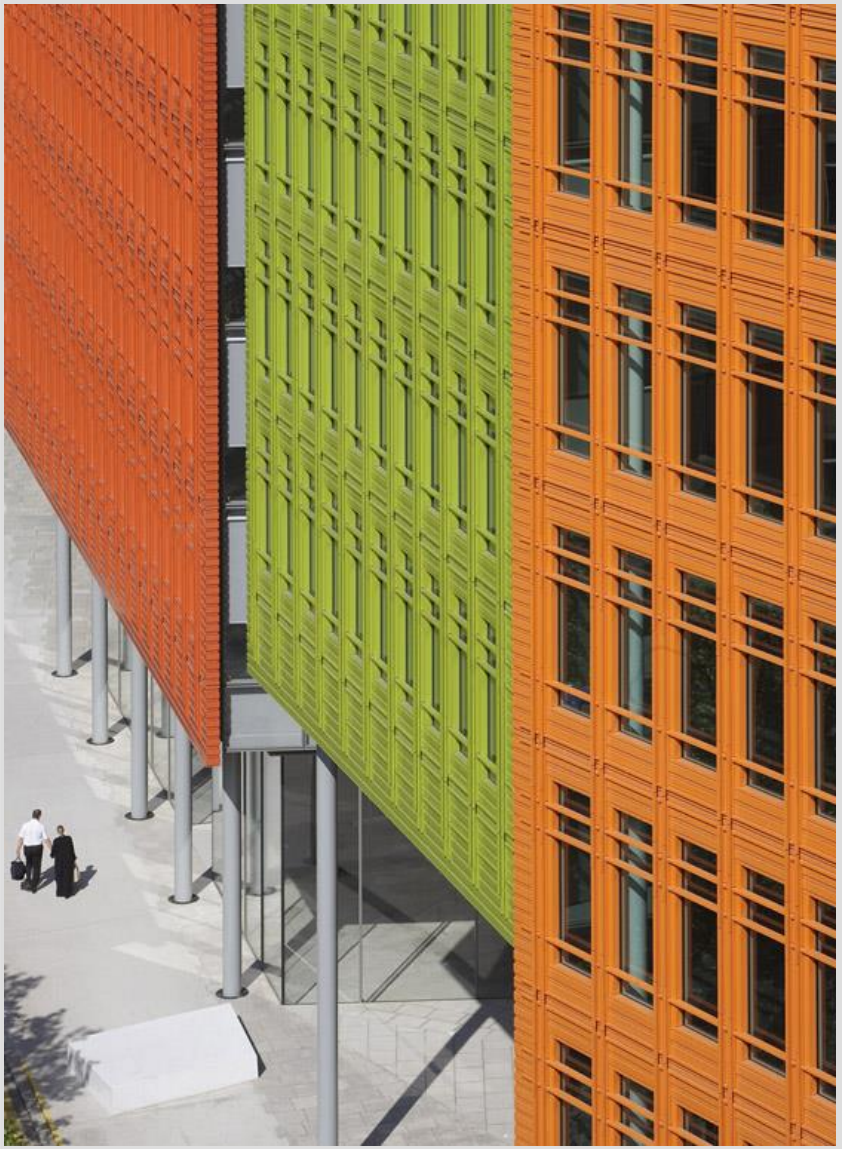
NEW OXFORD STREET

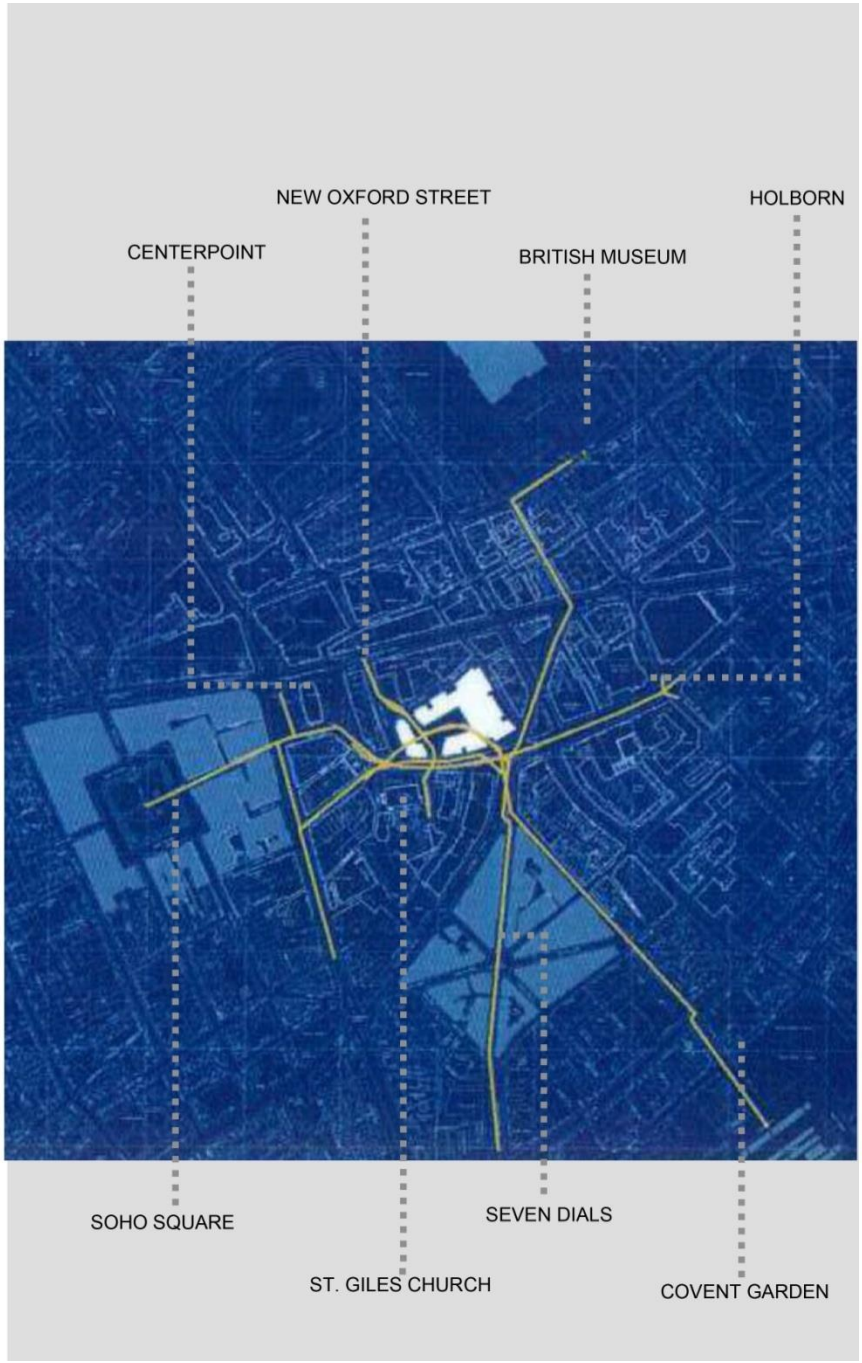
AA E+E Environment & Energy Studies Programme | Architectural Association Graduate School
MSc / March Sustainable Environmental Design | Term 2 2011-2012
Pedro Augspach | Meital Ben Dayan | João Cotta | Nikhil Deotarase

