



29 Bow lane West
Sunlight, Daylight and Shadow Assessment

CEARDEAN
a r c h i t e c t s

D8 Studios, 9 Dolphin's Barn,
Dublin 8, Ireland, D08WD35
Ph: + 353 (1) 532 4183
sarah@ceardean.com

Executive Summary

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

This report is related to the impact of the proposed residential development at Bow Lane West. The layouts were examined and the numbers below reflect the results of this study. And as for the scope of the work, it was the following:

- Analyse the Average daylight factor (ADF) in respect of the proposed residential units.
- Conduct a general overshadowing study base on 24 scenarios, considering 3 different dates (21st of March, 21st of June, and 21st of December), 4 different times (9 am, 12 pm, 14 pm, and 18 pm). All of those features were analyzed with the existing building in place and the proposed building on the site.

Methodology

This work has been done in accordance with the recommendations of Site Layout Planning for Daylight and Sunlight/ A Guide to Good Practice (BRE 2011), BS 8206 Lighting for buildings, Part 2: Code of Practice for Daylight and Design Standards for New Apartments - Guidelines for Plannings Authorities (March 2018).

BRE Guide and Advisory Note

The numerical guidelines given in these documents are purely advisory. The BRE Guide States that:

“ The advice given is not mandatory and the guide should not be an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, this should be interpreted flexibly since natural lighting is only one of many factors in site layout design”.

“ it is purely advisory and the numerical target values within it may be varied to meet the needs of the development and its location” (Section 1.6, p1)

Average Daylight Factor (ADF)

The Average Daylight Factor (ADF) is a measure of the adequacy of diffuse daylight within a room and accounts for factors such as the size of a window in relation to the size of the room, the reflectance of the walls, and the nature of the glazing and number of windows.

The BRE guidelines confirm that the acceptable minimum ADF target value depends on the room use. That is 1% for a bedroom, 1.5% for a living room, and 2% for a family kitchen. In cases where one room serves more than one purpose, the minimum ADF should be that for the room type with the higher value. This that, the combined Living/ Dining/Kitchen spaces were analyzed against the 2% value.

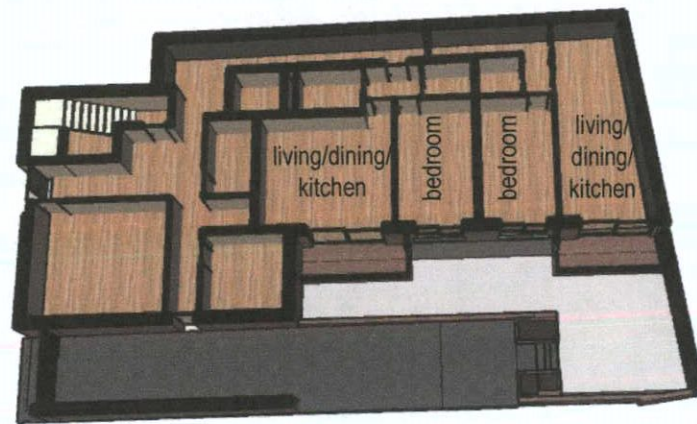
Overall Conclusion

- ADF for all of the designed habitable rooms on all floors complies with strict BRE requirements.
- The overall average ADF of all tested bedrooms is 2.90% and the Living/Dining/ Kitchen is 3.11% which should be considered against the strict BRE targets of 1.0% and 2.0% respectively.

Design model

A 3d model of the site and environs and proposed development was developed based on the architectural drawings and survey. The model was georeferenced to its correct location and an accurate solar daylight system was introduced.

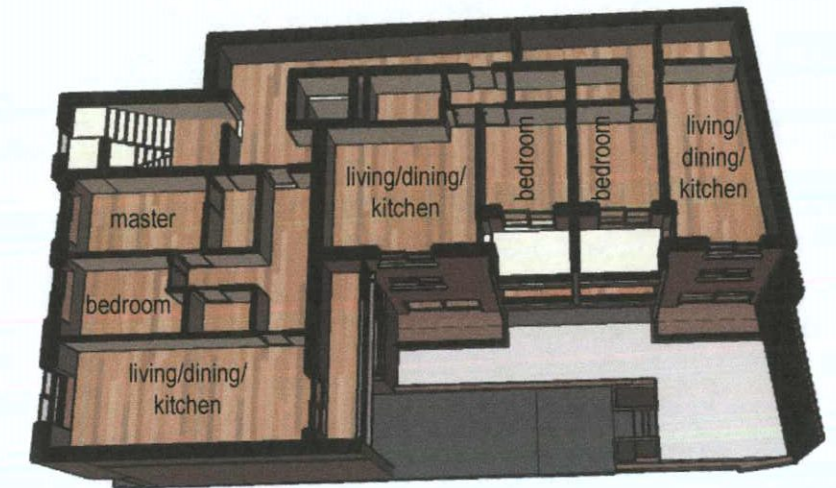
DDC PLAN NO 5400/22
RECEIVED: 08/12/2022



Ground floor



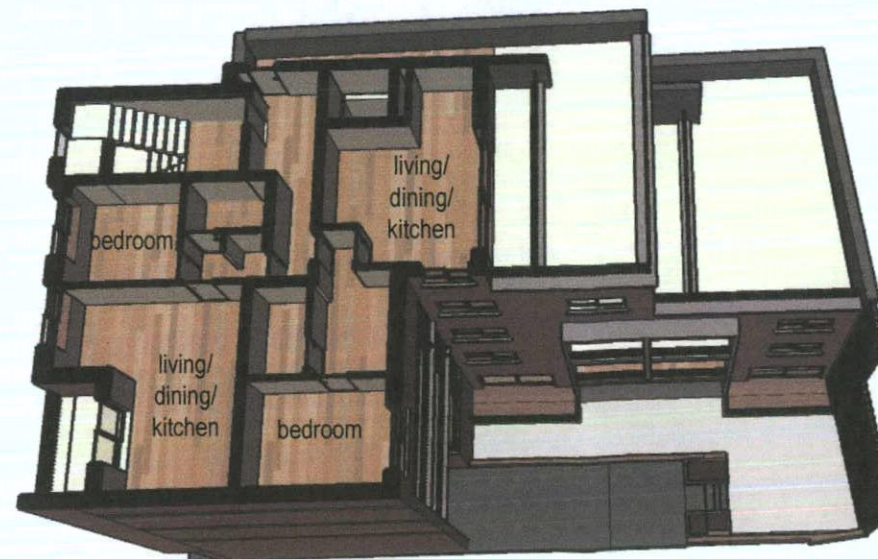
First floor



Second floor



Third floor



Fourth floor



Fifth floor

Proposed Floor models.

Development Performance

Development Performance - Average Daylight Factor - ADF

The aim of this daylight analysis of the proposed development at Bow Lane West is to demonstrate that the proposed residential units in the project carry an acceptable standard of amenities in respect of daylight.

Definition of Daylight Factor under clause 2.11.3 in BS 6100-7:2008,59011:

“ratio of illuminance at a point on a given plane due to light received from sky of known or assumed luminance distribution to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky.”

Definition of Average Daylight Factor under clauses 2.11.4 and 5.5 in Bre 209 Glossary:

“Ratio of total daylight flux incident on the working plane to the area of the working plane expressed as a percentage of the outdoor illuminance on a horizontal due to an obstructed CIE standard overcast sky. Thus a 1% ADF would mean that the average indoor illuminance would be one hundredth the outdoor unobstructed illuminance

Internal light distribution within a room is examined by testing ADF (Average Daylight Factor) against pre-defined parameters. Calculation of average daylight factor is based on the recommendations of Site Layout Planning for Daylight and Sunlight/ A Guide to Good Practice (BRE 2011), BS 8206 Lighting for buildings, Part 2: Code of Practice for Daylight and Design Standards for New Apartments - Guidelines for Plannings Authorities (March 2018).

Room type	Minimum Average daylight factor%
Bedrooms	1
Living rooms	1.5
Kitchens	2

Table 2 - Minimum average daylight factor

“where one room serves more than one purpose, the minimum average daylight factor should be that for the room type with the highest value. For example, in a space that combines a living room and a kitchen the minimum average daylight factor should be 2%.

The calculations were conducted using “Dialux Evo” software and based on the layout drawings submitted in the planning application. The simulation was run based on the standard CIE overcast sky model over a standard working plane for residential of 0.85 and the results are provided in terms of Average Daylight Factor for select rooms.

Light distribution was computed by modeling the internal configuration of rooms and window laces within the existing urban environment and then the analysis was run.

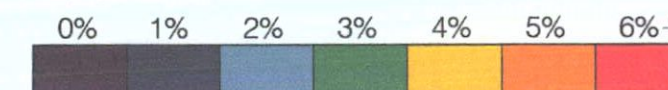
Surface	Description	Reflectance
External Walls	Brickwork	20%
Floor	Light Wood	40%
Internal Walls	Cream	70%
Ceiling	White	80%
Frame	Medium Grey	50%
Glass	Double glazing	82%

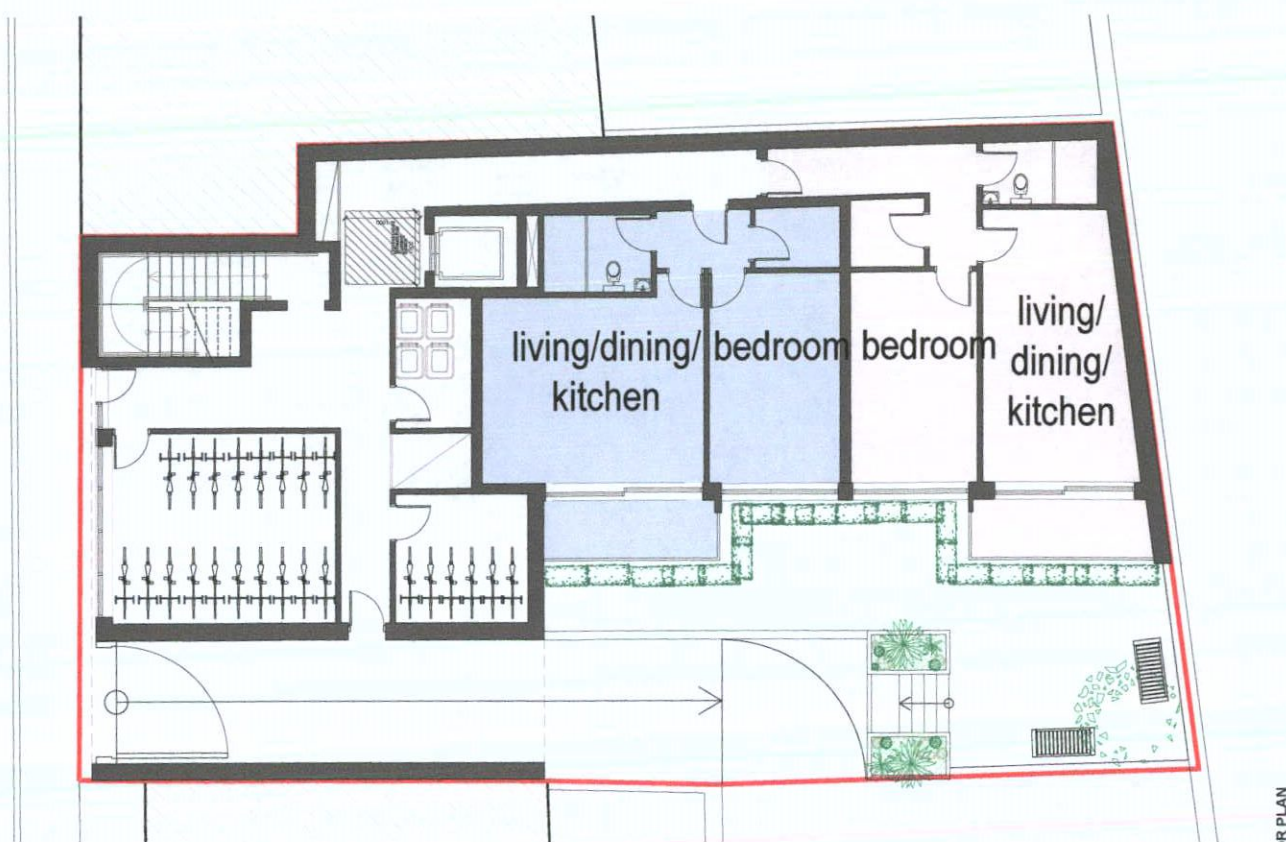
	Degree of transmission
--	------------------------

The average light factor is used as a measure of general illumination from the skylight. It is considered good practice to ensure that rooms in dwellings and in most other buildings have a predominantly daylit appearance. In order to achieve this average daylight factor should be at least 2%.

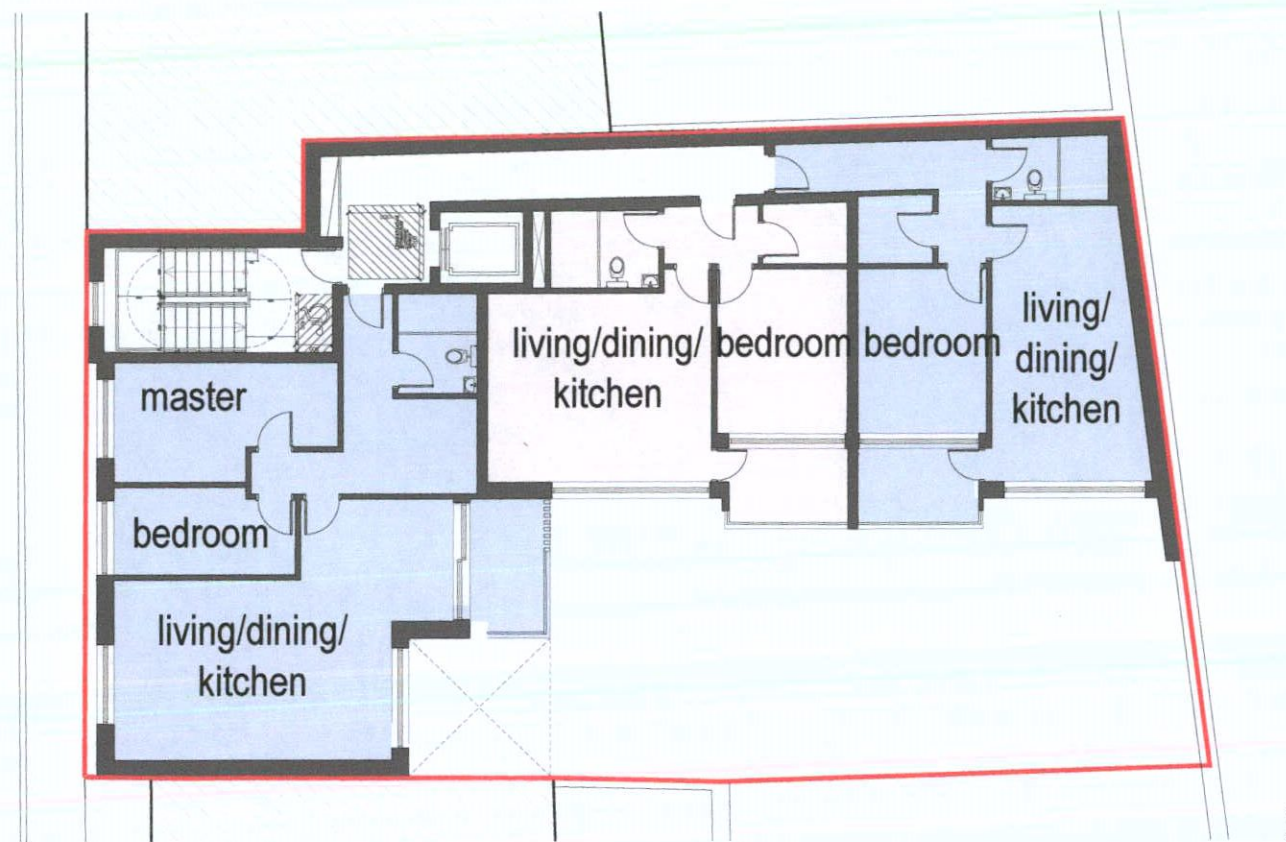
If the average daylight factor in a space is at least 5% then electric lighting is not normally needed during the daytime, provided the uniformity is satisfactory (see 5.7 BS or 2.1.8 BRE 209). If the average daylight factor in a space is between 2% and 5% supplementary electric light is usually required. Values greater than 6% might suggest that the room has too much daylight.

