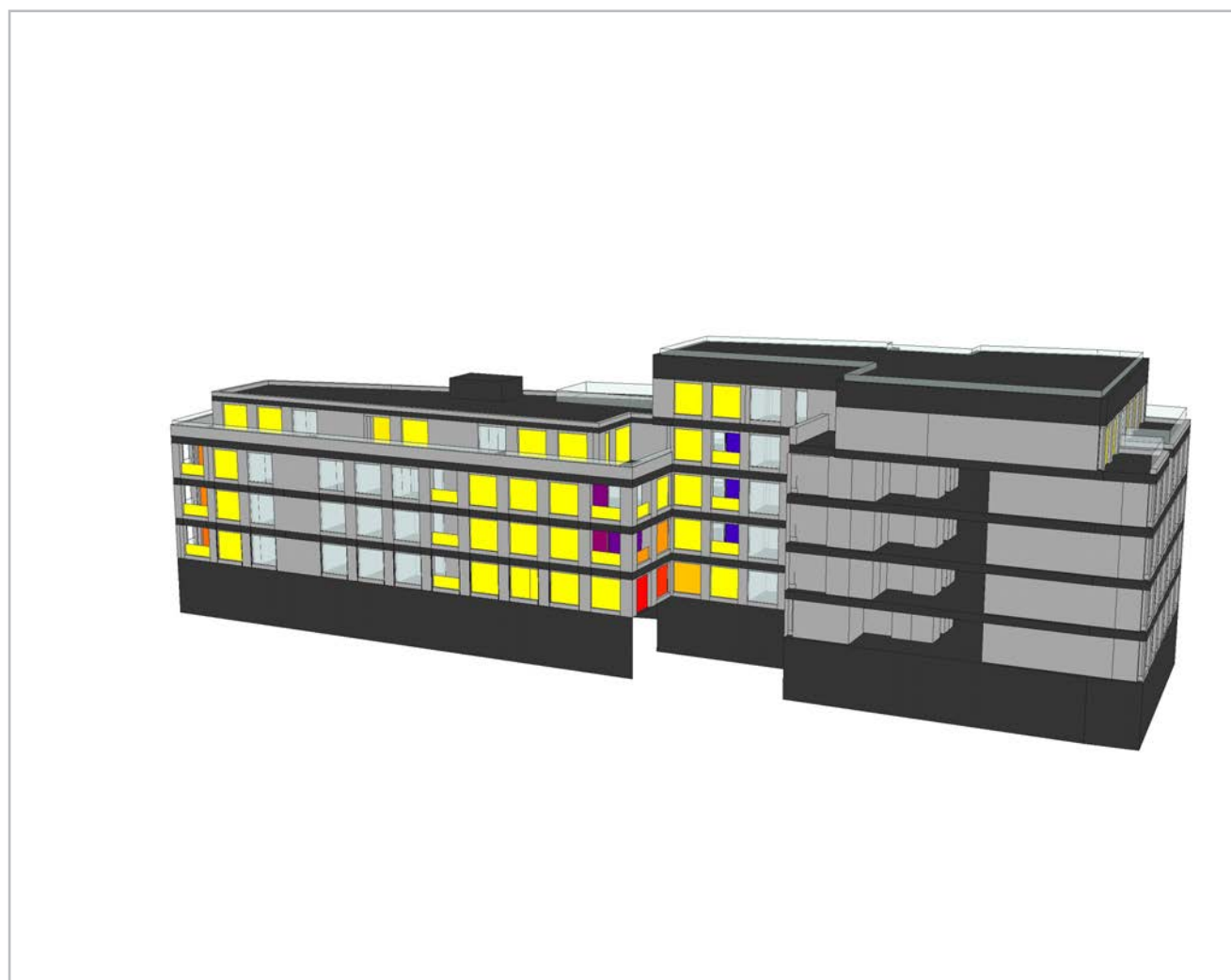


Figure 8: Annual Probable Sunlight Hours - Total

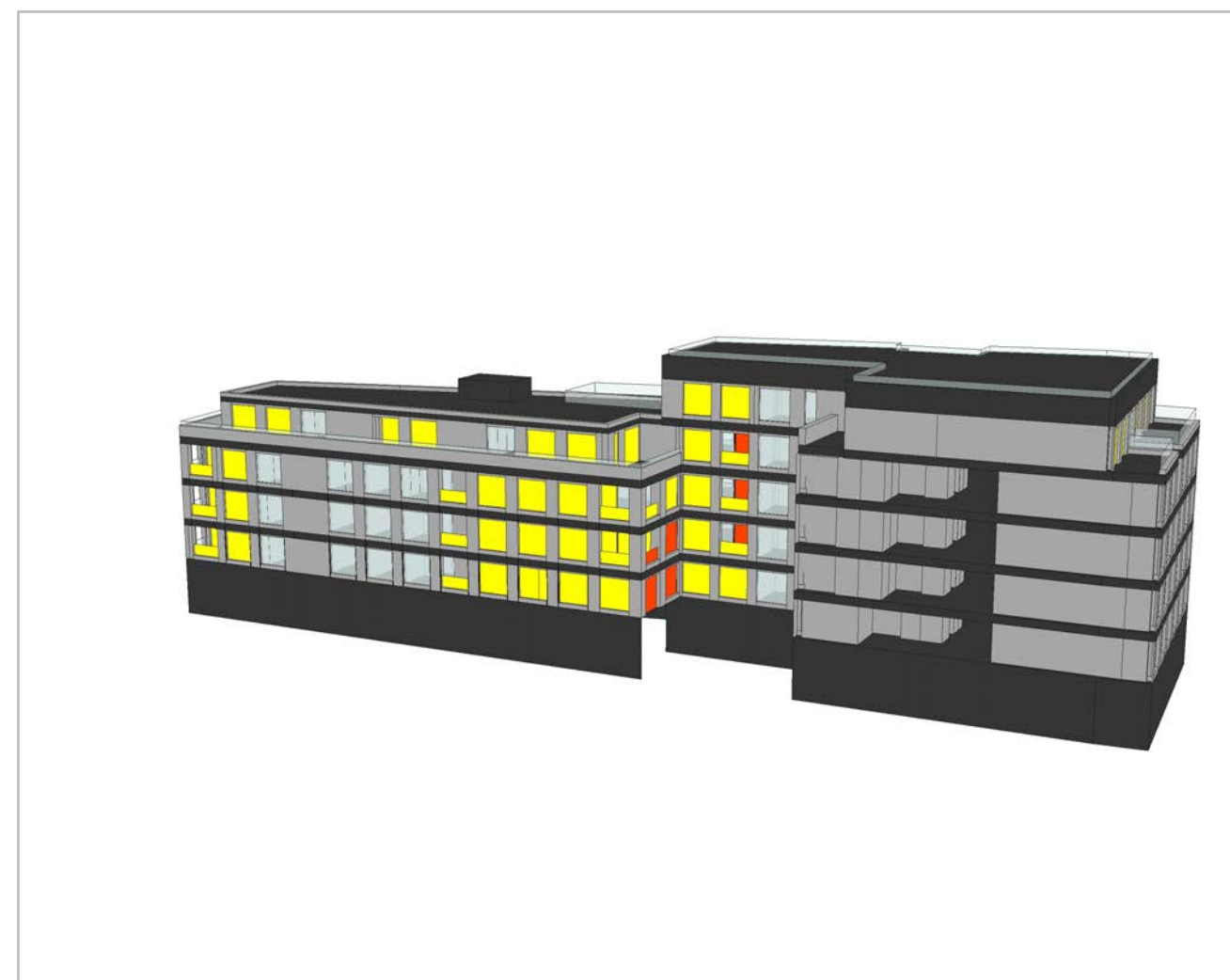
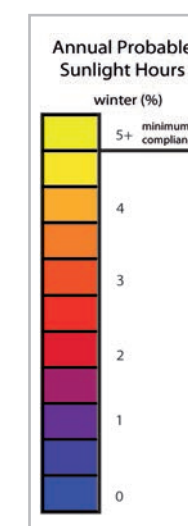
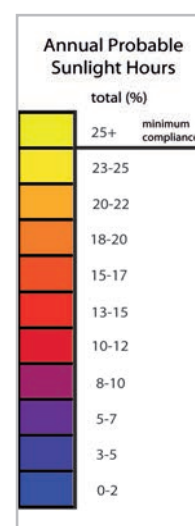
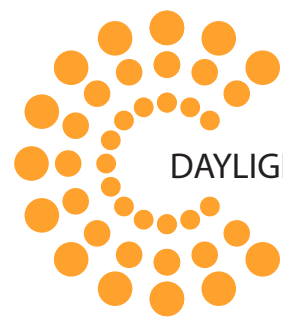


Figure 9: Annual Probable Sunlight Hours - Winter





2801 - Camden Lock Village / Hawley Wharf - Area D - NMA Internal Daylight and Sunlight Report