LESSONS LEARNT FROM ST. GILES



LESSONS LEARNT FROM ST. GILES

ALLOW FOR TRANSIENT ACTIVITY CONNECTING THE NEIGHBOURING DESTINATIONS



LESSONS LEARNT FROM ST. GILES

ALLOW FOR TRANSIENT ACTIVITY CONNECTING THE NEIGHBOURING DESTINATIONS

MAINTAIN PERMEABILITY AT THE GROUND LEVEL

LESSONS LEARNT FROM ST. GILES

ALLOW FOR TRANSIENT ACTIVITY CONNECTING THE NEIGHBOURING DESTINATIONS

MAINTAIN PERMEABILITY AT THE GROUND LEVEL

MAXIMISE SOLAR ACCESS IN THE COURTYARD

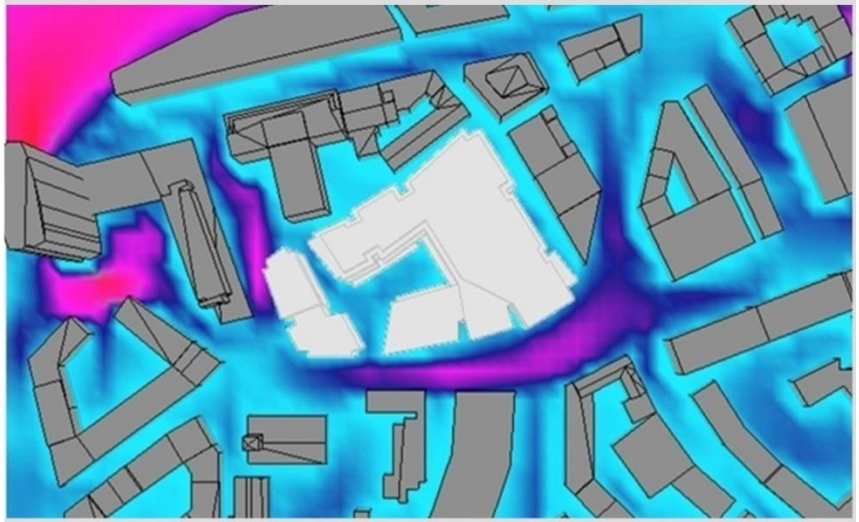
LESSONS LEARNT FROM ST. GILES

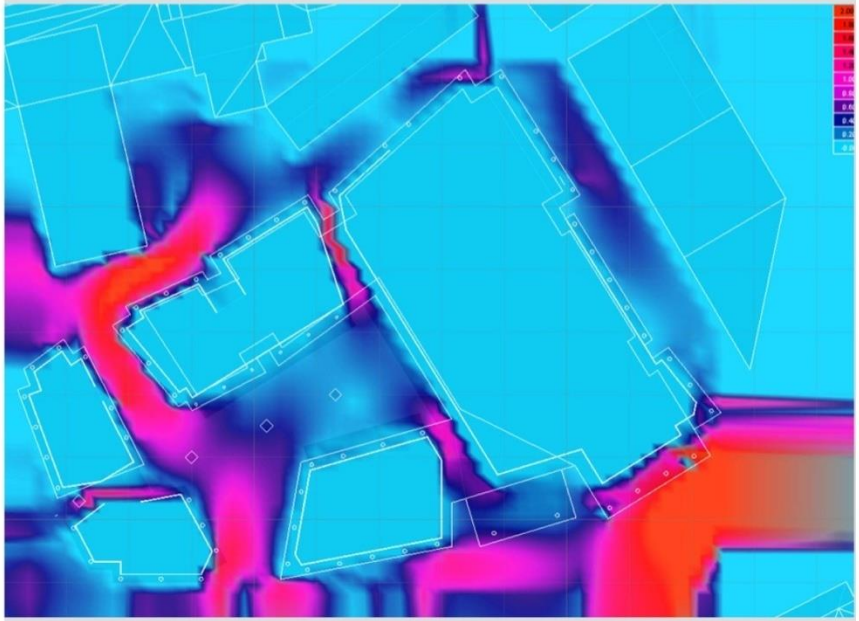
ALLOW FOR TRANSIENT ACTIVITY CONNECTING THE NEIGHBOURING DESTINATIONS

MAINTAIN PERMEABILITY AT THE GROUND LEVEL

MAXIMISE SOLAR ACCESS IN THE COURTYARD

PROTECT THE COURTYARD FROM HIGH WIND





LESSONS LEARNT FROM ST. GILES

ALLOW FOR TRANSIENT ACTIVITY CONNECTING THE NEIGHBOURING DESTINATIONS

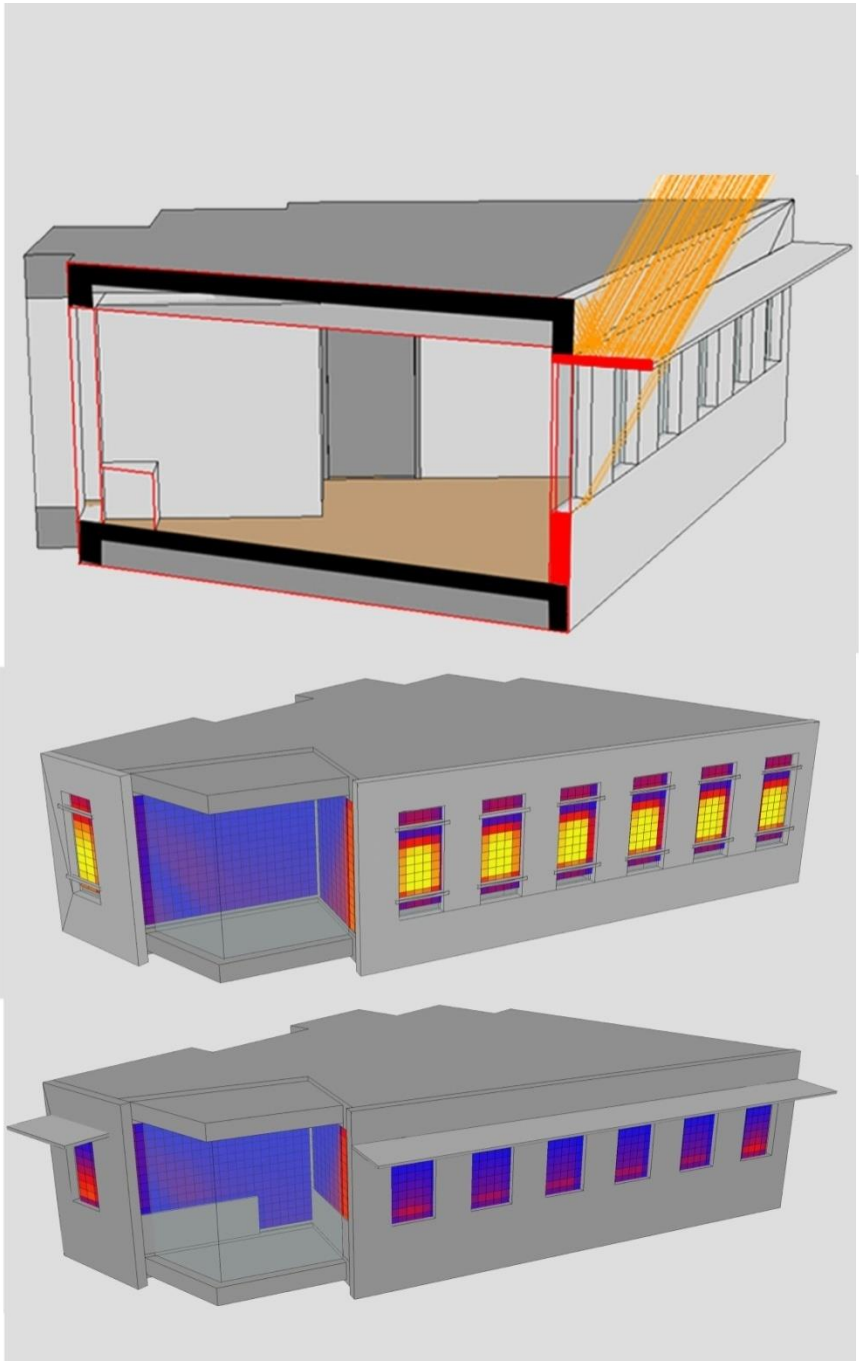
MAINTAIN PERMEABILITY AT THE GROUND LEVEL

MAXIMISE SOLAR ACCESS IN THE COURTYARD

PROTECT THE COURTYARD FROM HIGH WIND

MAXIMISE LIGHT WITH HIGHER REFLECTANCE WITHIN THE COURTYARD

ACHIEVE GOOD SOLAR CONTROL ON THE SOUTH



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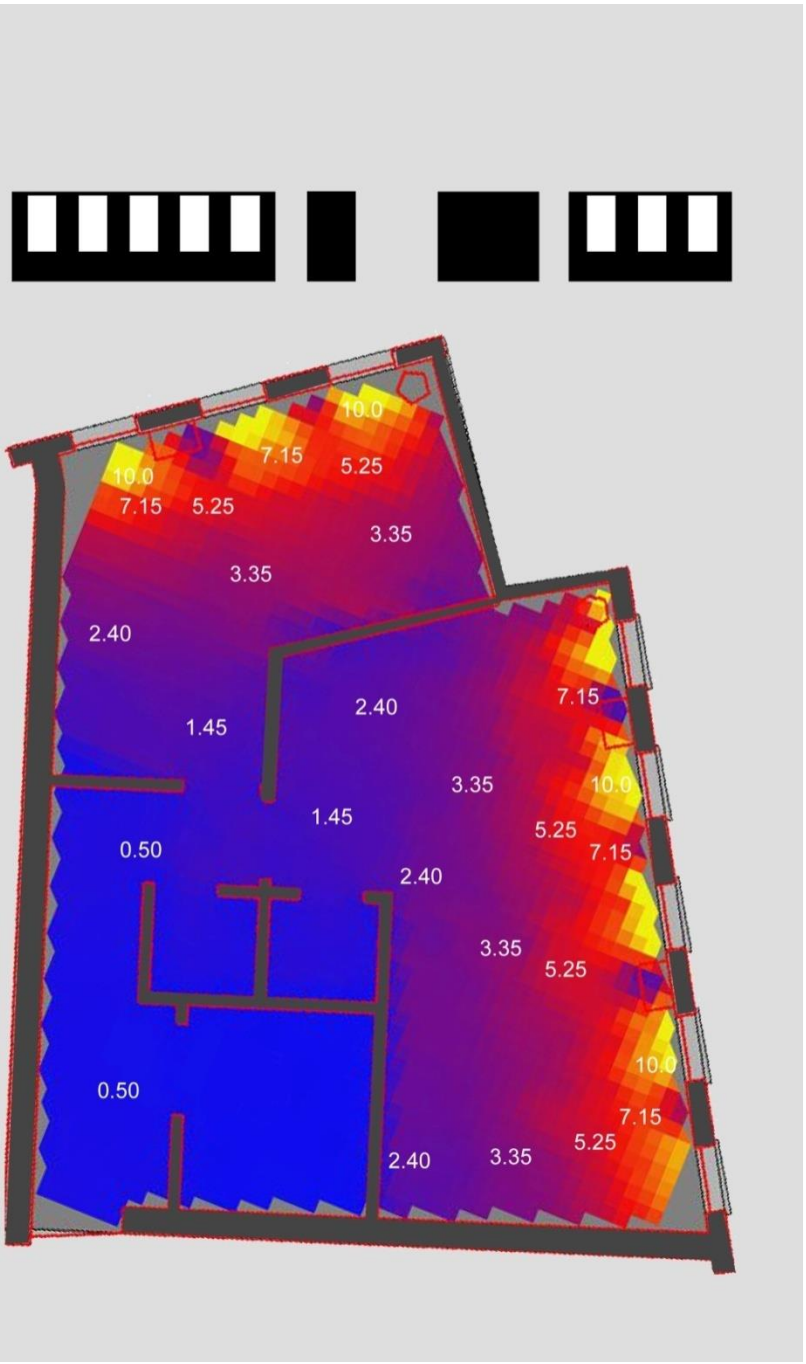
ATTAIN AN ADEQUATE WINDOW TO FLOOR RATIO