Legend for radiance plots:
Daylight Factor (DF) %:





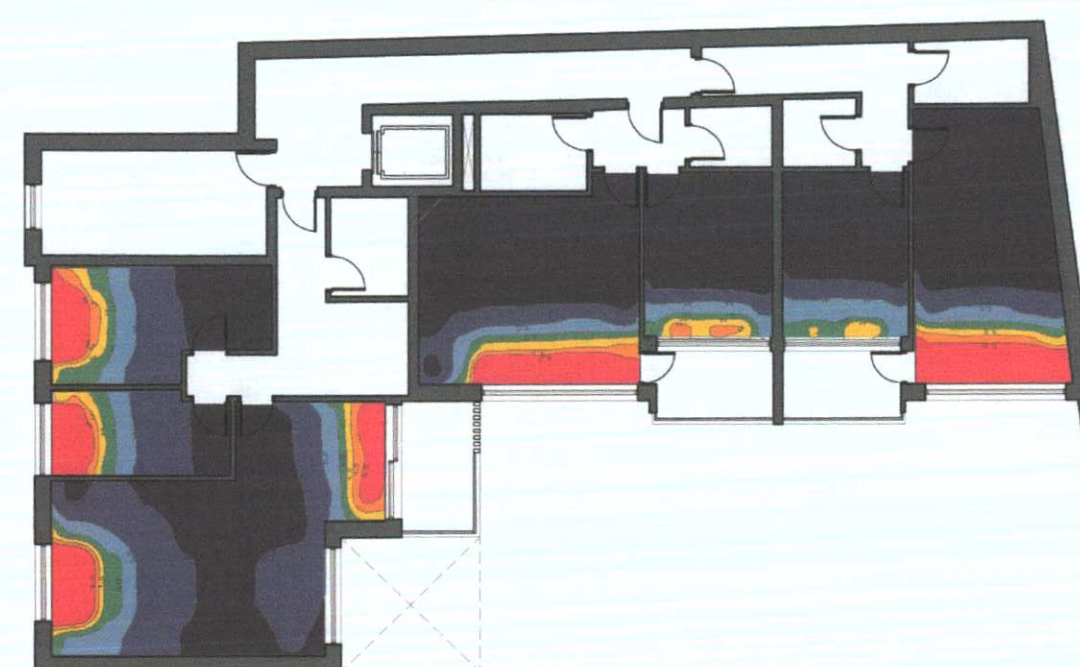
Ground floor



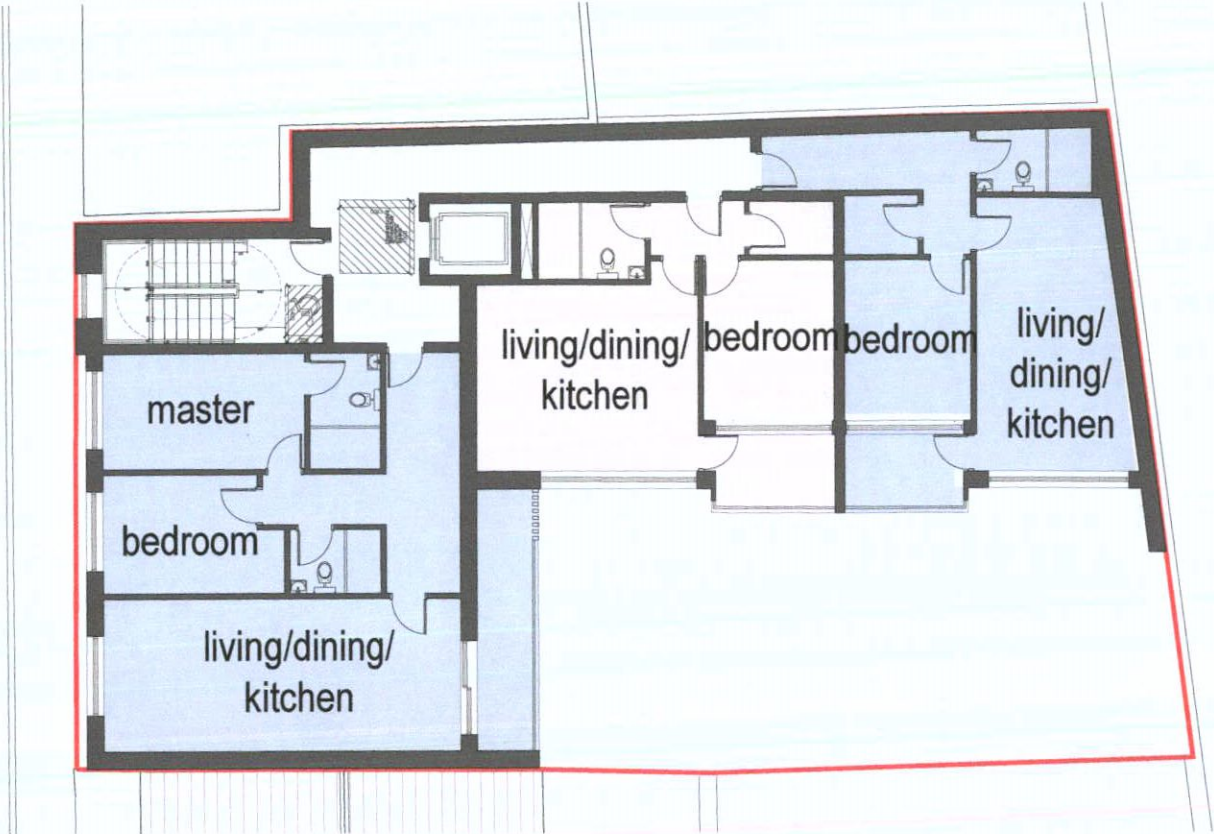
First floor



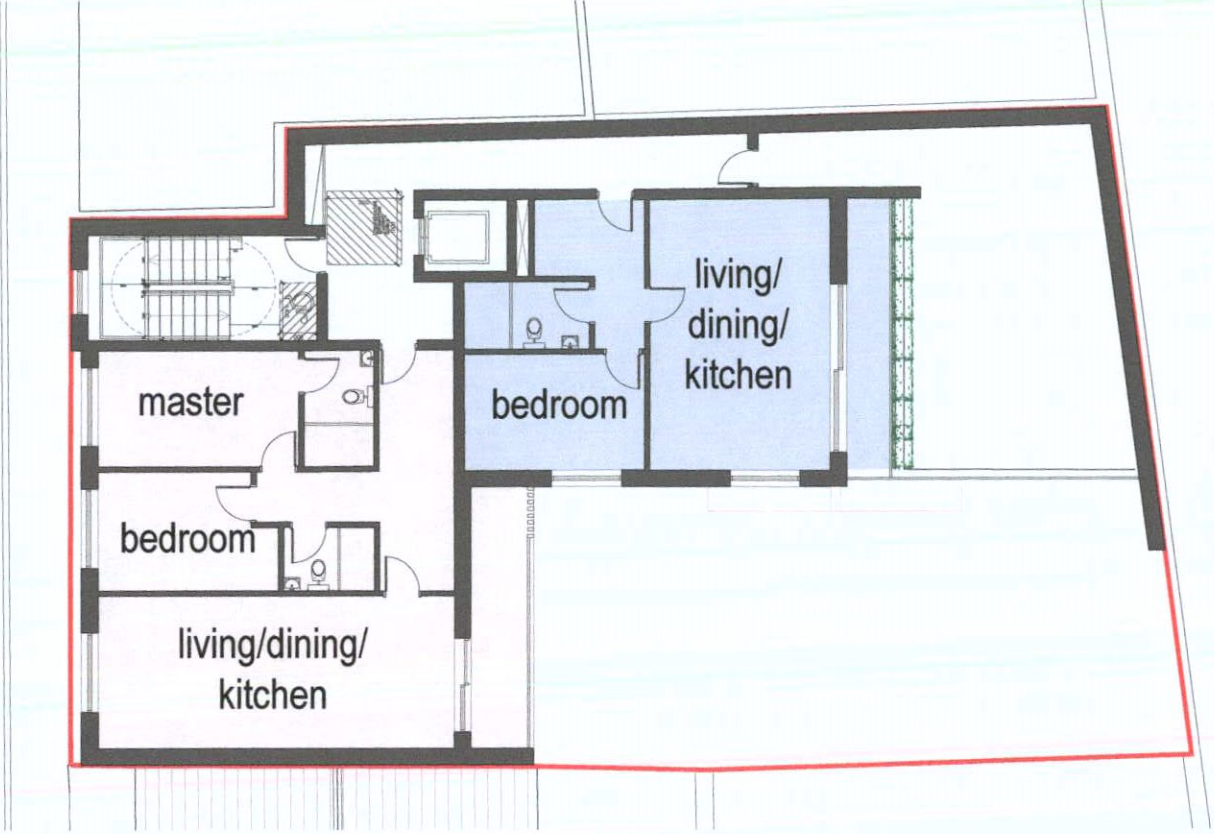
Radiance plots shadowing the DF distribution over relevant room working planes.



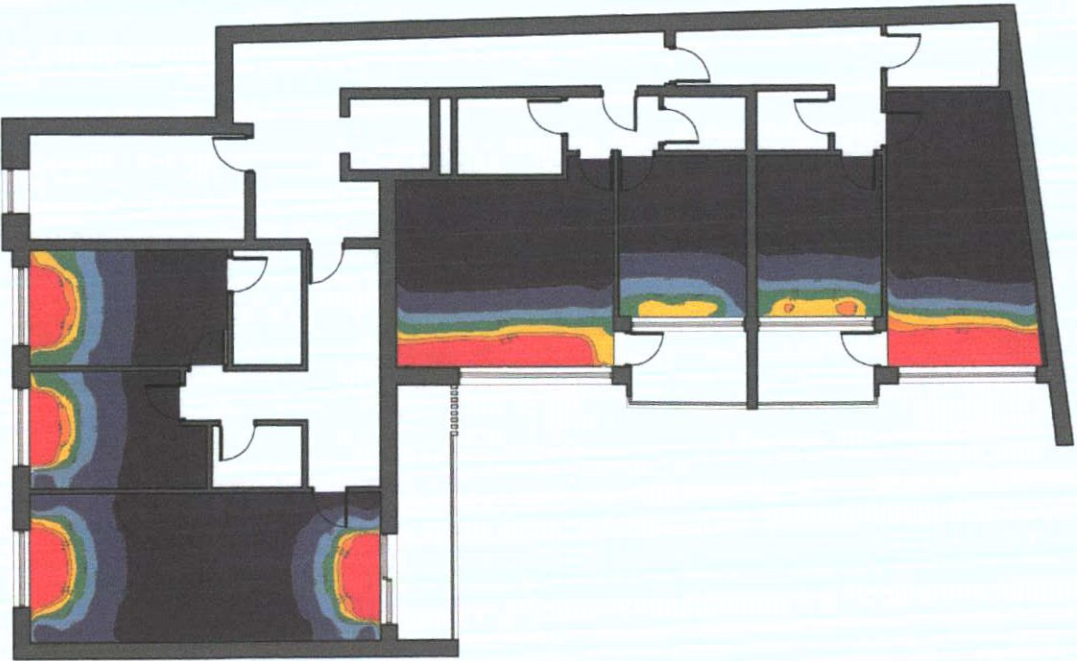
Radiance plots shadowing the DF distribution over relevant room working planes.



Second floor



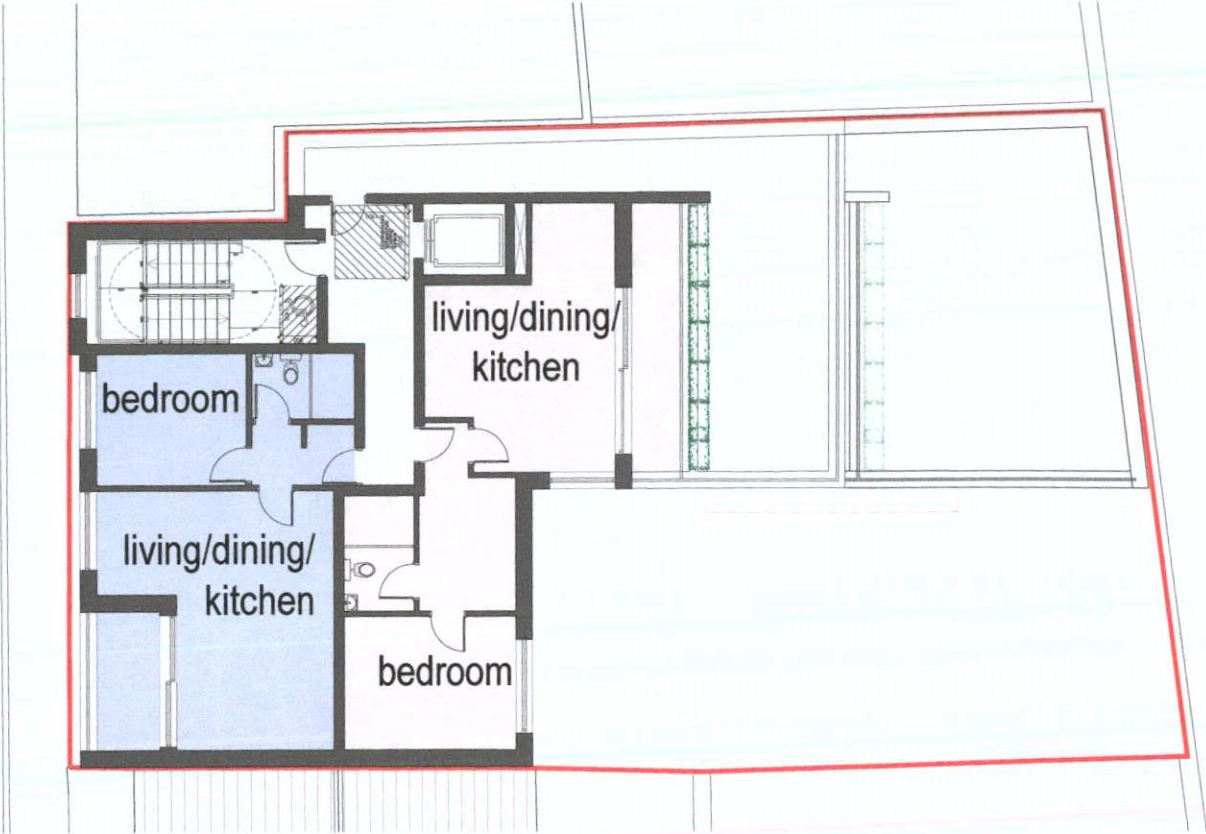
Third floor



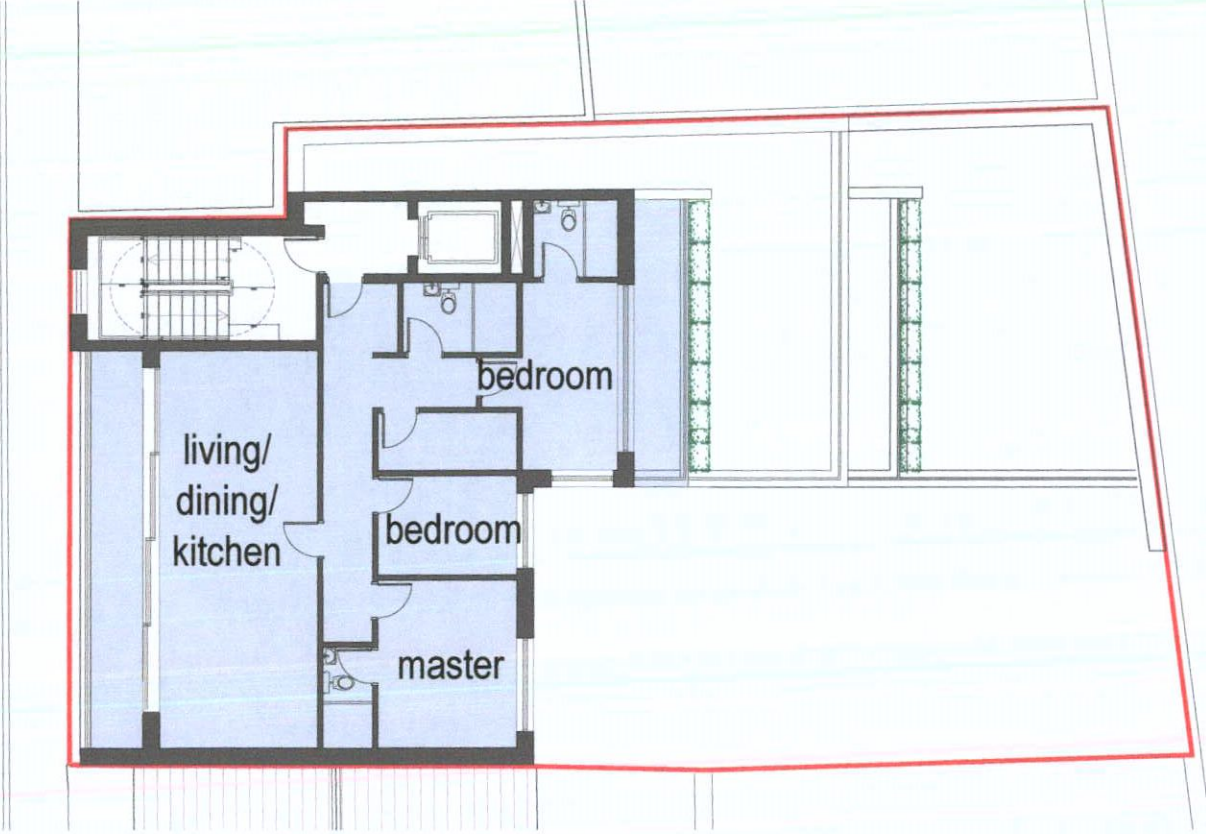
Radiance plots shadowing the DF distribution over relevant room working planes.