Sunlight Assessment

Sources of information:

- IR152| Rel_33_2801_DSD

Issue No:

IS10-2801

Page No:

15

Date:

March 26, 2015

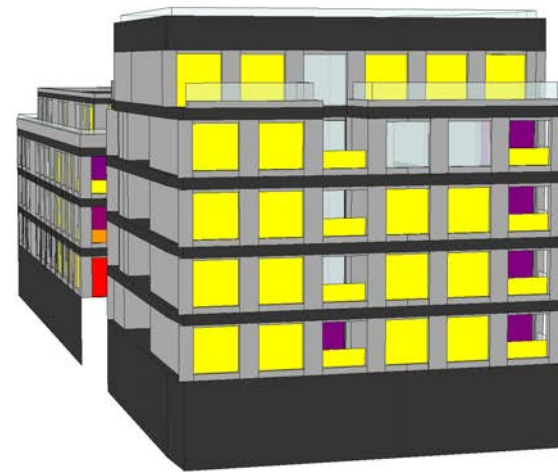


Figure 10: Annual Probable Sunlight Hours - Total

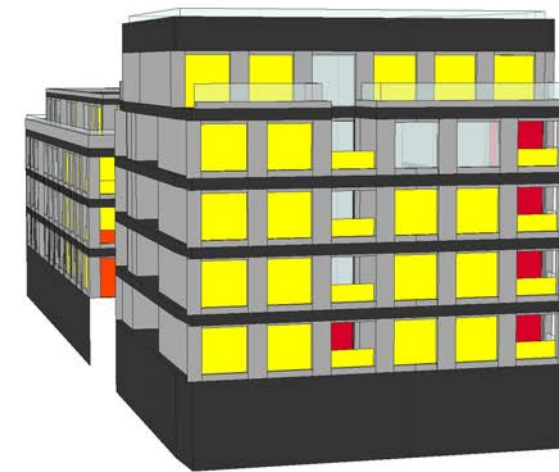


Figure 11: Annual Probable Sunlight Hours - Winter