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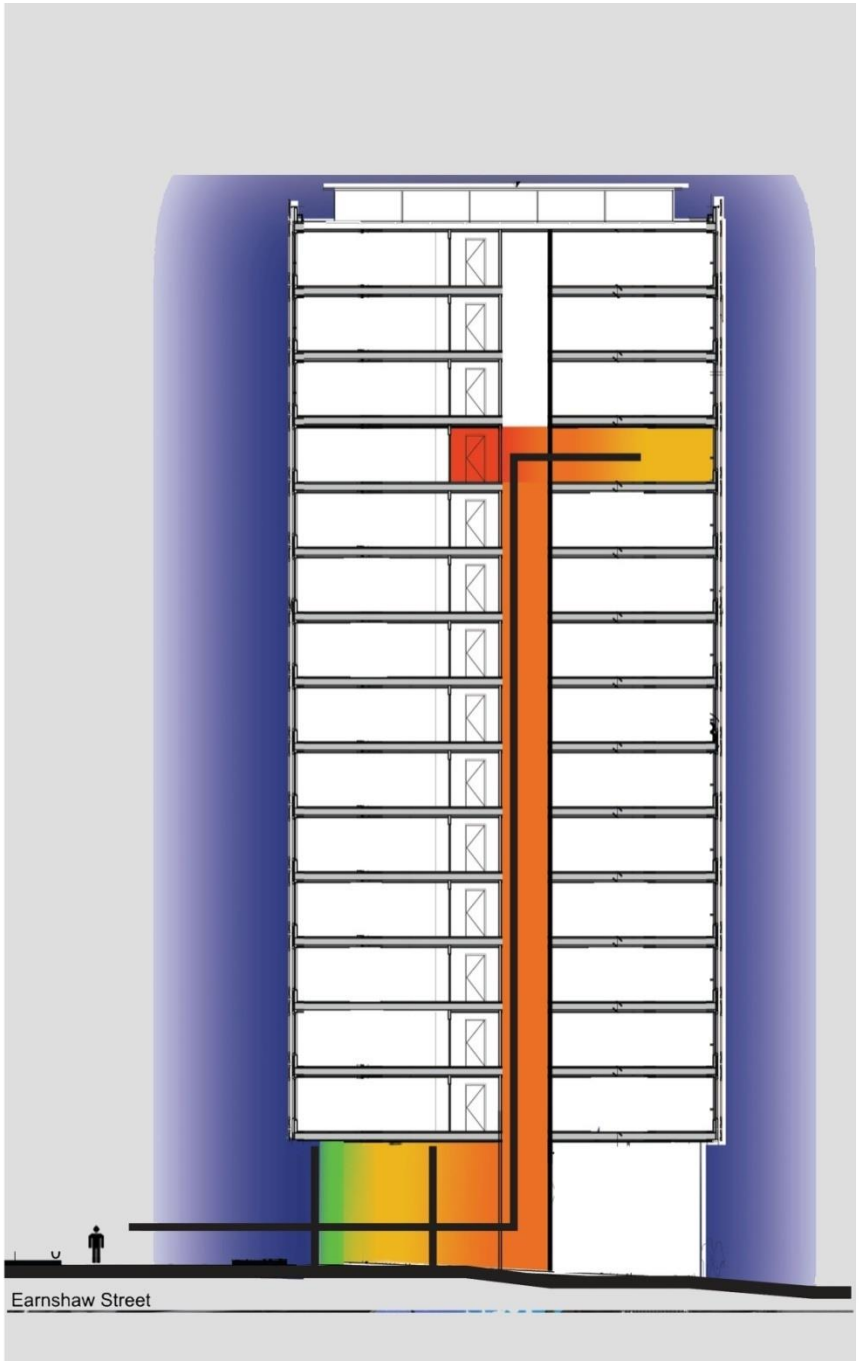
ALLOW FOR VENTILATION IN THE CORRIDORS



LESSONS LEARNT FROM ST. GILES

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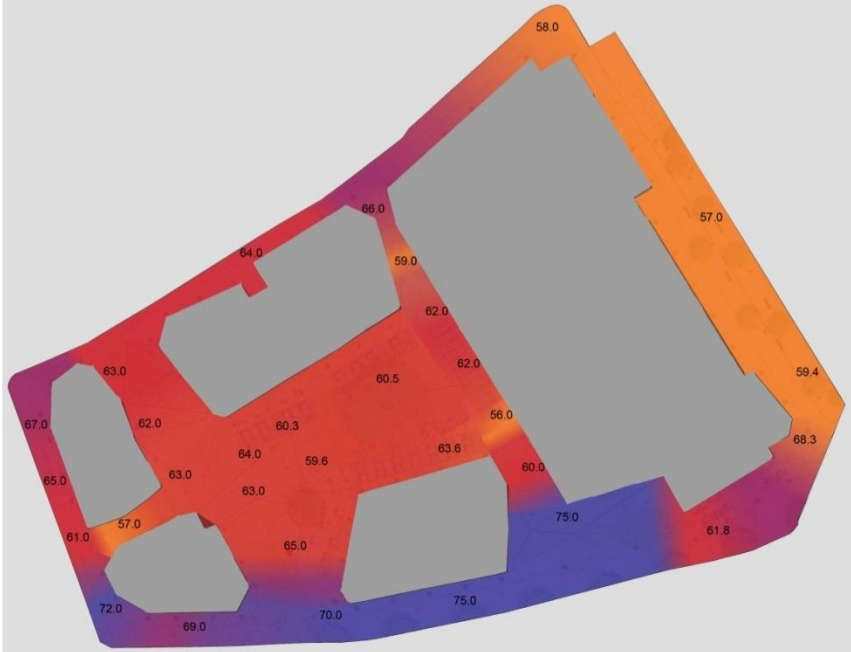
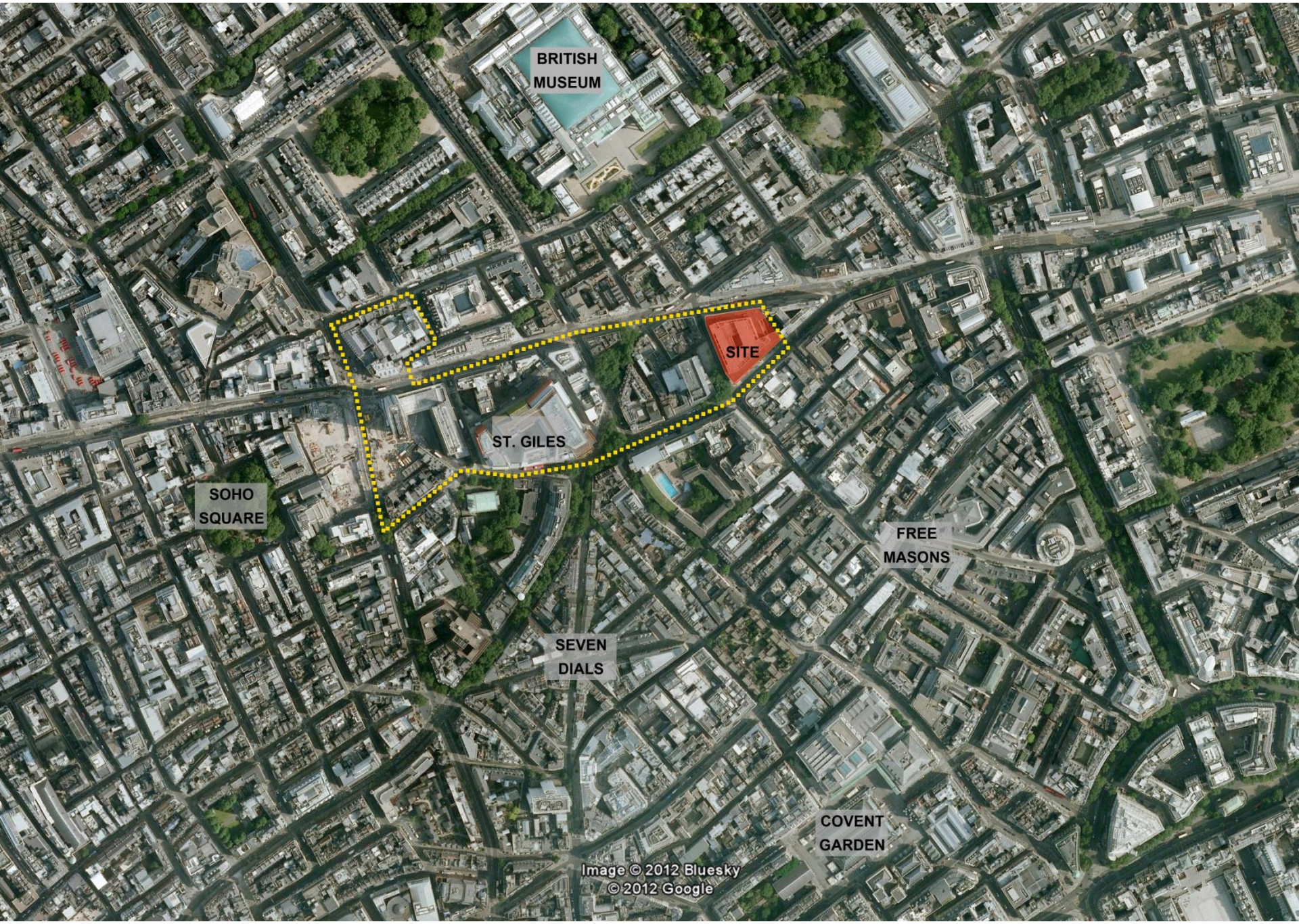
ALLOW FOR VENTILATION IN THE CORRIDORS