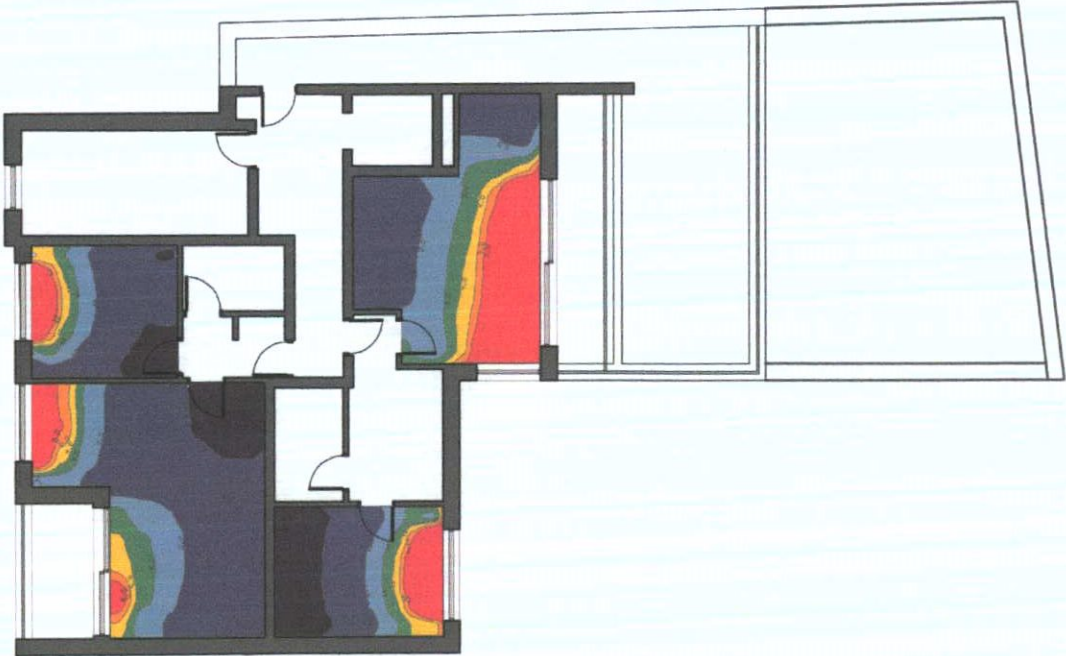
Radiance plots shadowing the DF distribution over relevant room working planes.



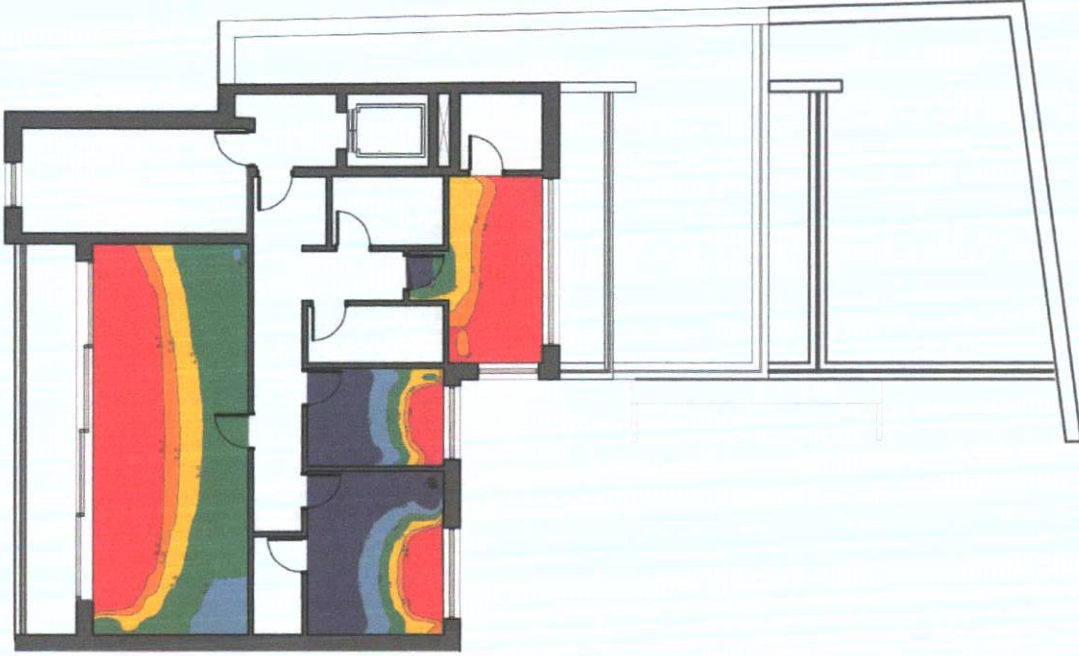
Fourth floor



Fifth floor



Radiance plots shadowing the DF distribution over relevant room working planes.



Radiance plots shadowing the DF distribution over relevant room working planes.

Light distribution

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

Average Dylight Factor - ADF

Summary

- ADF for all of the designed habitable rooms on all floors complies with strict BRE requirements.

- The overall average ADF of all tested bedrooms is 2,90% and the Living/ Dining/ Kitchen is 3.11% which should be considered against the strict BRE targets of 1.0% and 2.0% respectively.

Rooms analysed	31
Rooms that comply	31
Rooms that do not comply	0

Room	Floor	Apart ment unit	Type	DF strict BRE min.	ADF	Compliance
1	Ground floor	Unit 1	Bedroom	1%	2.76%	Yes
2	Ground floor	Unit 1	Living room/Dining/kitchen	2%	2.48%	Yes
3	Ground floor	Unit 2	Bedroom	1%	2.91%	Yes
4	Ground floor	Unit 2	Living room/Dining/kitchen	2%	2.77	Yes
5	First floor	Unit 3	Bedroom 1	1%	3.65%	Yes
6	First floor	Unit 3	Master	1%	2.73%	Yes
7	First floor	Unit 3	Living room/Dining/kitchen	2%	2.17%	Yes
8	First floor	Unit 4	Bedroom	1%	1.20%	Yes
9	First floor	Unit 4	Living room/Dining/kitchen	2%	2.02%	Yes
10	First floor	Unit 5	Bedroom	1%	1.45%	Yes
11	First floor	Unit 5	Living room/Dining/kitchen	2%	2.72%	Yes
12	Second floor	Unit 6	Bedroom 1	1%	2.37%	Yes
13	Second floor	Unit 6	Master	1%	2.57%	Yes
14	Second floor	Unit 6	Living room/Dining/kitchen	2%	2.20%	Yes
15	Second floor	Unit 7	Bedroom	1%	1.07%	Yes
16	Second floor	Unit 7	Living room/Dining/kitchen	2%	2.17%	Yes
17	Second floor	Unit 8	Bedroom	1%	1.13%	Yes
18	Second floor	Unit 8	Living room/Dining/kitchen	2%	2.33%	Yes
19	Third floor	Unit 9	Bedroom 1	1%	3.03%	Yes
20	Third floor	Unit 9	Master	1%	2.77%	Yes
21	Third floor	Unit 9	Living room/Dining/kitchen	2%	2.35%	Yes
22	Third floor	Unit 10	Bedroom	1%	1.48%	Yes
23	Third floor	Unit 10	Living room/Dining/kitchen	2%	4.04%	Yes
24	Fourth floor	Unit 11	Bedroom	1%	2.96%	Yes
25	Fourth floor	Unit 11	Living room/Dining/kitchen	2%	2.50%	Yes
26	Fourth floor	Unit 12	Bedroom	1%	3.25%	Yes
27	Fourth floor	Unit 12	Living room/Dining/kitchen	2%	5.43%	Yes
28	Fifth floor	Unit 13	Bedroom1	1%	9.92%	Yes
29	Fifth floor	Unit 13	Bedroom2	1%	3.54%	Yes
30	Fifth floor	Unit 13	Master	1%	3.56%	Yes
31	Fifth floor	Unit 13	Living room/Dining/kitchen	2%	7.31%	Yes

Overshadowing study

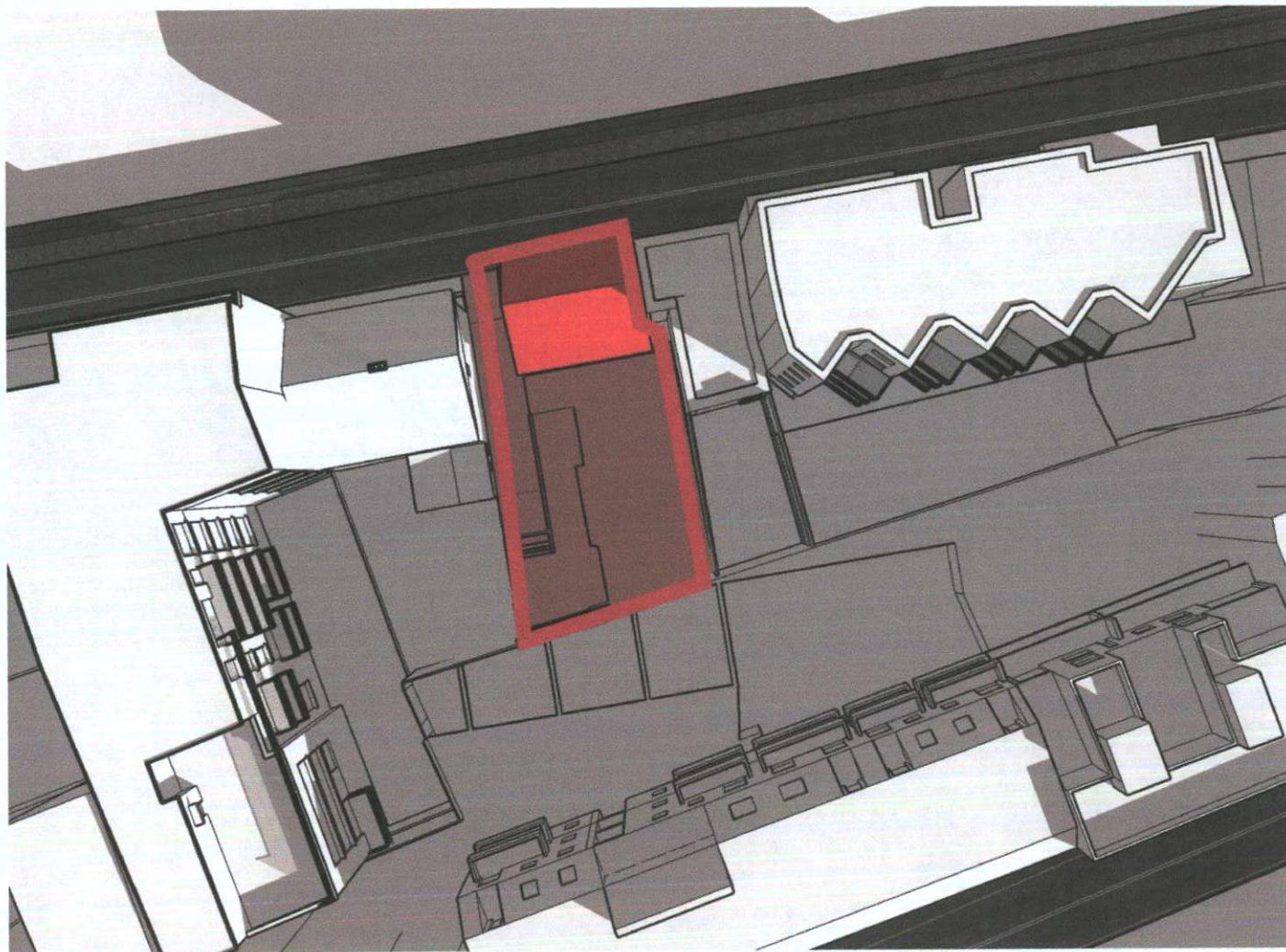
The following images illustrate the shadows cast on the neighbour's amenity areas between 9 am and 18 pm.