VENTILATION STRATEGIES SHOULD TAKE INTO CONSIDERATION THE DISTURBING NOISE LEVELS




BRITISH
MUSEUM
SITE
ST. GILES
SOHO
SQUARE
FREE
MASONS
SEVEN
DIALS
COVENT
GARDEN
Image © 2012 Bluesky
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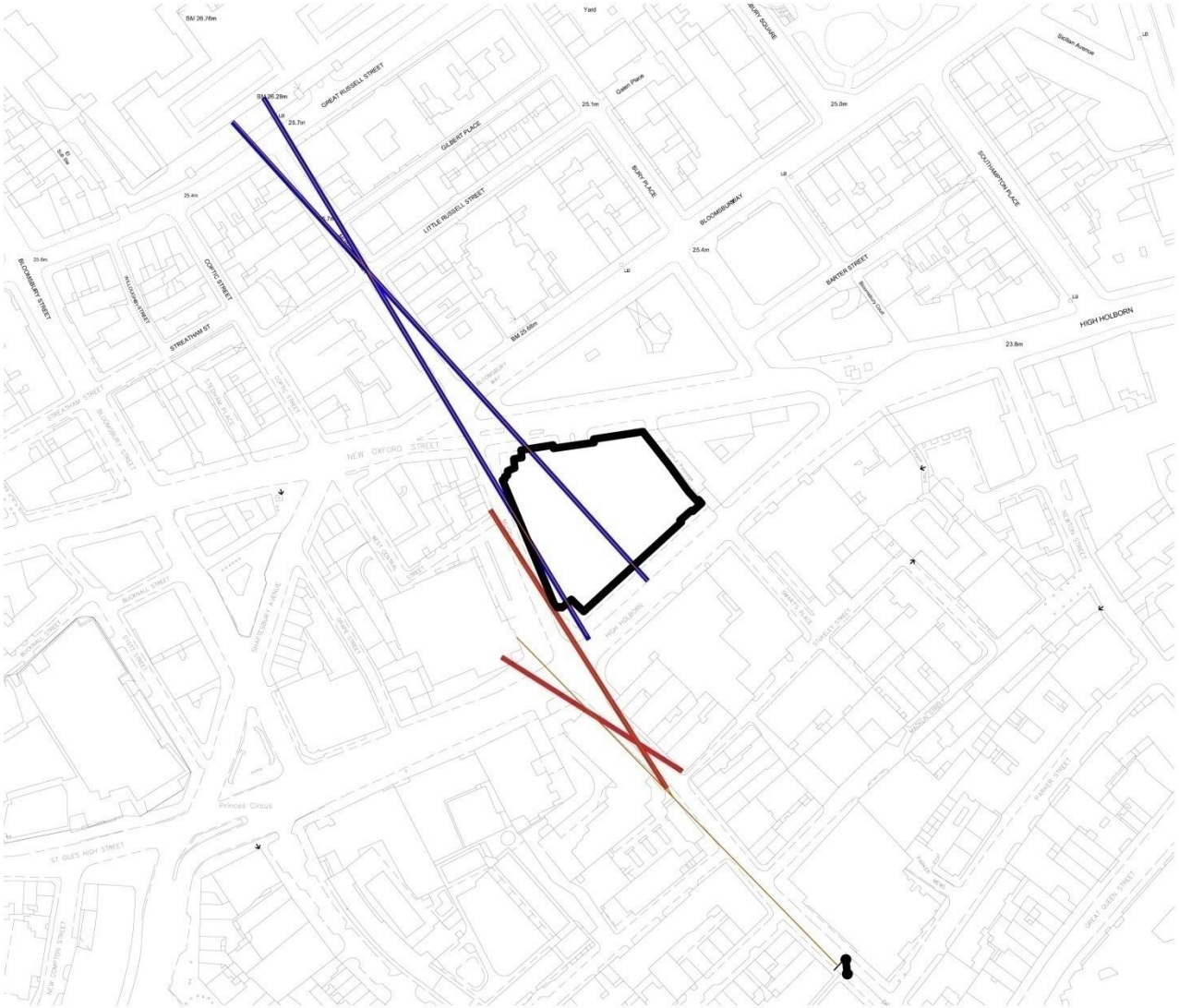
YOU+ME

Intervention Site

Current Building

Intervention Site

Current Building



BM 26.76m
Yard
BURY SQUARE
Sicilian Avenue
GREAT RUSSELL STREET
BM 26.29m
25.7m
25.1m
Galen Place
25.0m
GILBERT PLACE
BURY PLACE
SOUTHAMPTON PLACE
LITTLE RUSSELL STREET
BLOOMSBURY WAY
25.4m
25.4m
BARTER STREET
Bloomsbury Court
HIGH HOLBORN
23.8m
BM 25.66m
BLOOMSBURY STREET
COPTIC STREET
STREATHAM ST
STREATHAM STREET
STEDHAM PLACE
NEW OXFORD STREET
WEST CENTRAL STREET
BUCKNALL STREET
SHAFTESBURY AVENUE
GRAPE STREET
HIGH HOLBORN
NEWTON STREET
STOKELEY STREET
MASSON STREET
PARKER STREET
GREAT QUEEN STREET
Princes Circus
ST GILES HIGH STREET
NEW COMPTON STREET

West & Skye
SATCHELS & CO.

GREAT RUSSELL STREET
GILBERT PLACE
LITTLE RUSSELL STREET
BURY PLACE
BLOOMSBURY WAY
BARTER STREET
SOUTHAMPTON PLACE
HIGH HOLBORN
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STREATHAM ST
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Princes Circus
ST GILES HIGH STREET
NEW COMPTON STREET
Yard
Sicilian Avenue
25.7m
25.1m
25.0m
25.4m
23.8m
BM 26.76m
BM 26.29m
BM 25.68m

West & Skye
SATCHELS & CO.

GREAT RUSSELL STREET
GILBERT PLACE
LITTLE RUSSELL STREET
BURY PLACE
BLOOMSBURY WAY
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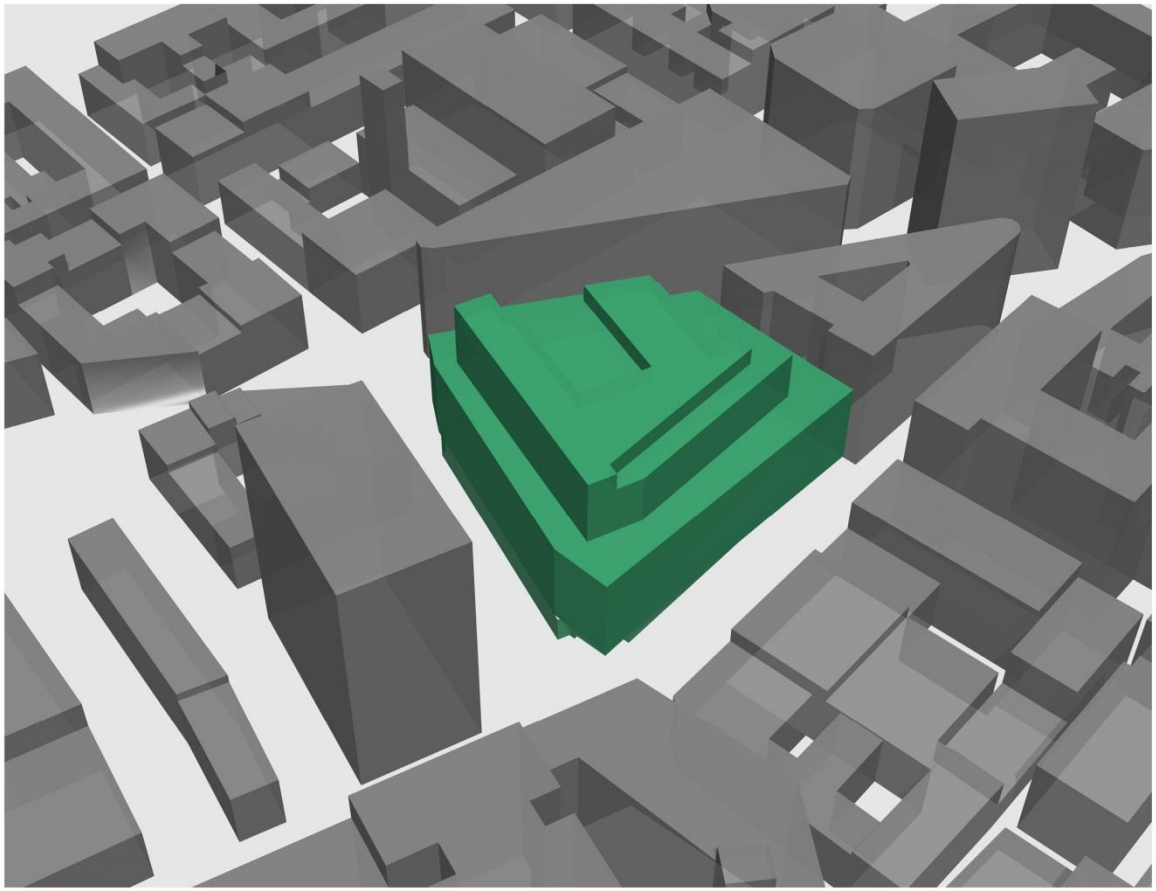
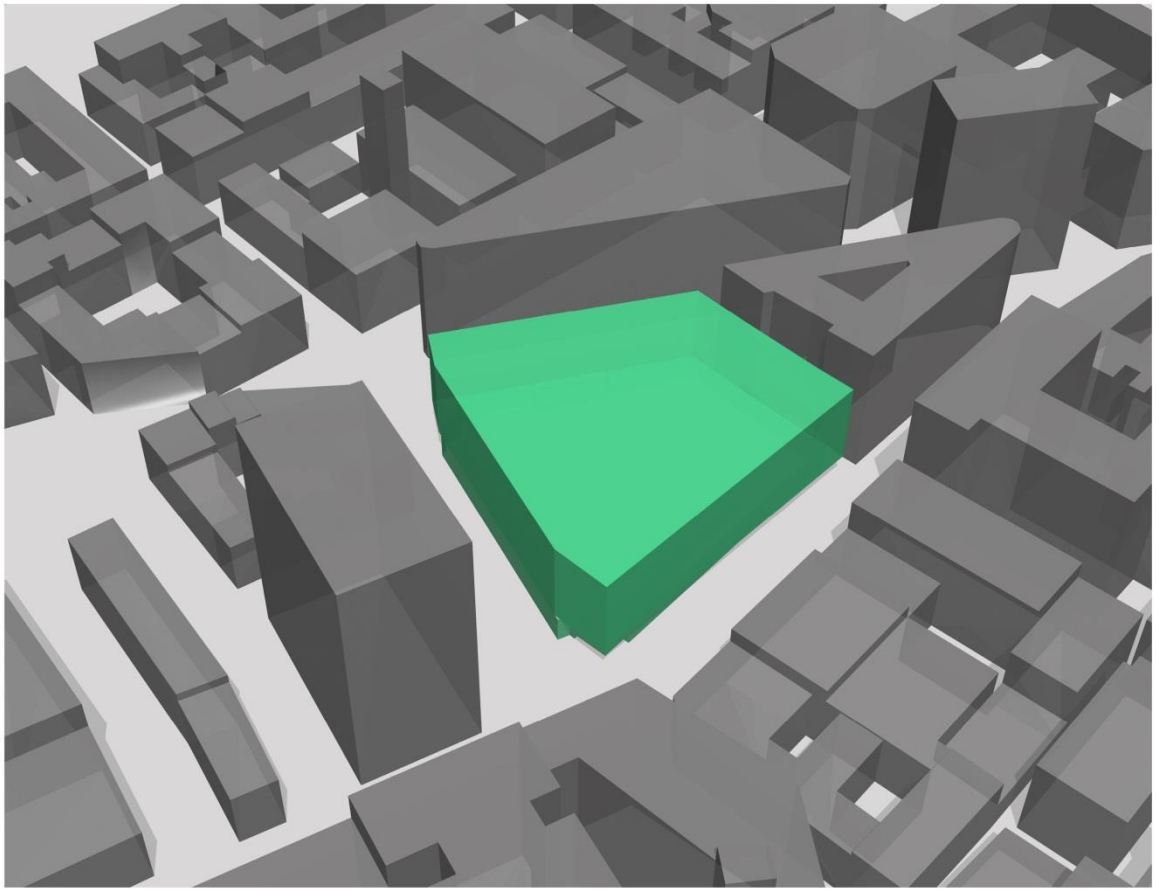
Yard
BM 26.76m
BM 26.29m
BM 25.66m
25.7m
25.1m
25.0m
25.4m
23.8m
23.6m



Existing building

29000 sq m



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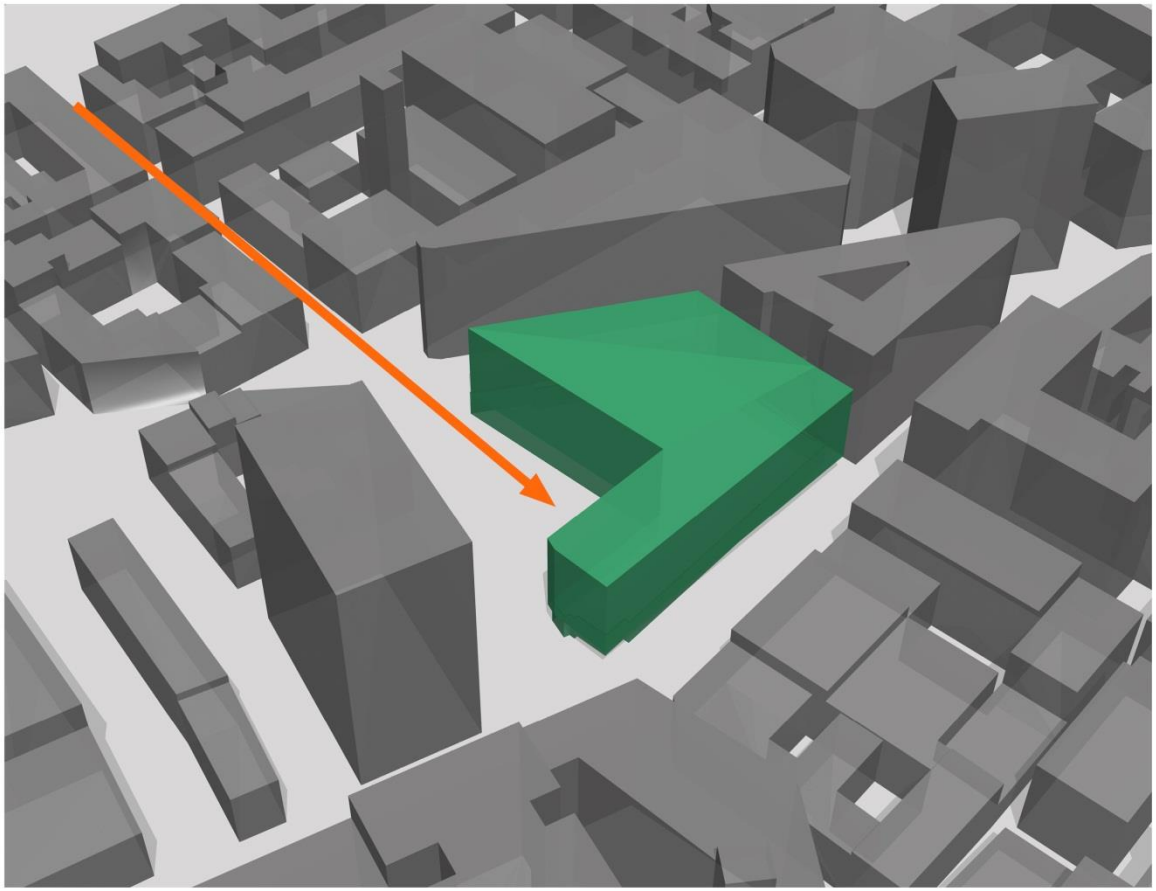
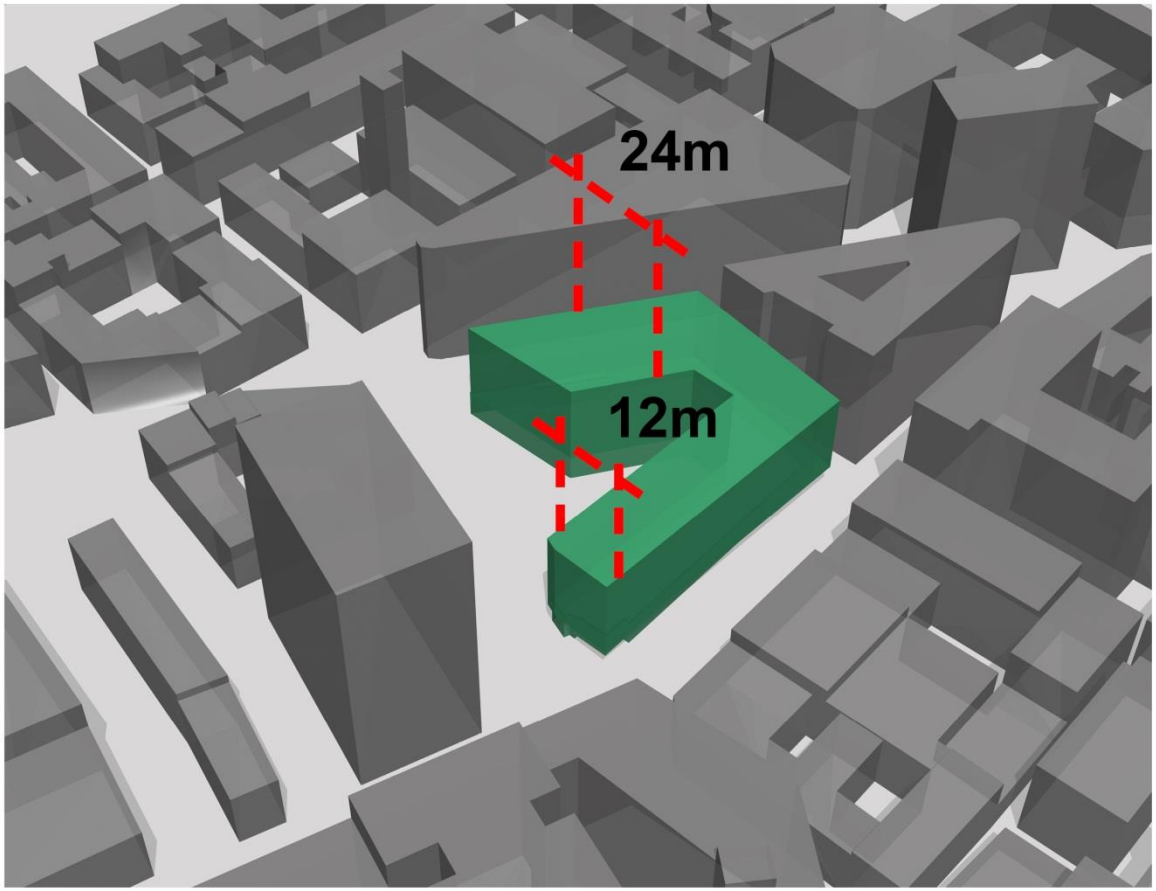
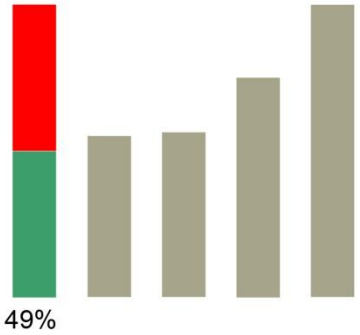