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

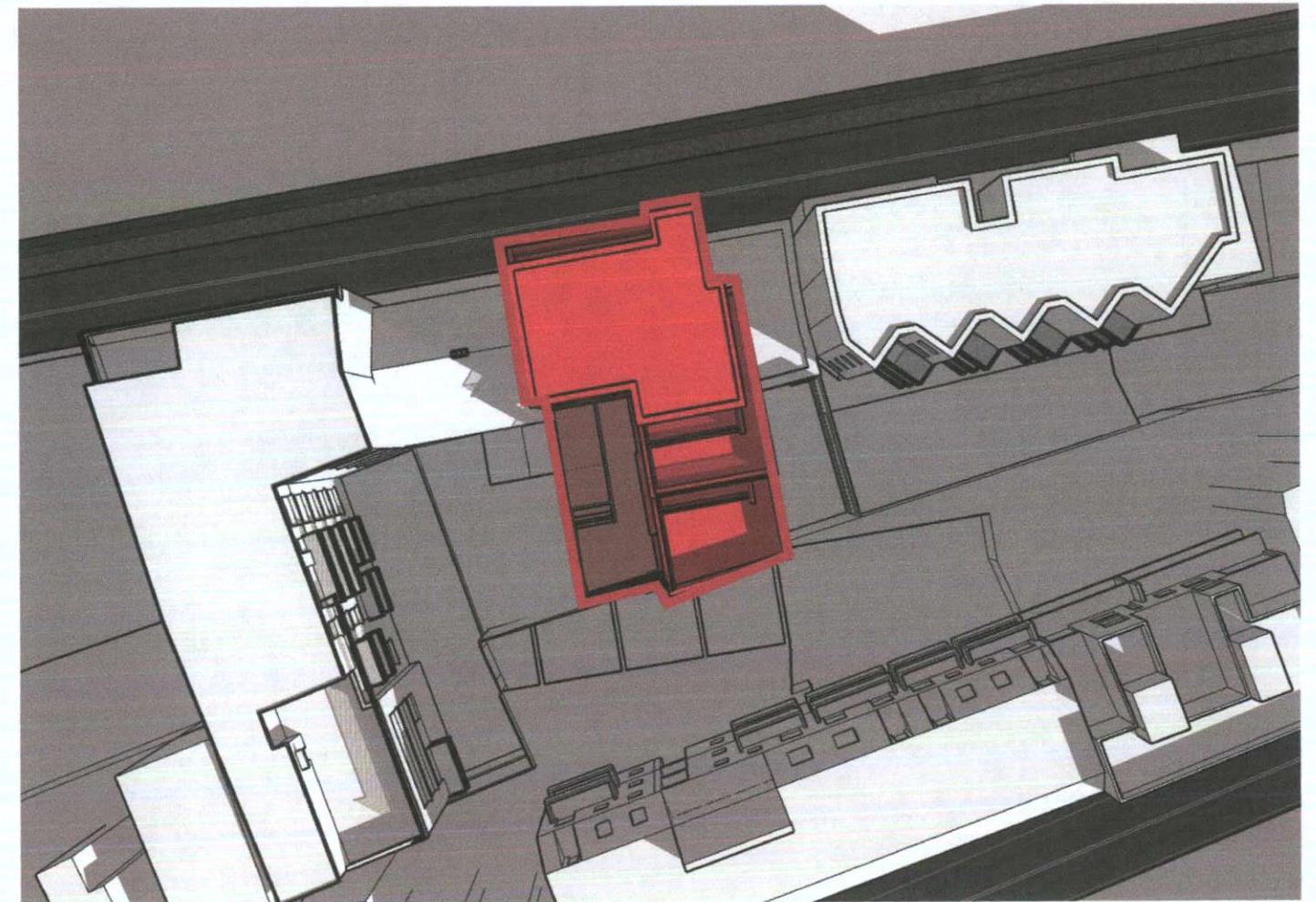
March/21

09:00

EXISTING



PROPOSED

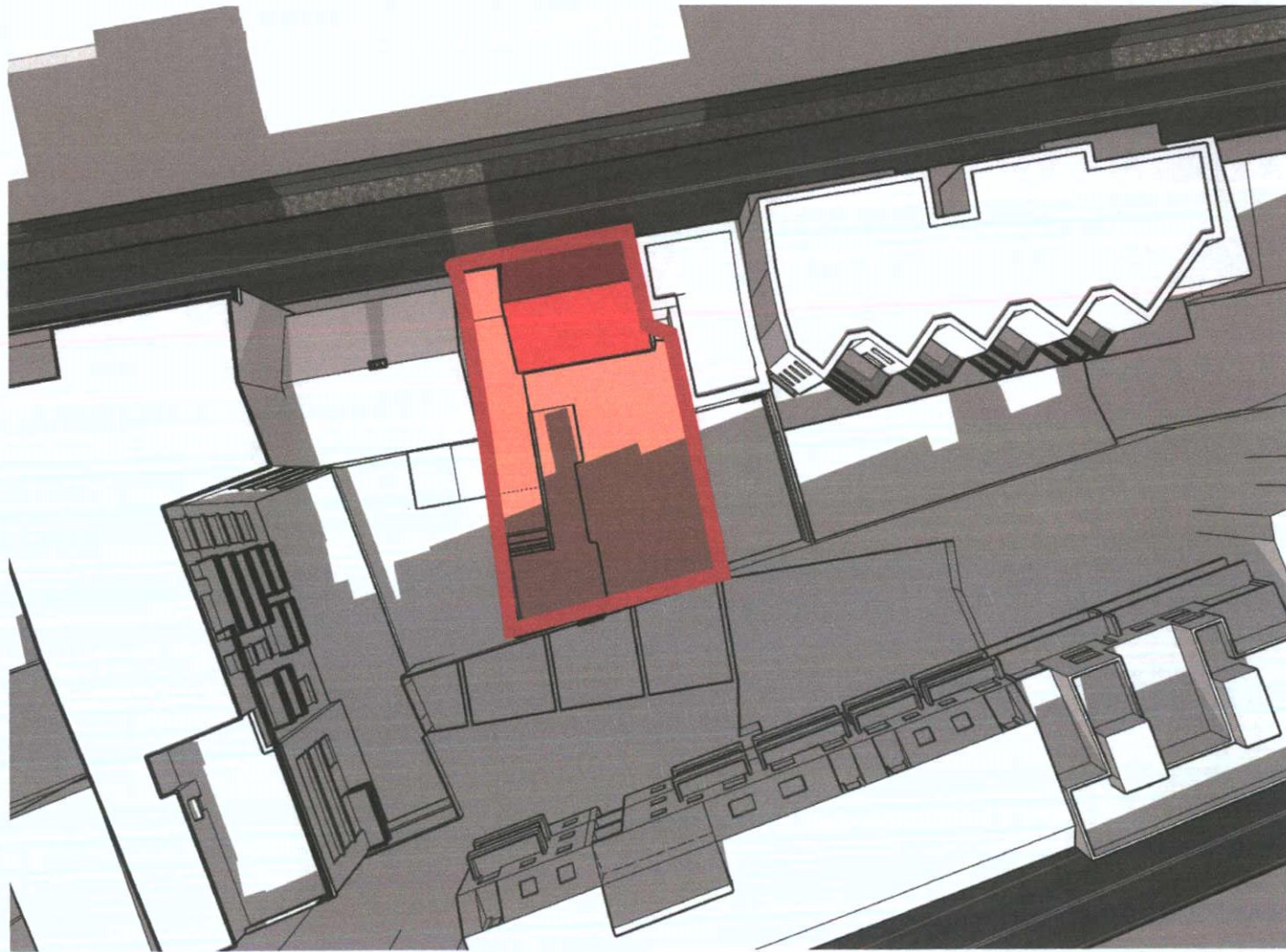


March/21

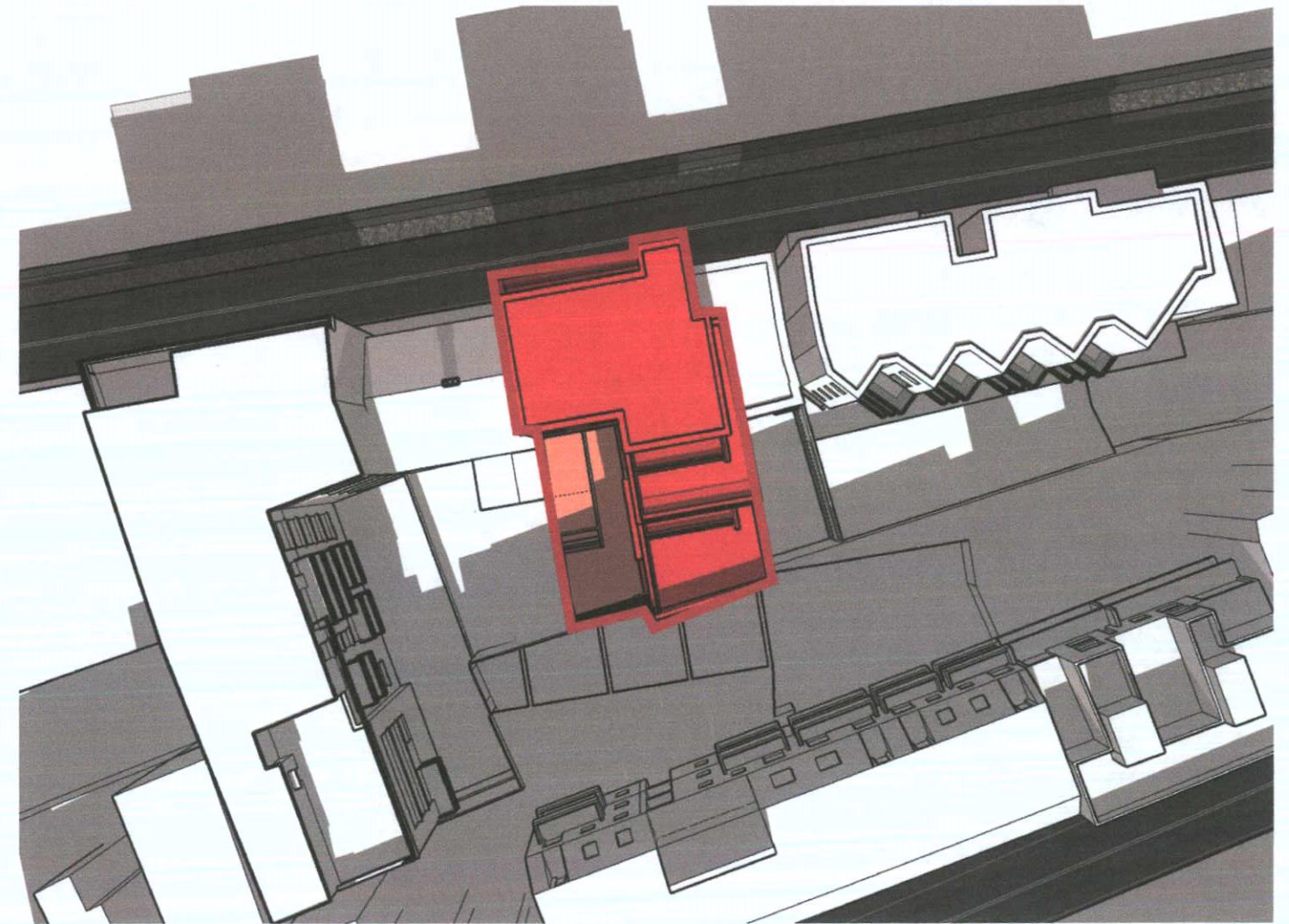
12:00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED

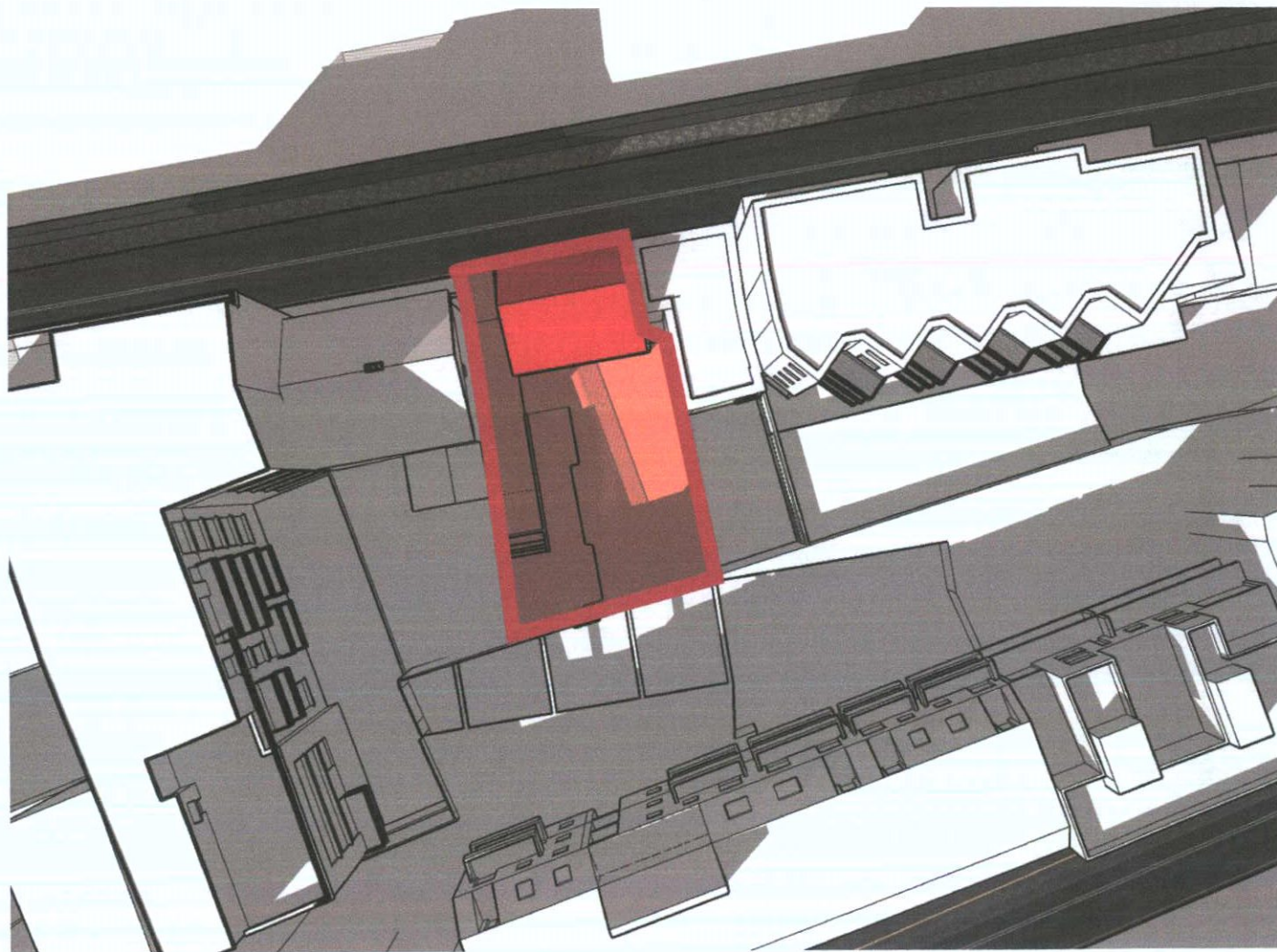


March/21

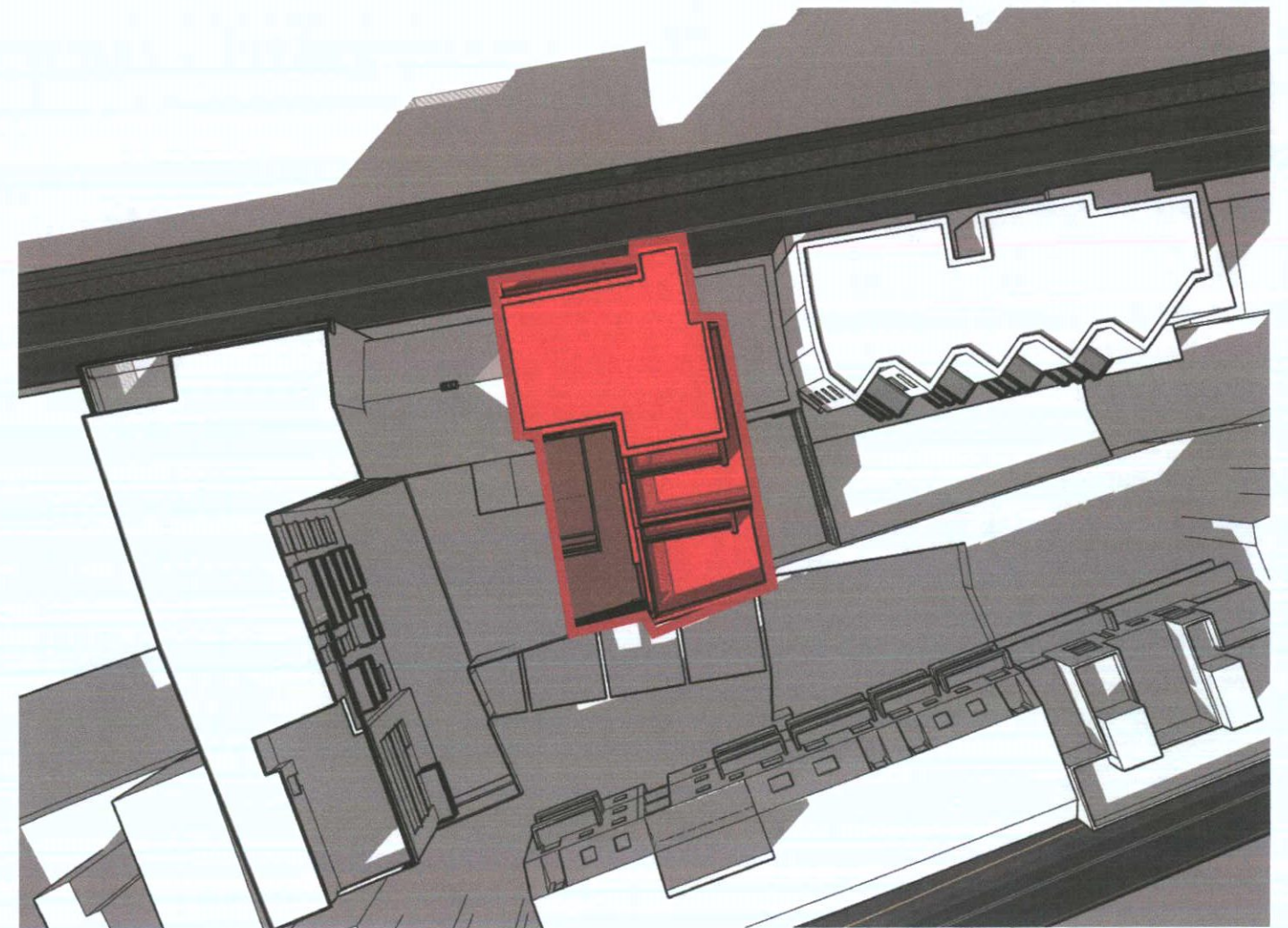
15:00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED

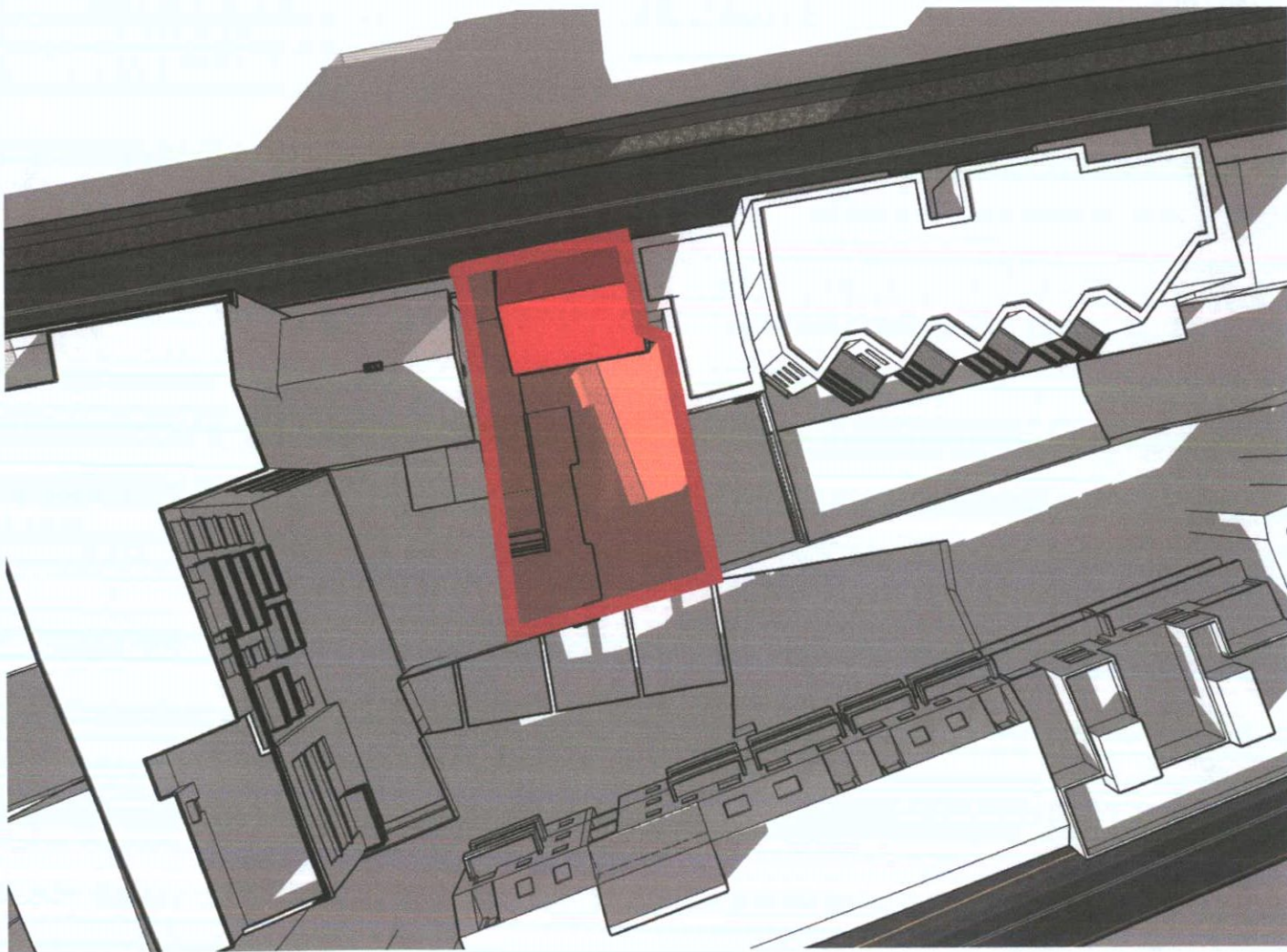


March/21

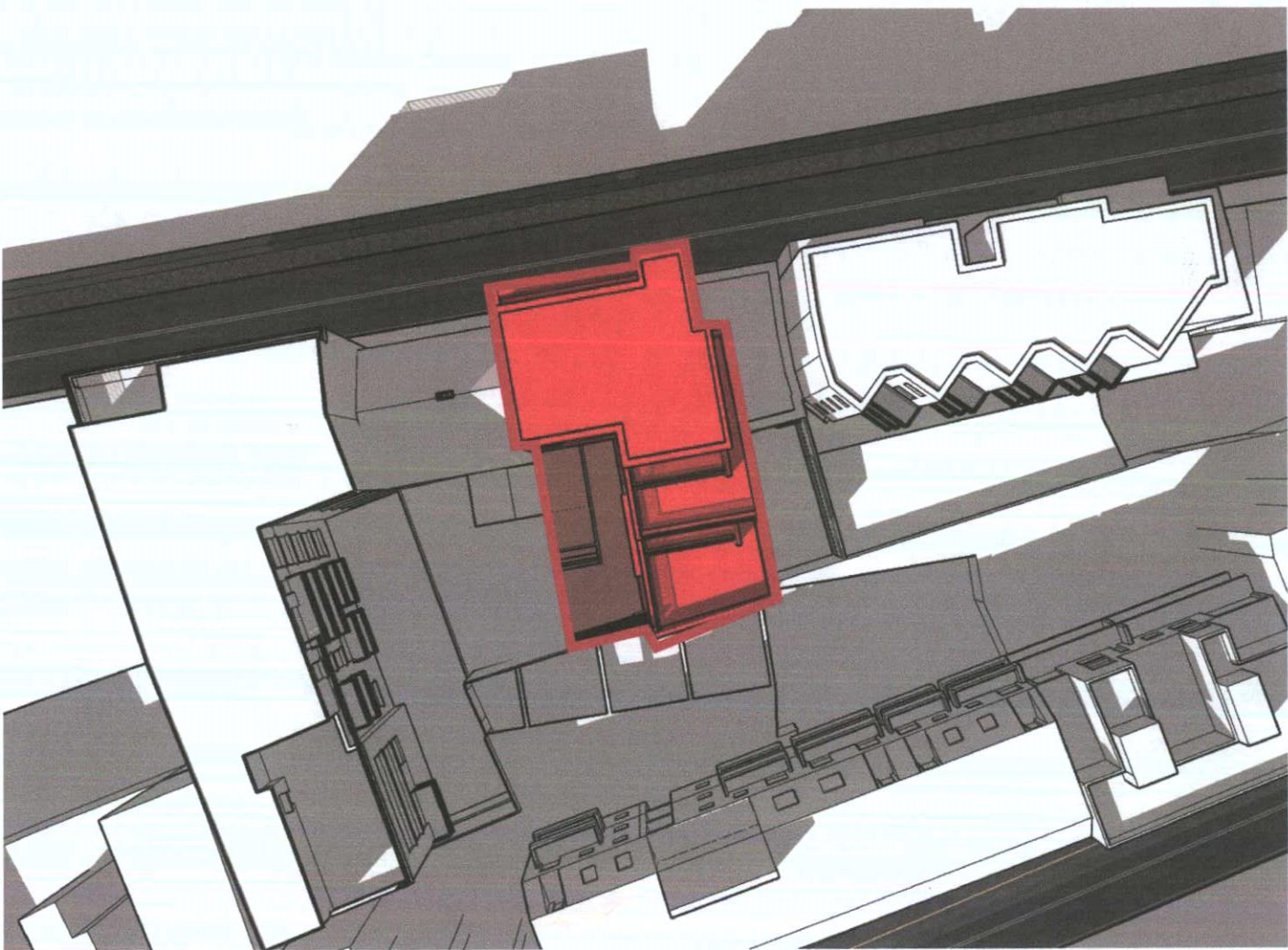
15:00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED

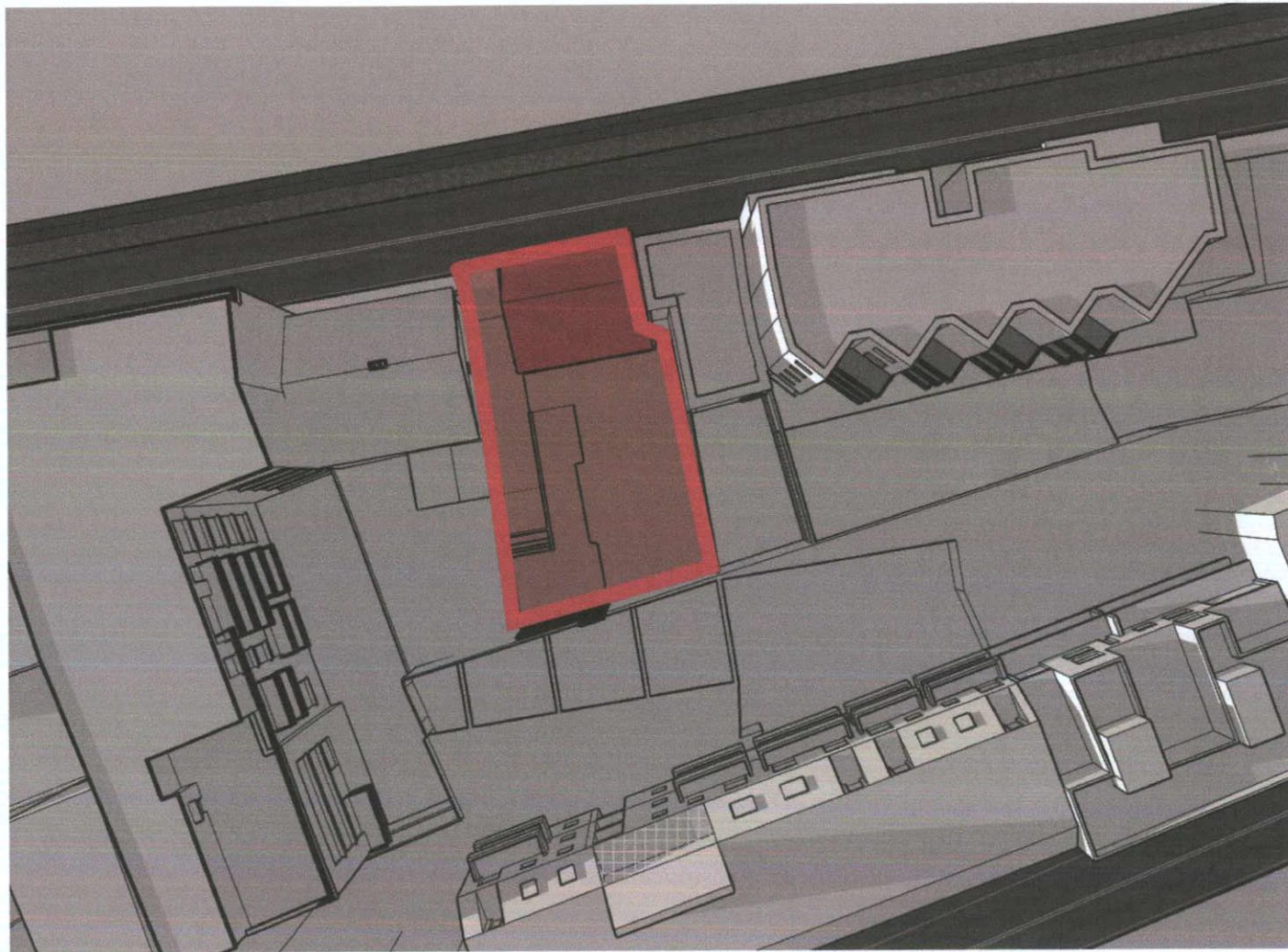


March /21

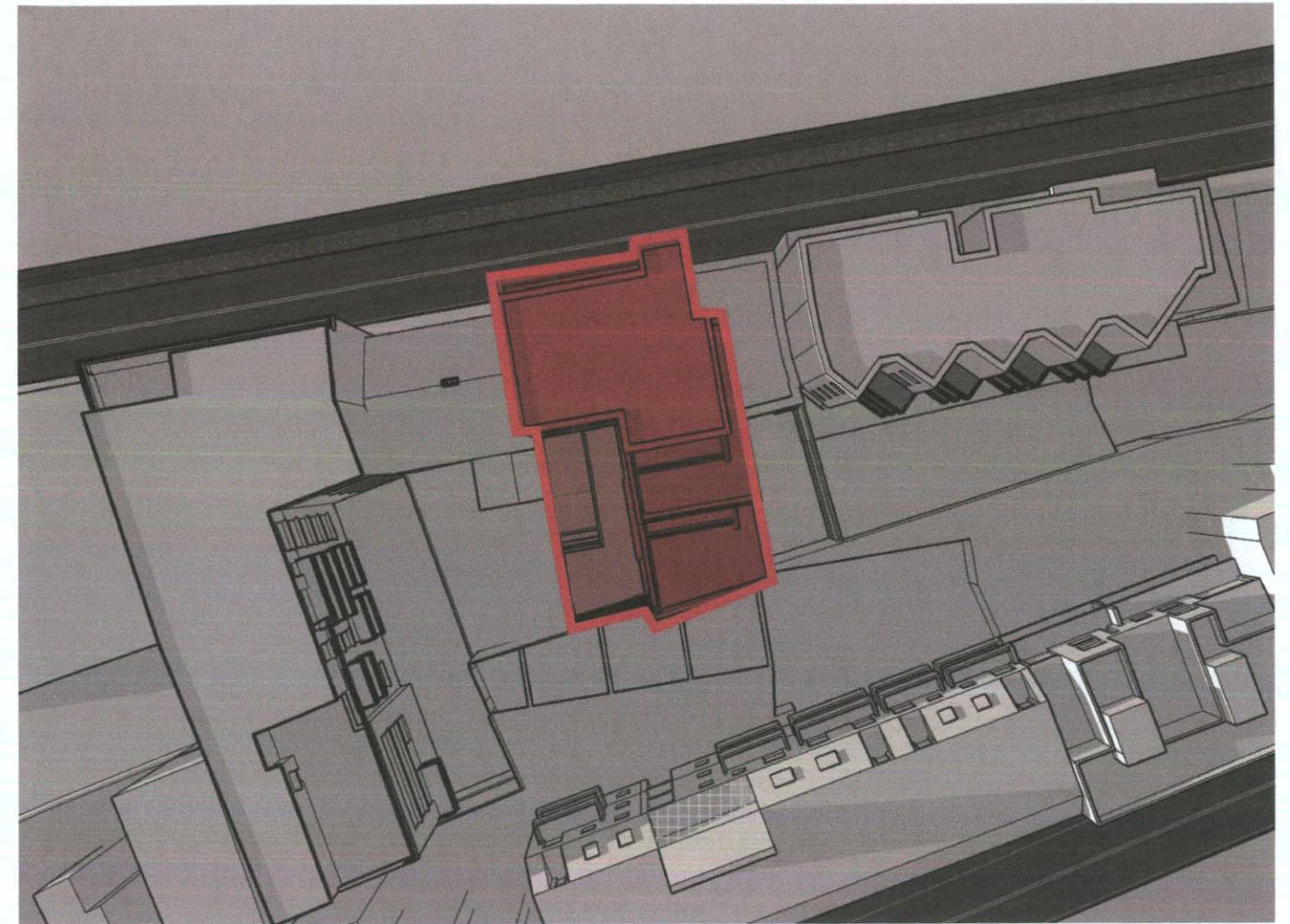
18:00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED

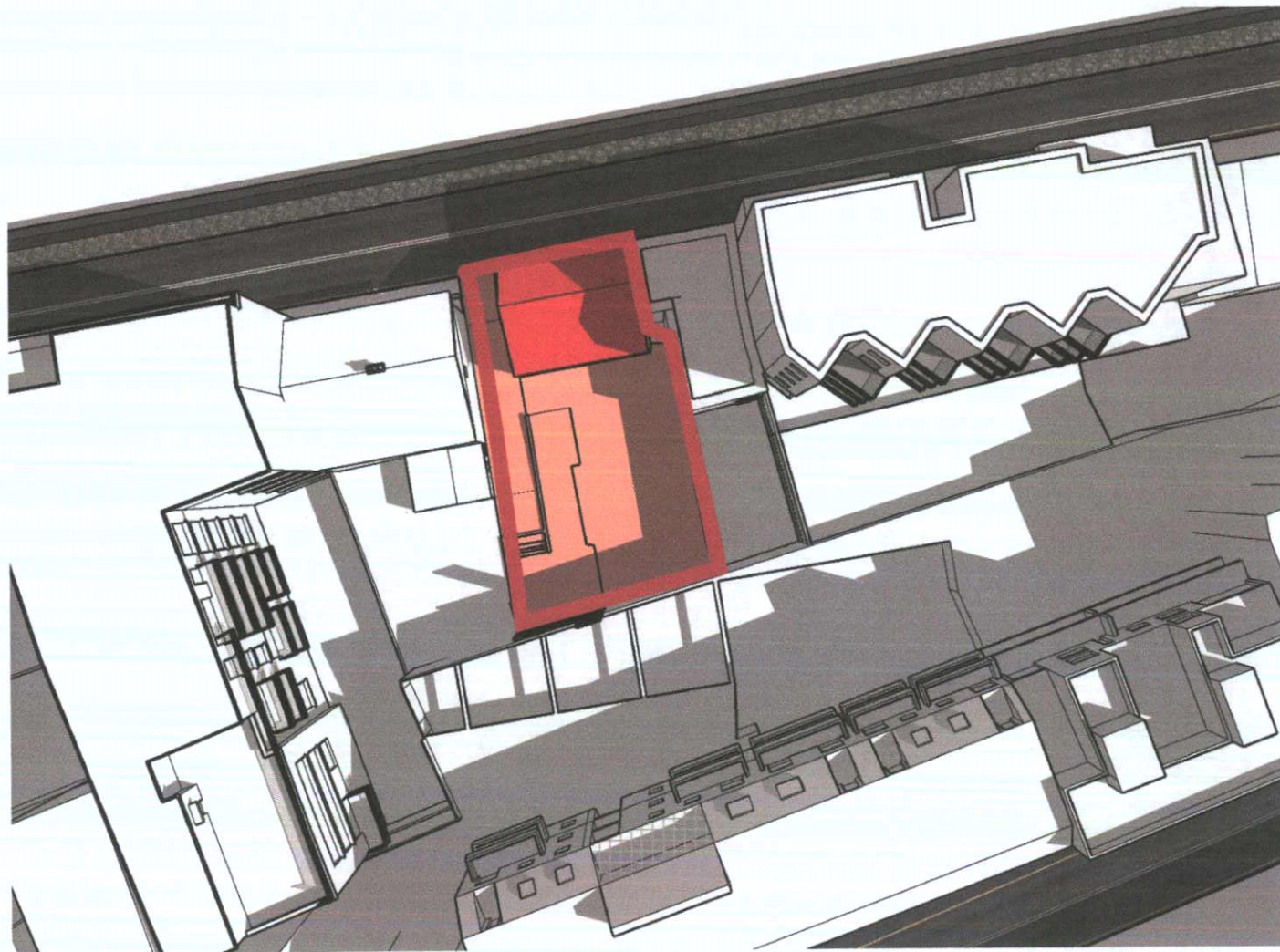


June /21

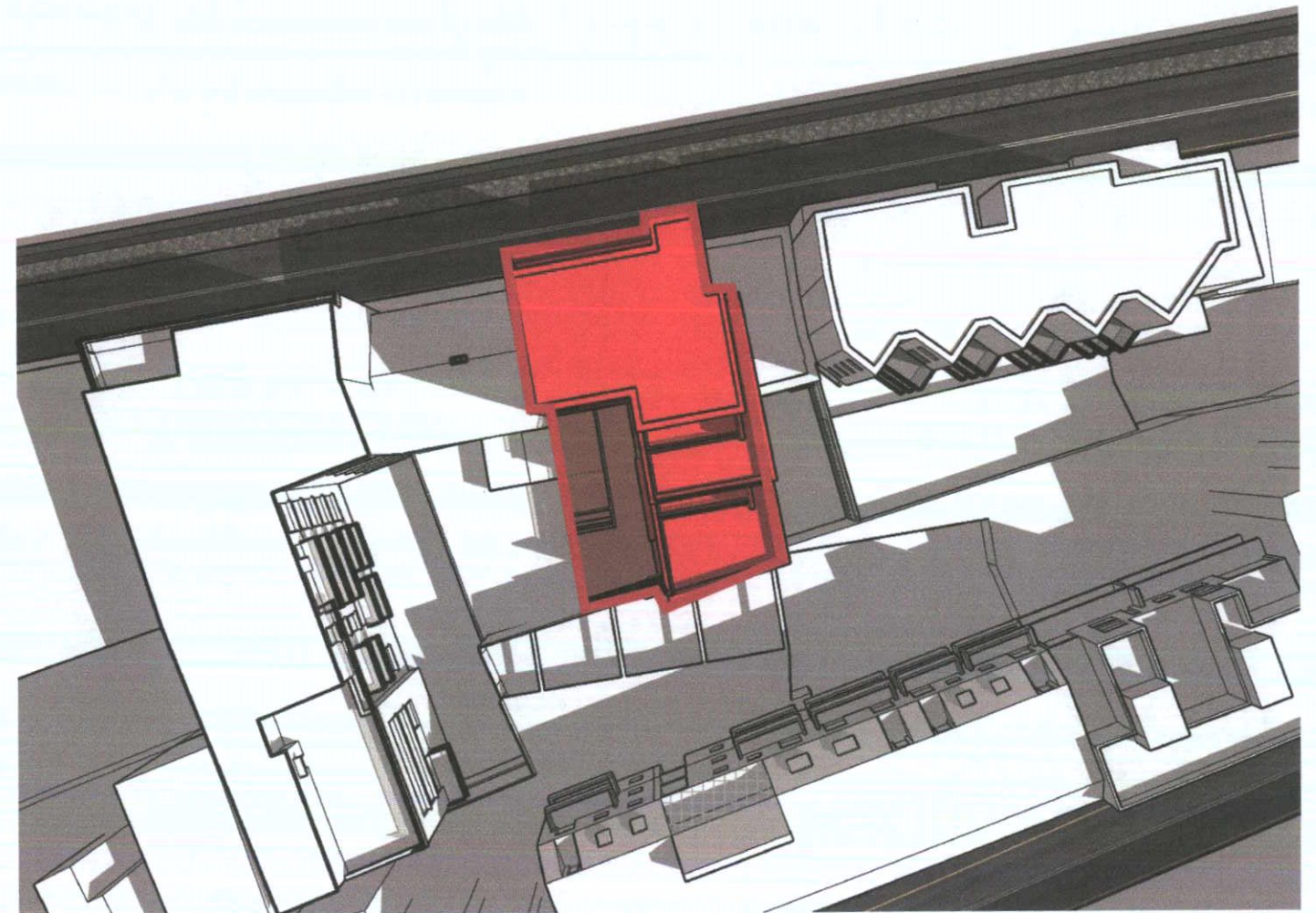
09:00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED

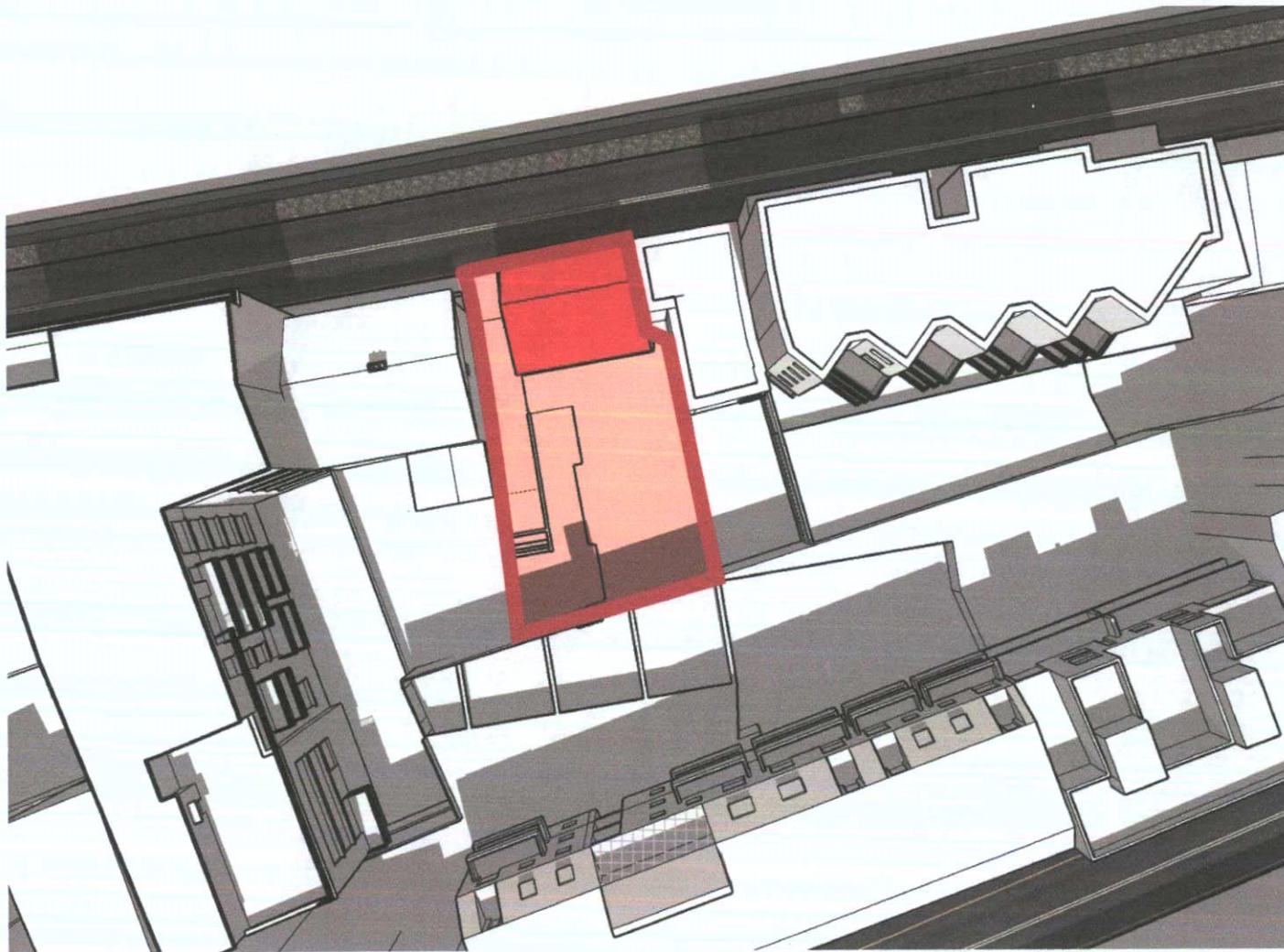


June /21

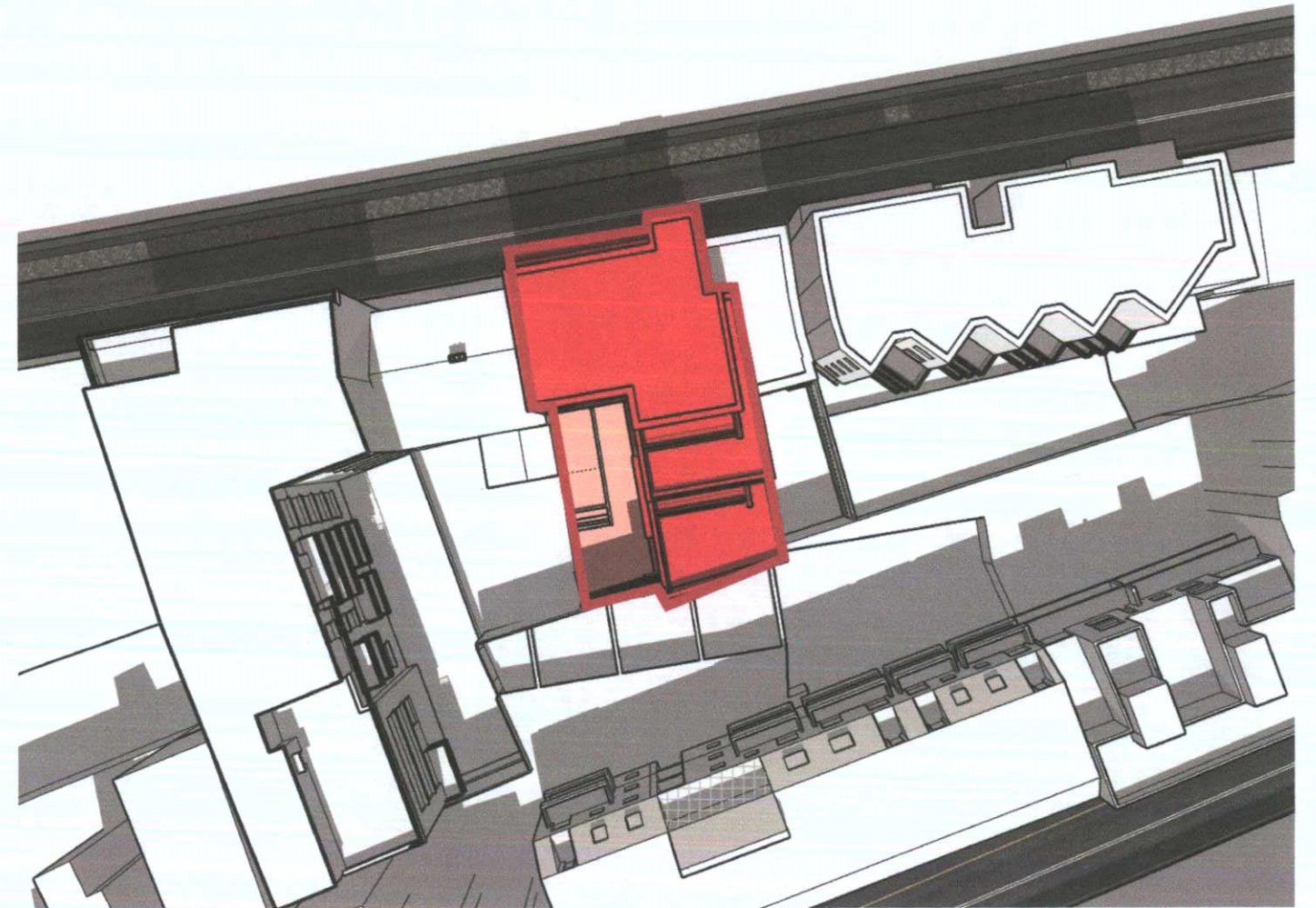
12:00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED

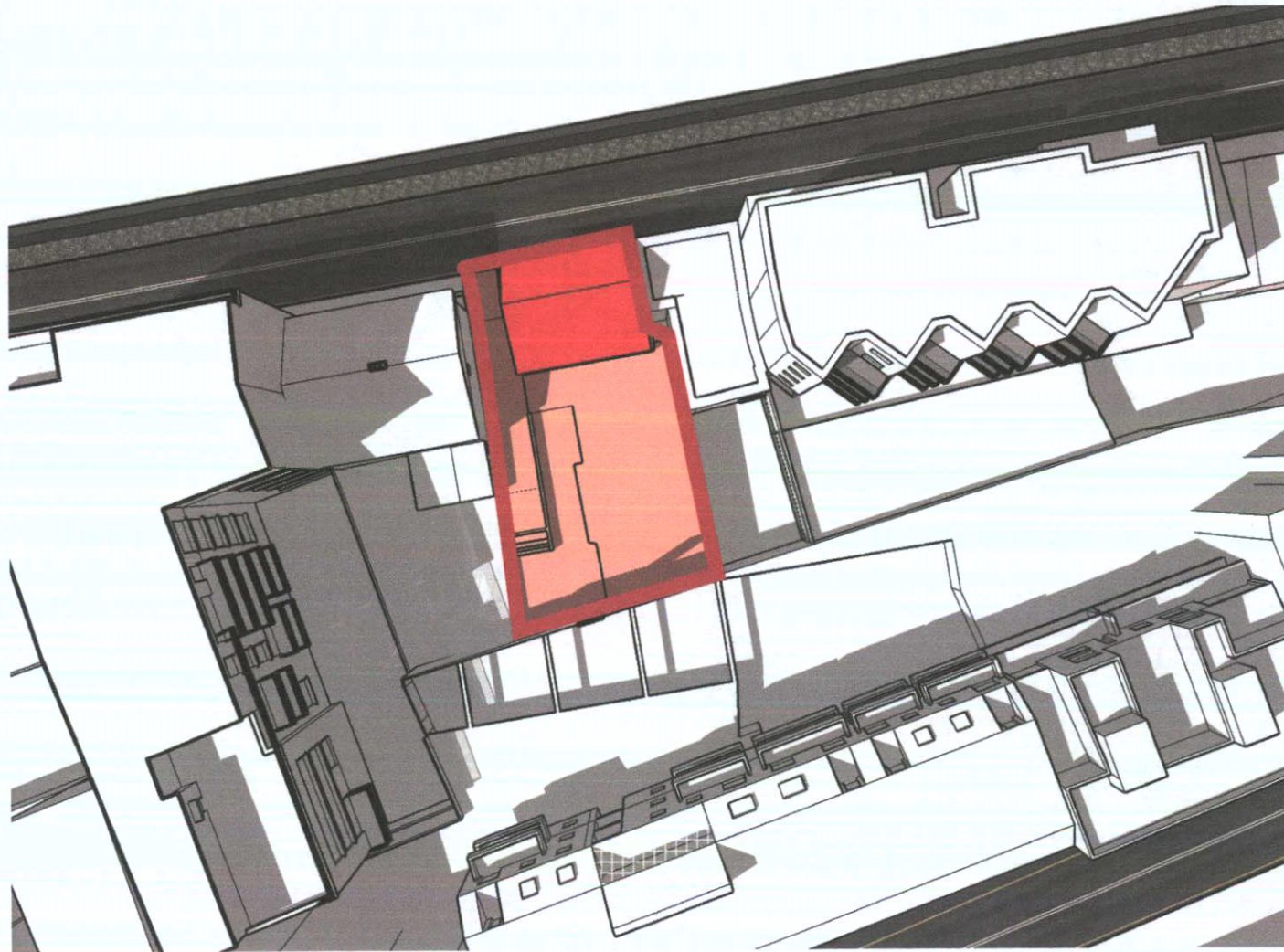


June /21

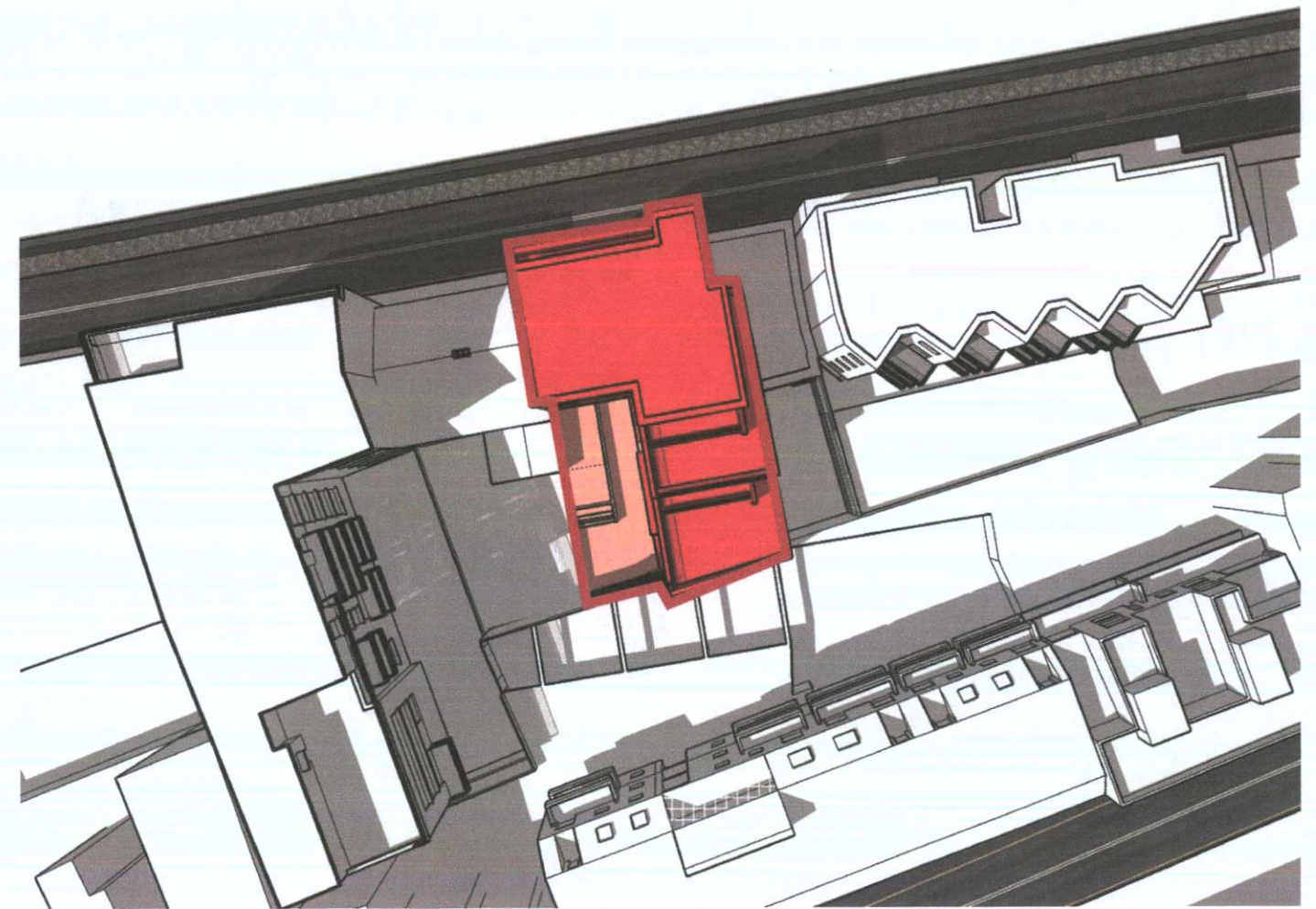
15:00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED

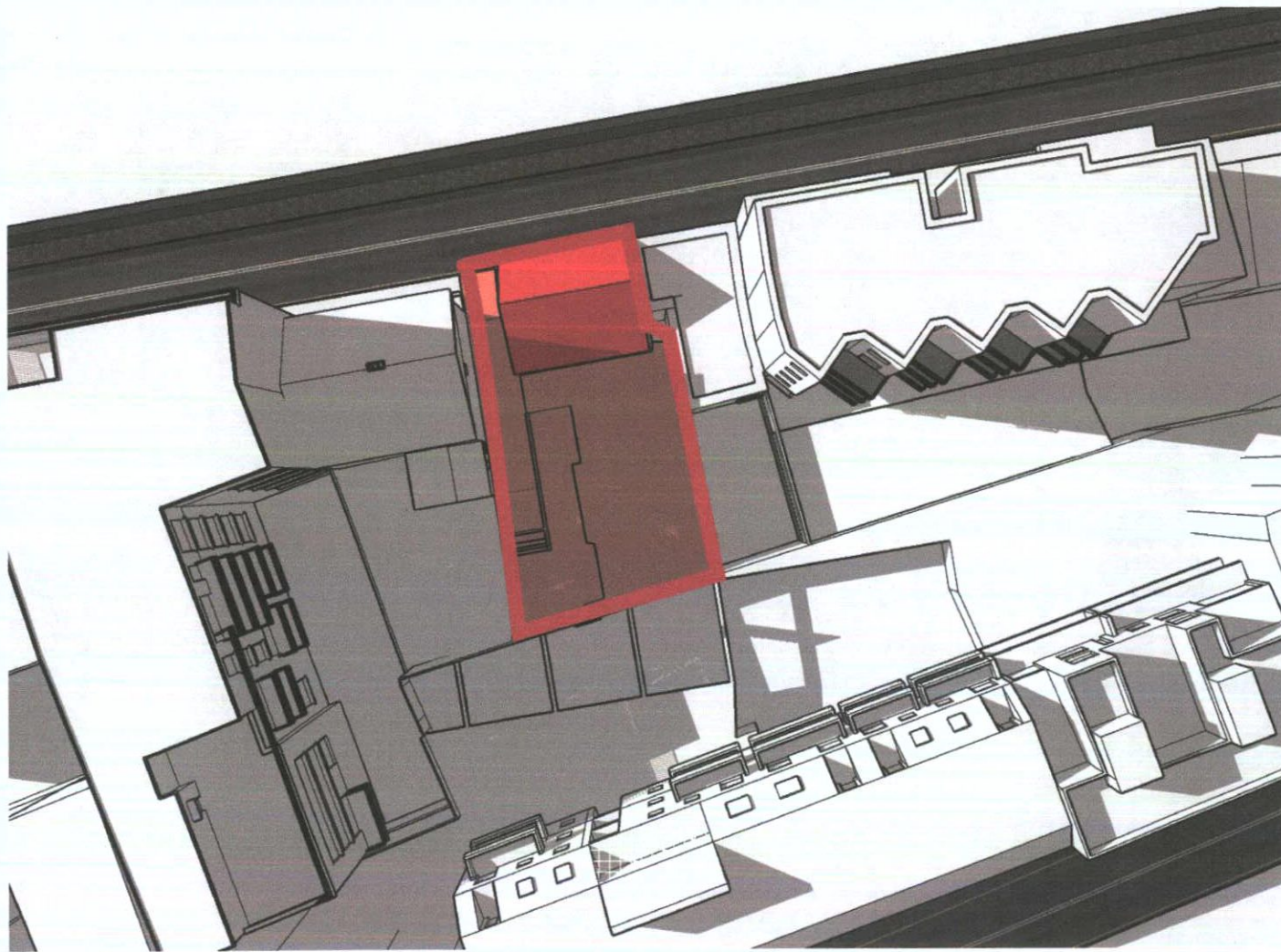


June /21

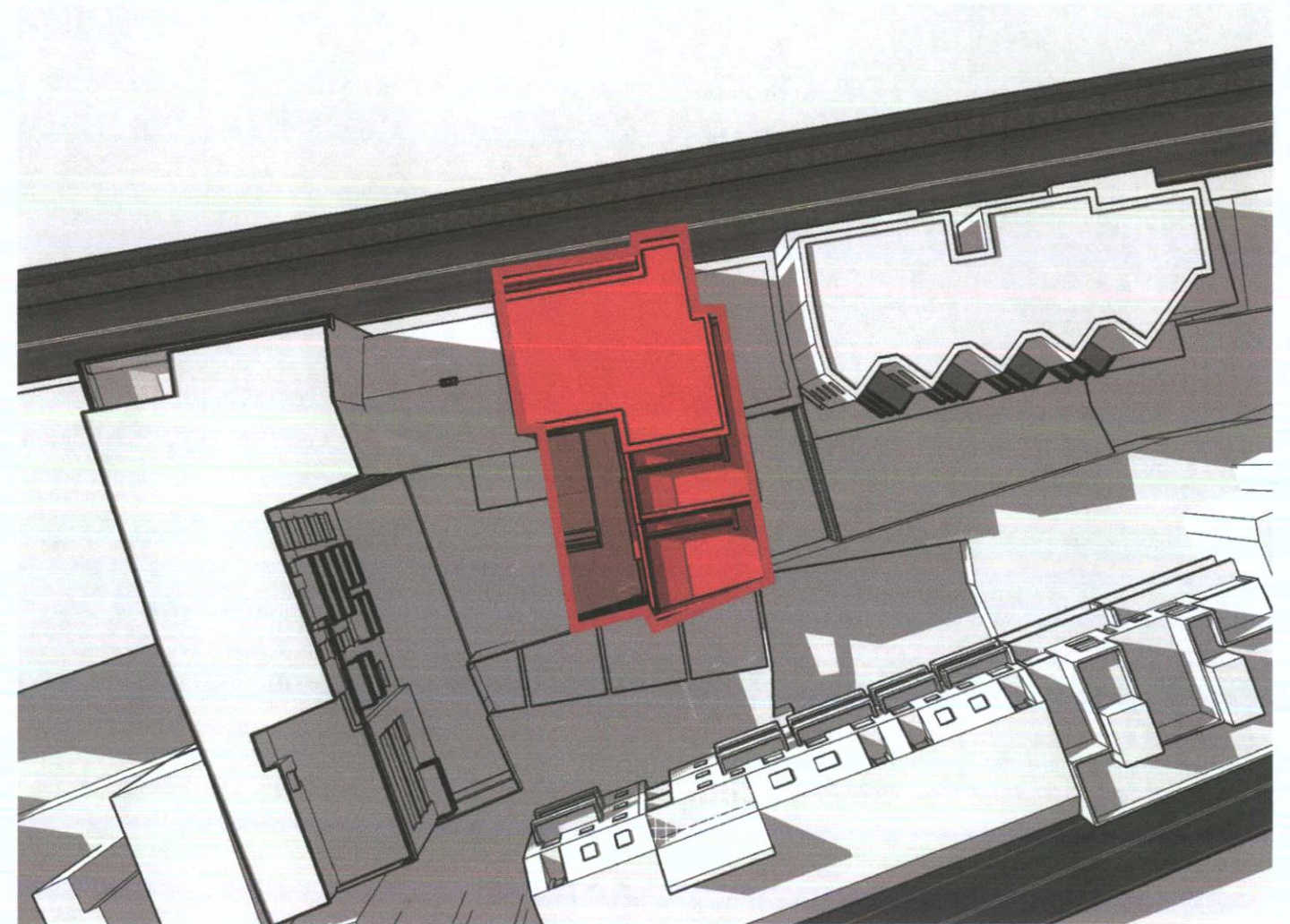
18:00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED

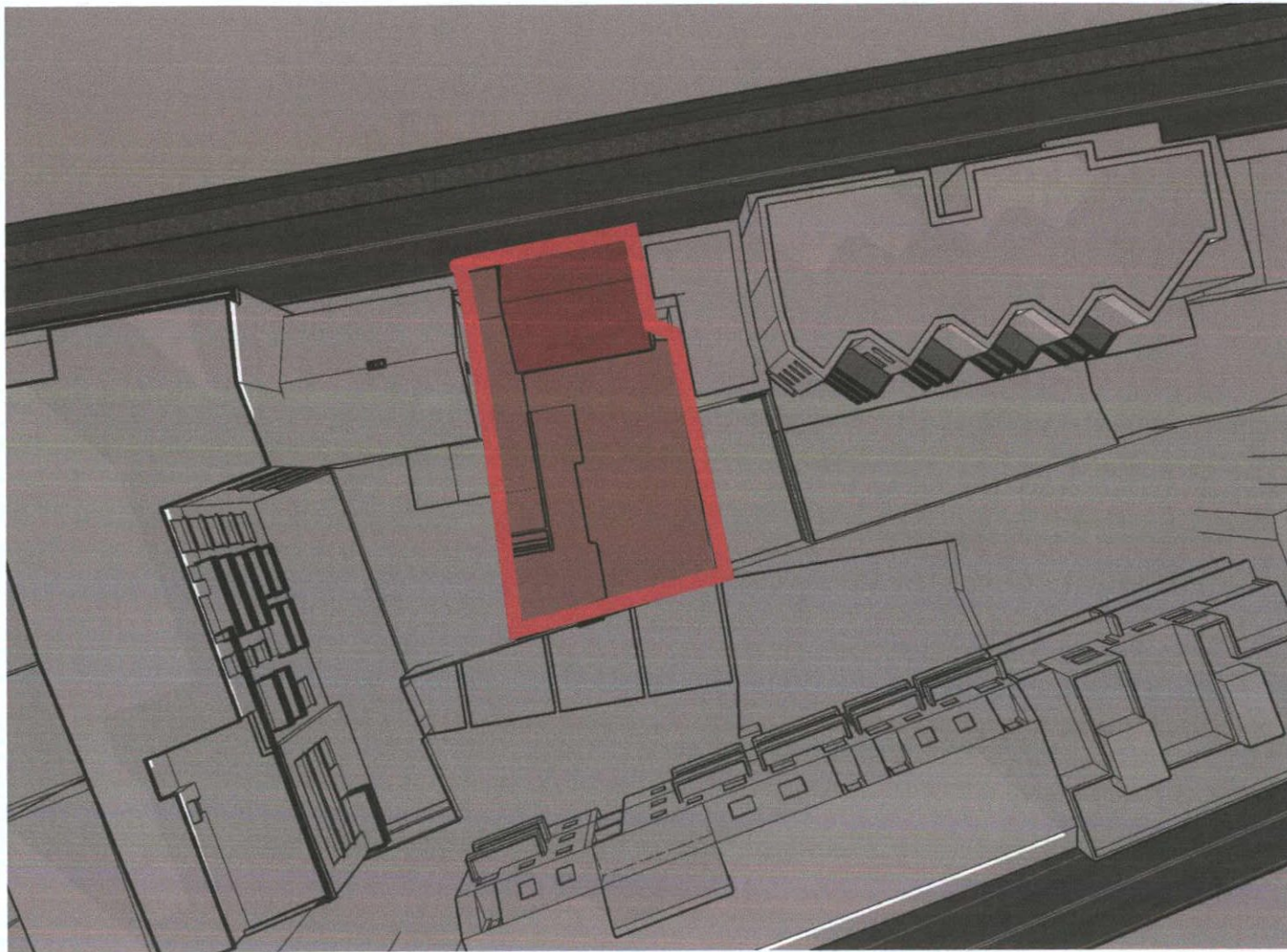


December /21

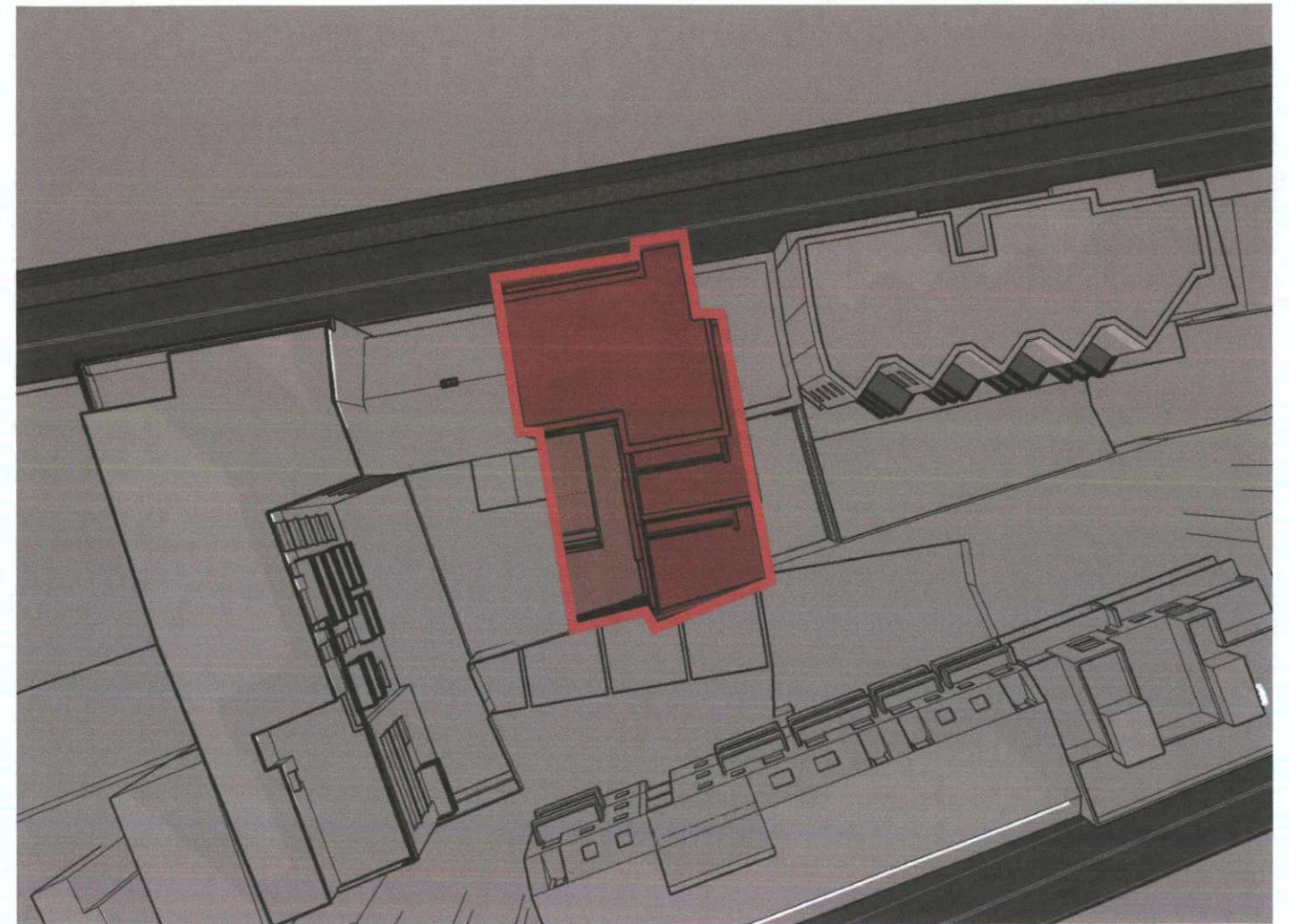
09:00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED

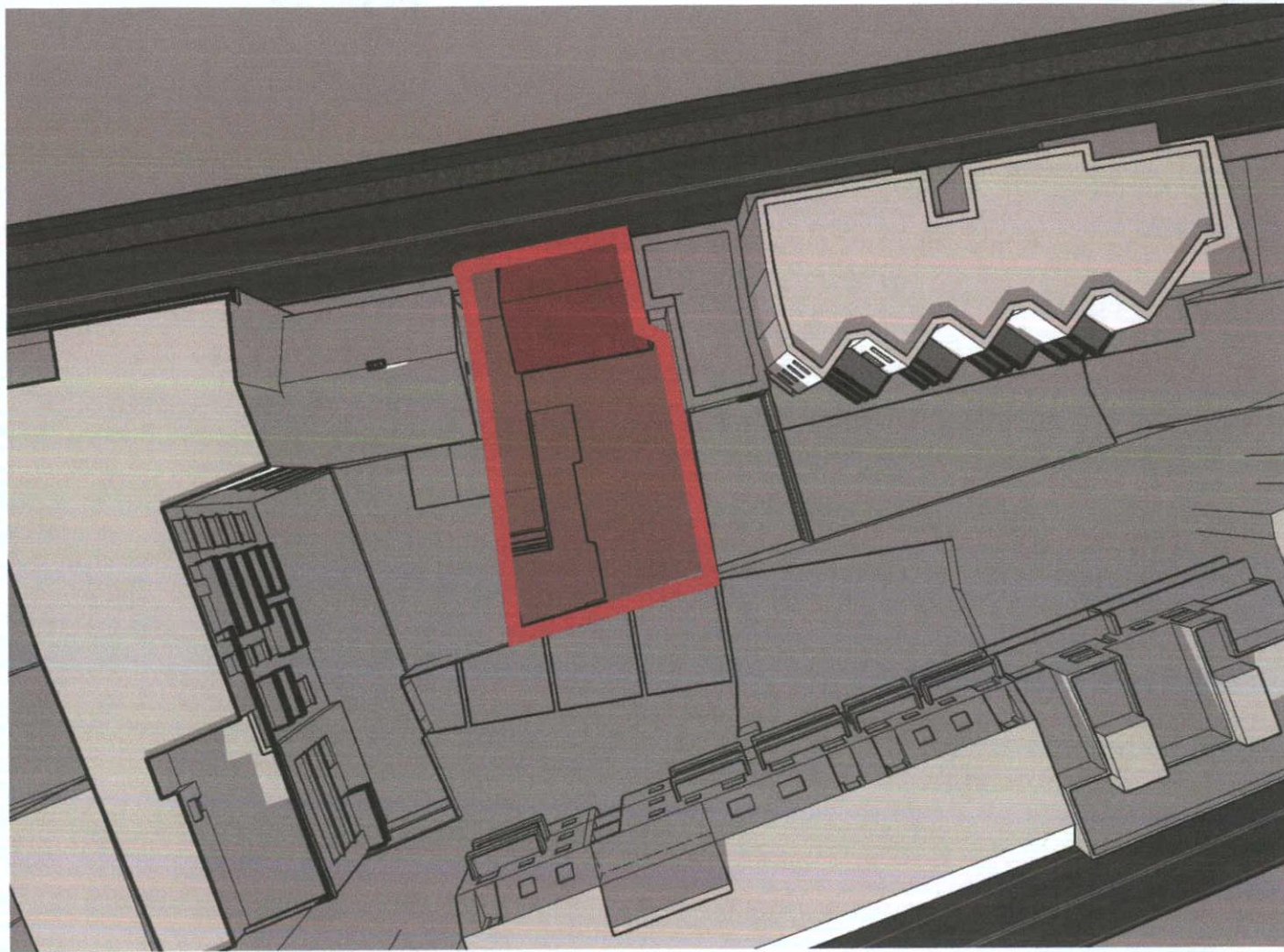


December /21

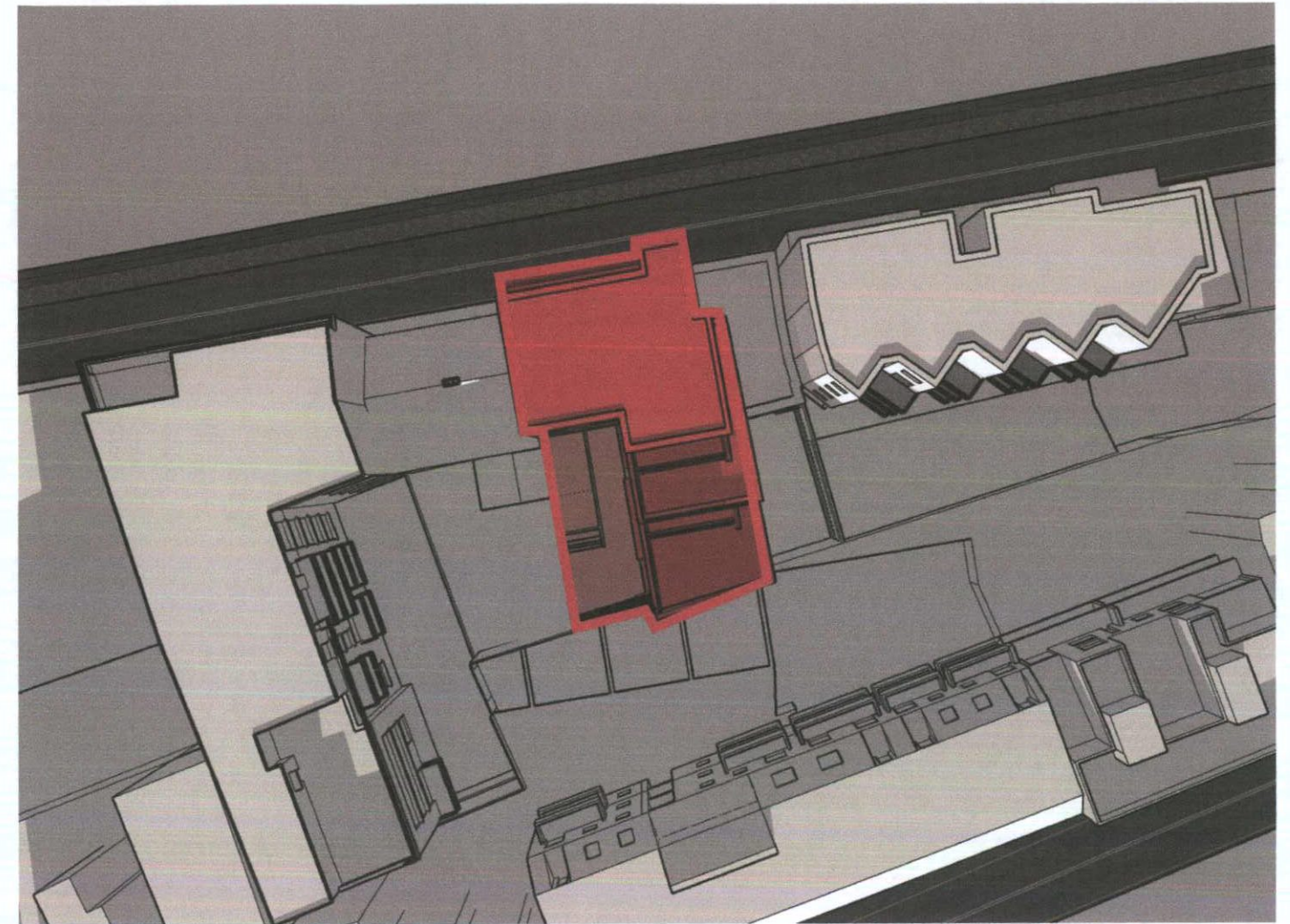
12 :00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED

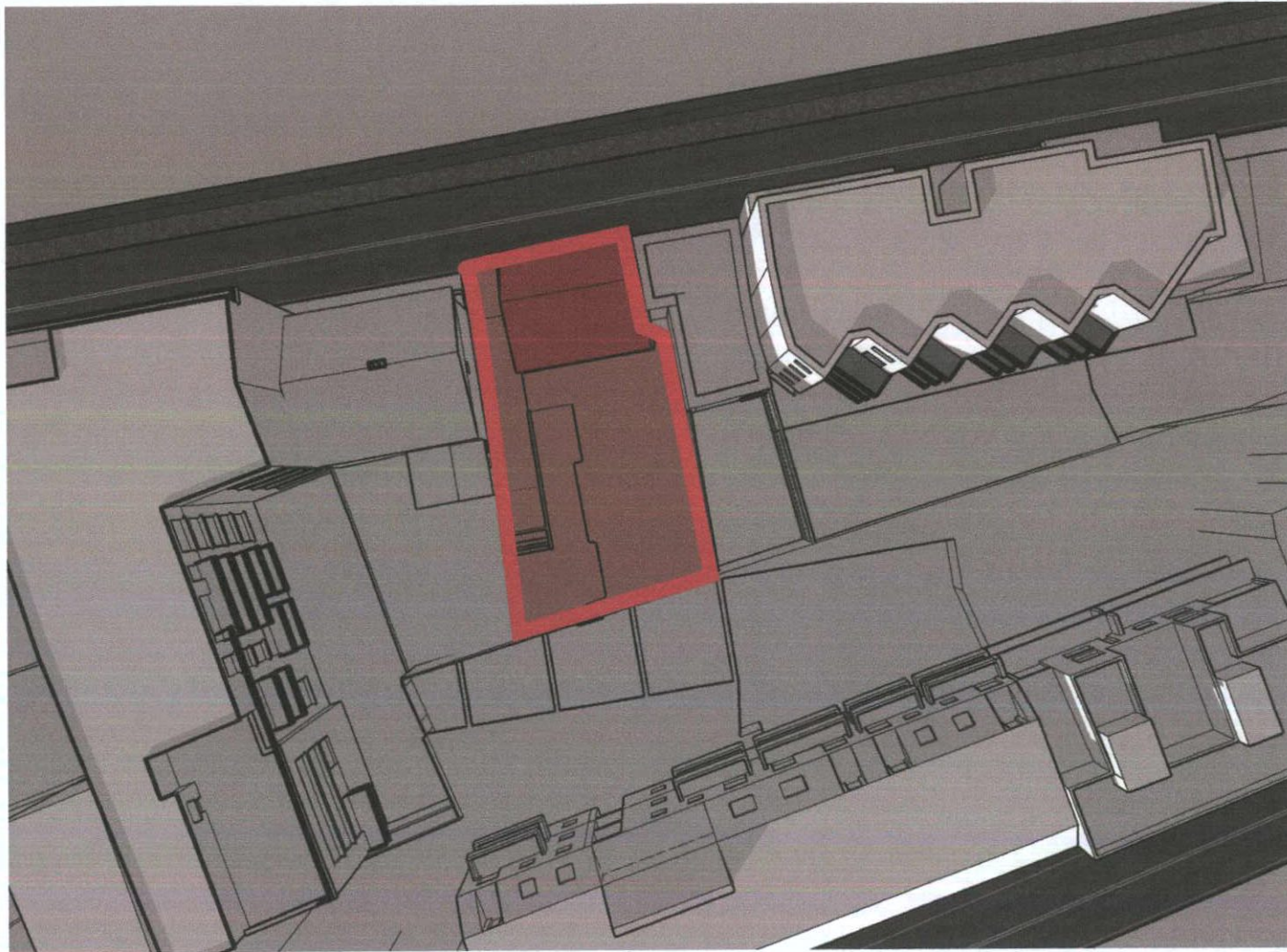


December /21

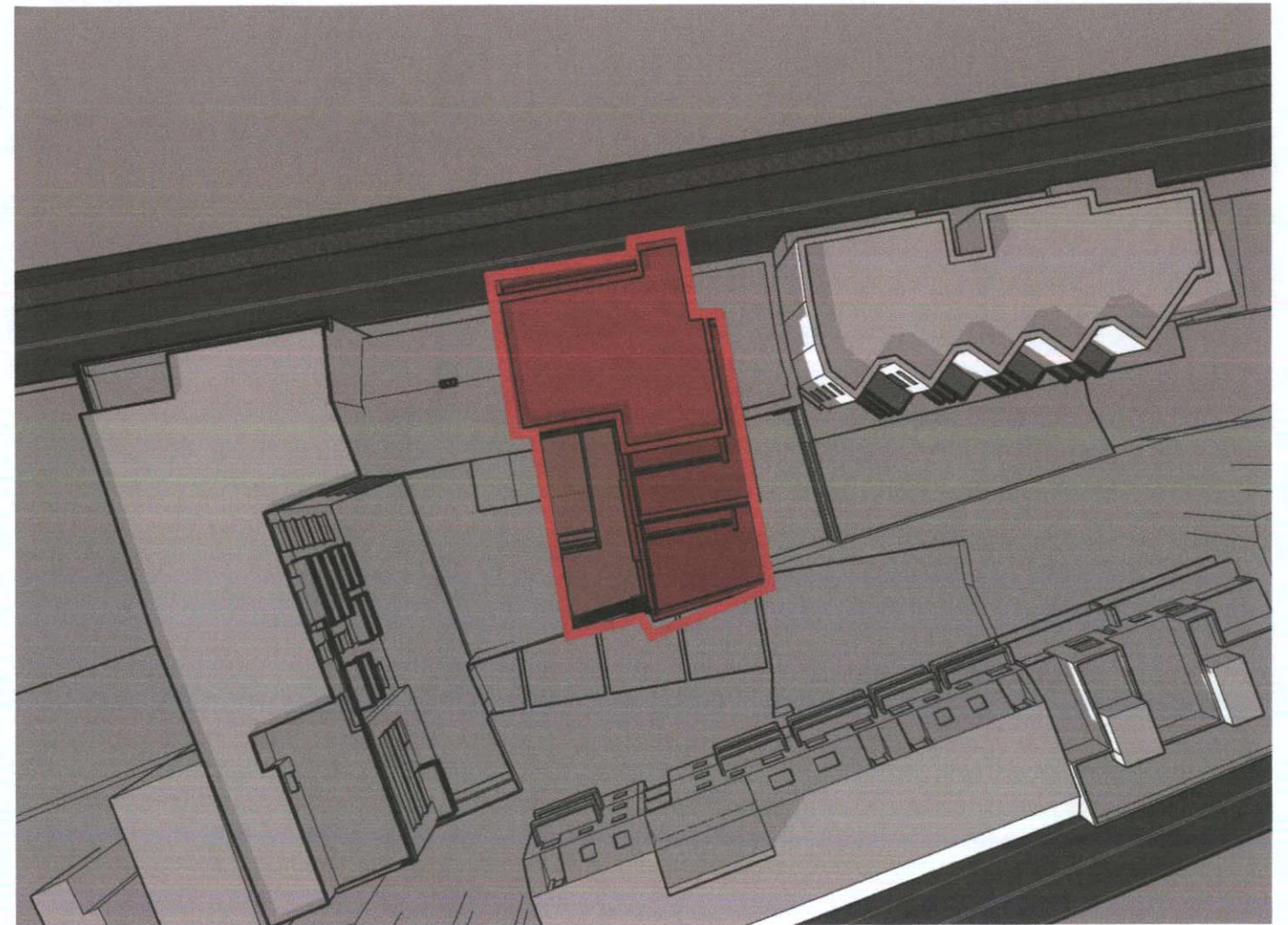
15:00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED



December /21

18:00

DDC PLAN NO 5400/22
RECEIVED: 08/12/2022

EXISTING



PROPOSED