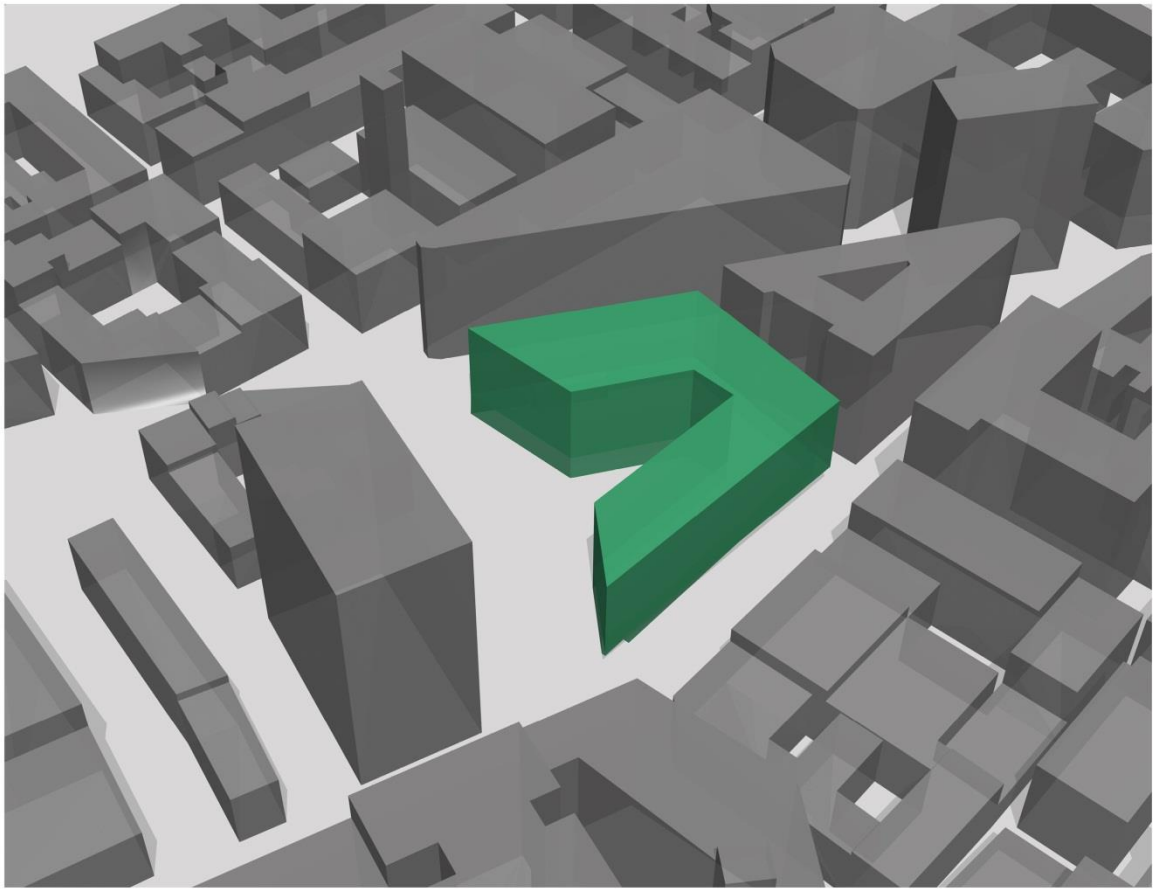
GREAT RUSSELL STREET
GILBERT PLACE
LITTLE RUSSELL STREET
BURY PLACE
BLOOMSBURY WAY
COPTIC STREET
STREATHAM ST
NEW OXFORD STREET

59%

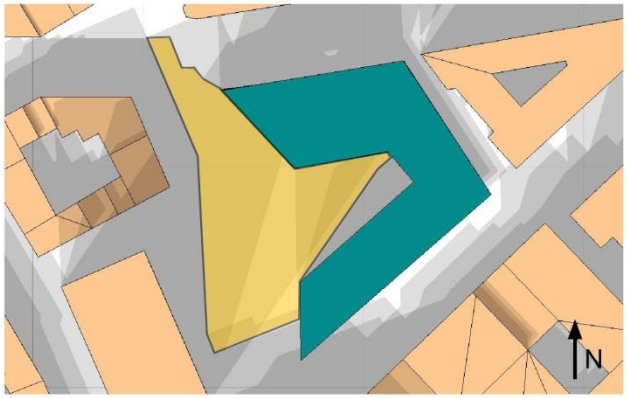


Passive Zones

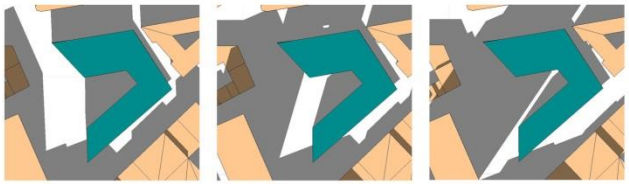




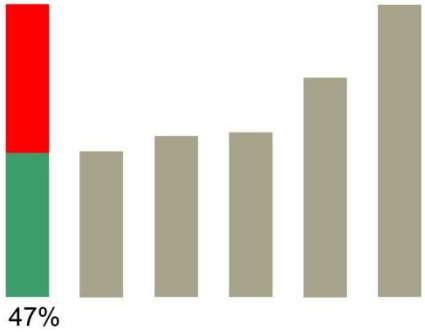
Solar access to the square

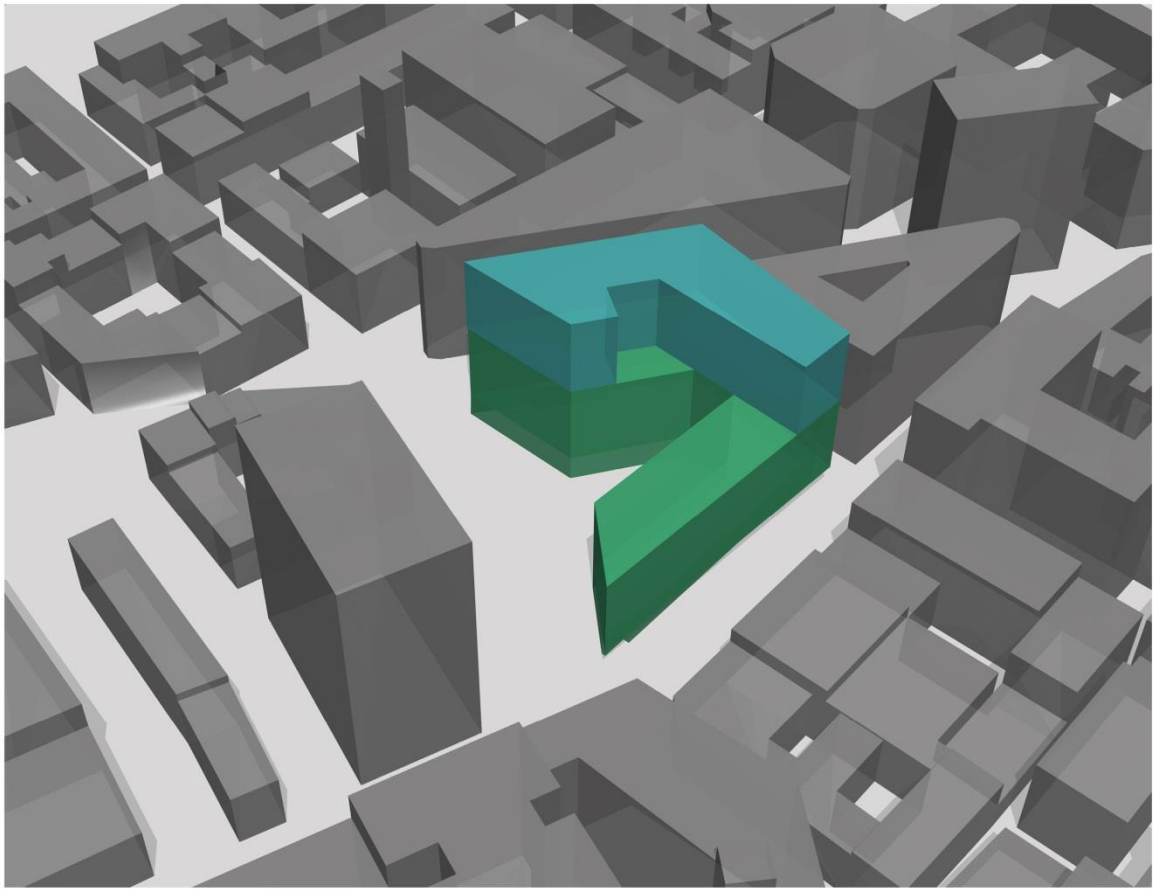


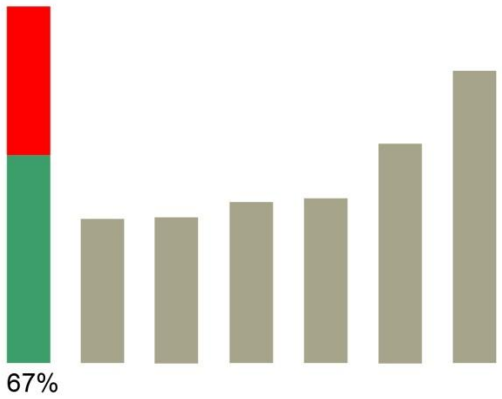
March Equinox 12:00 - 14:00



12:00 13:00 14:00



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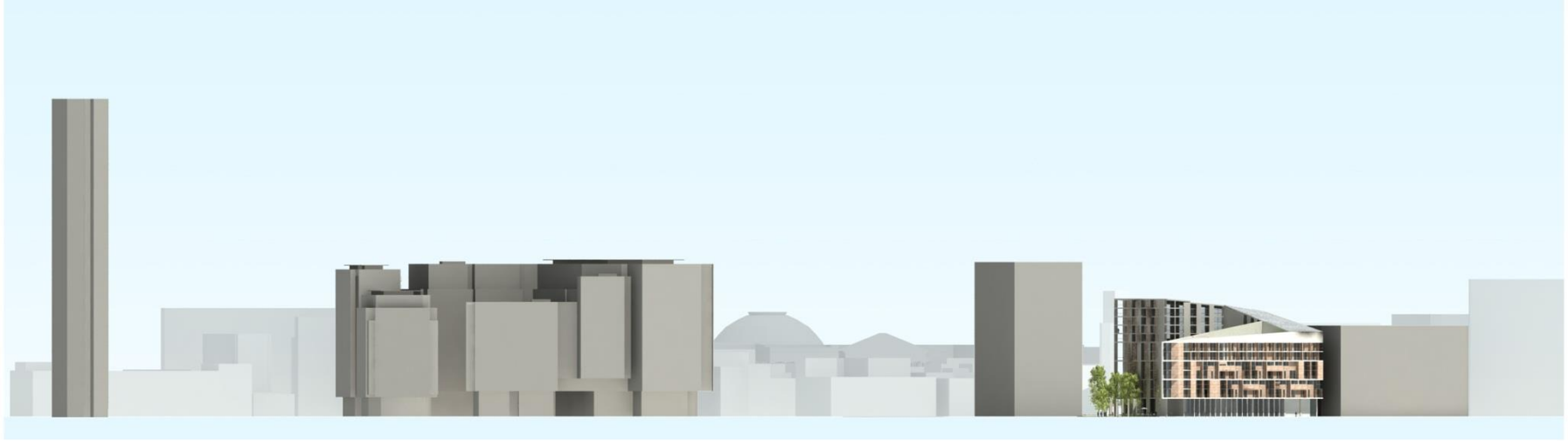

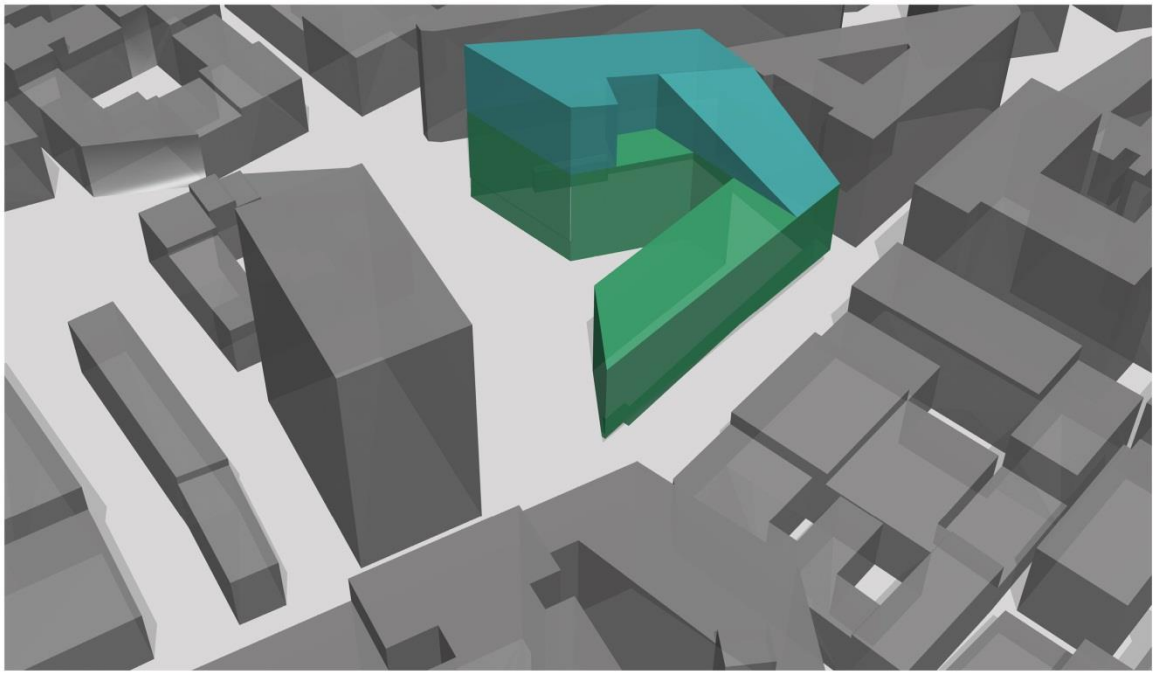

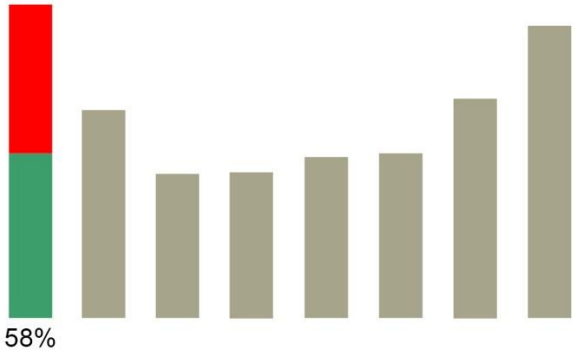
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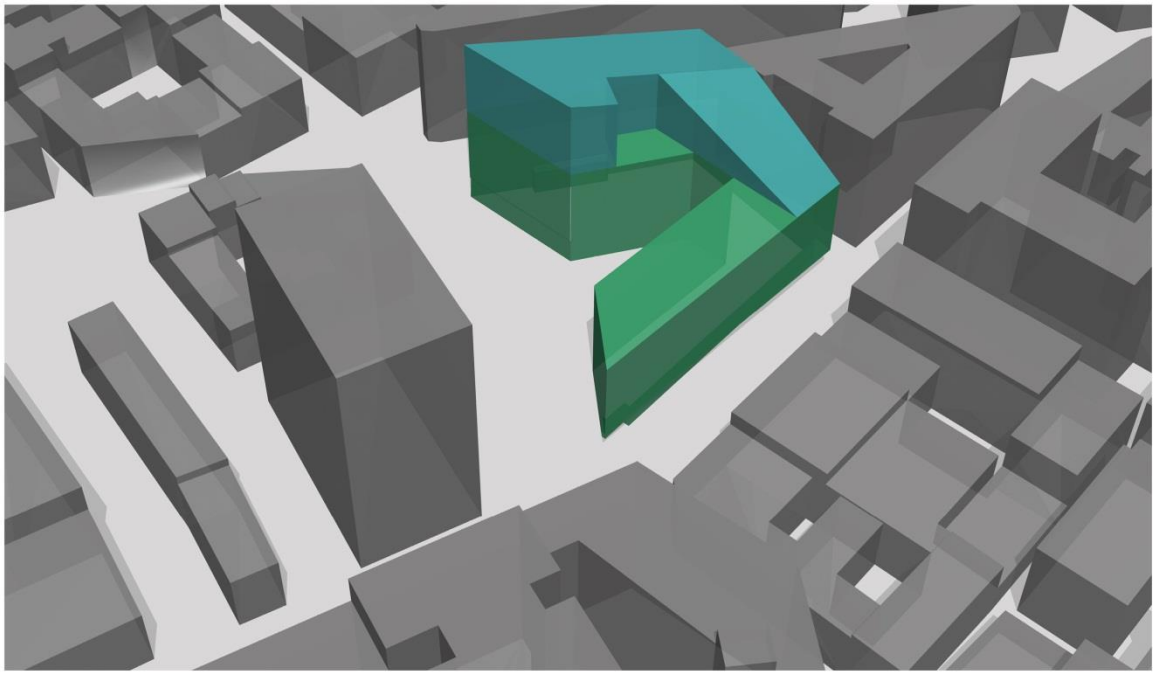

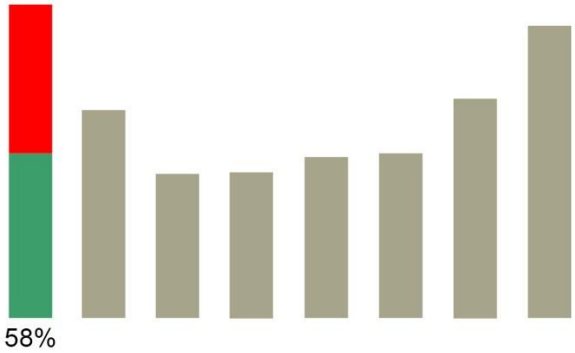
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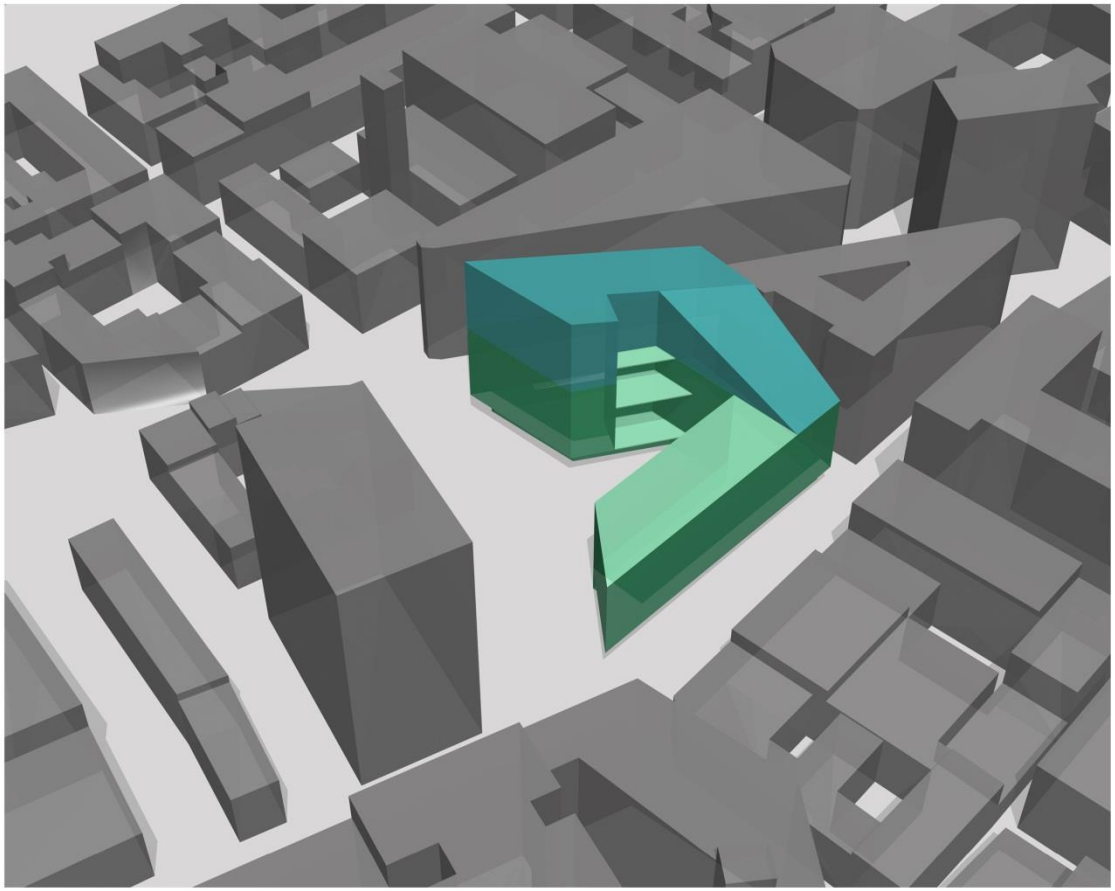
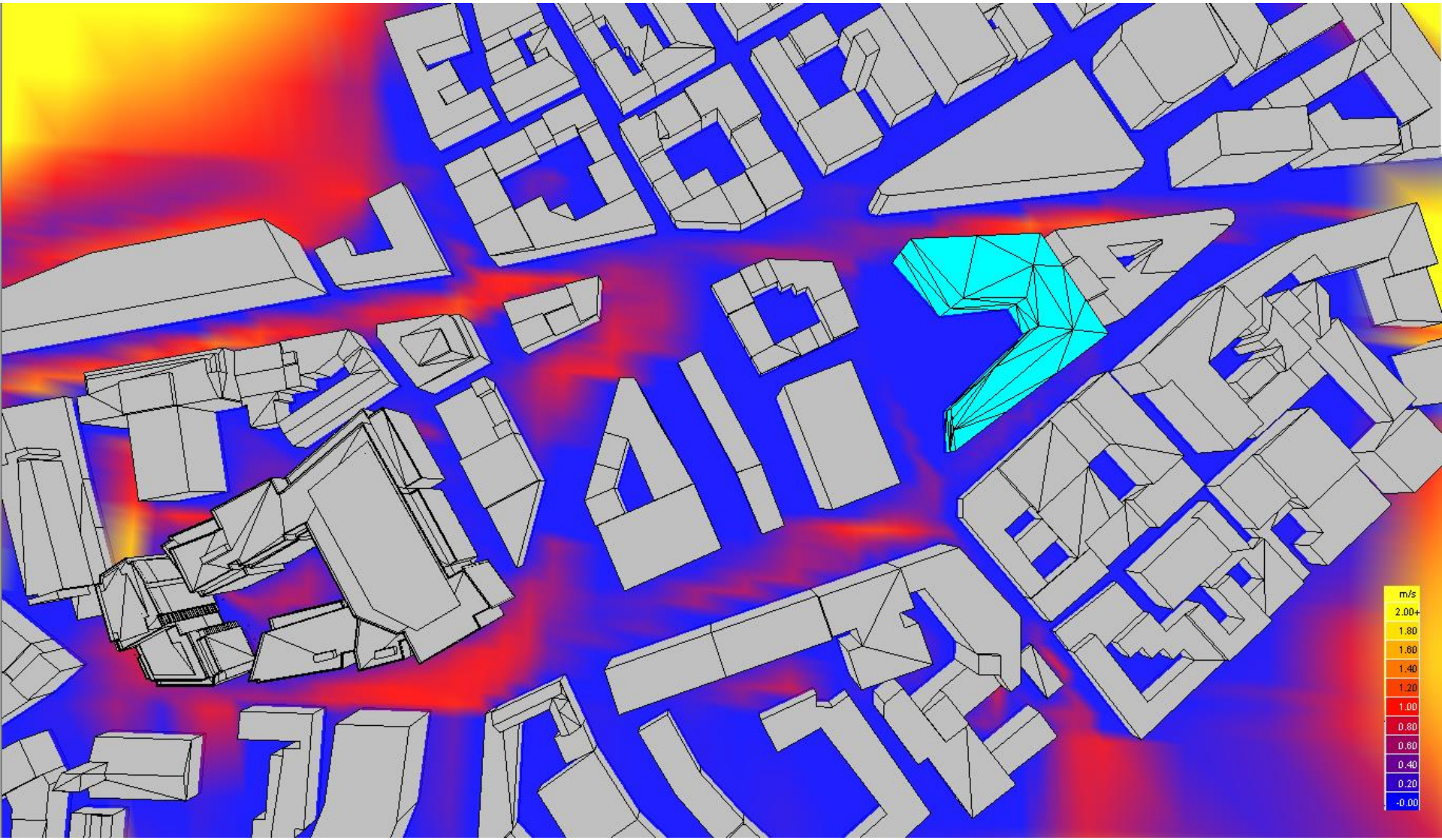
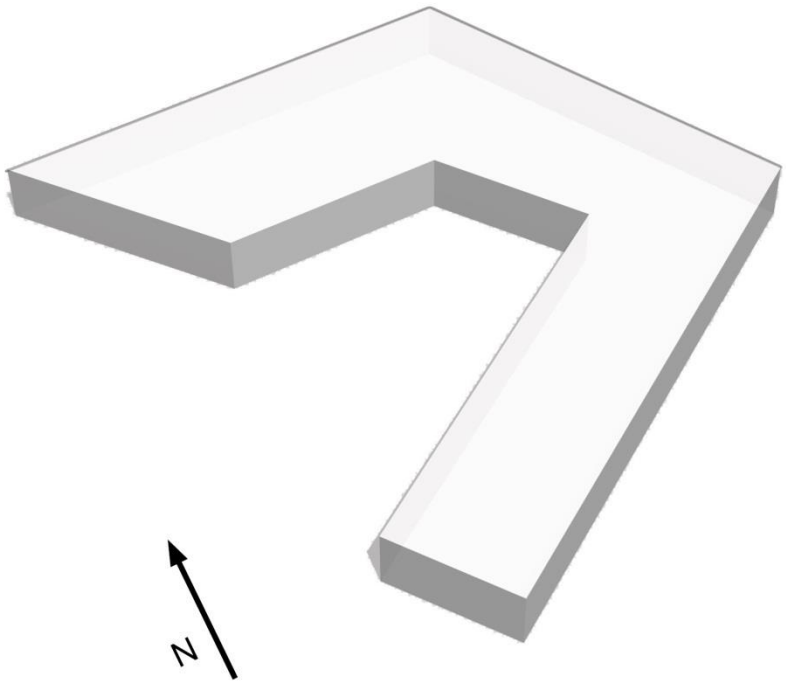
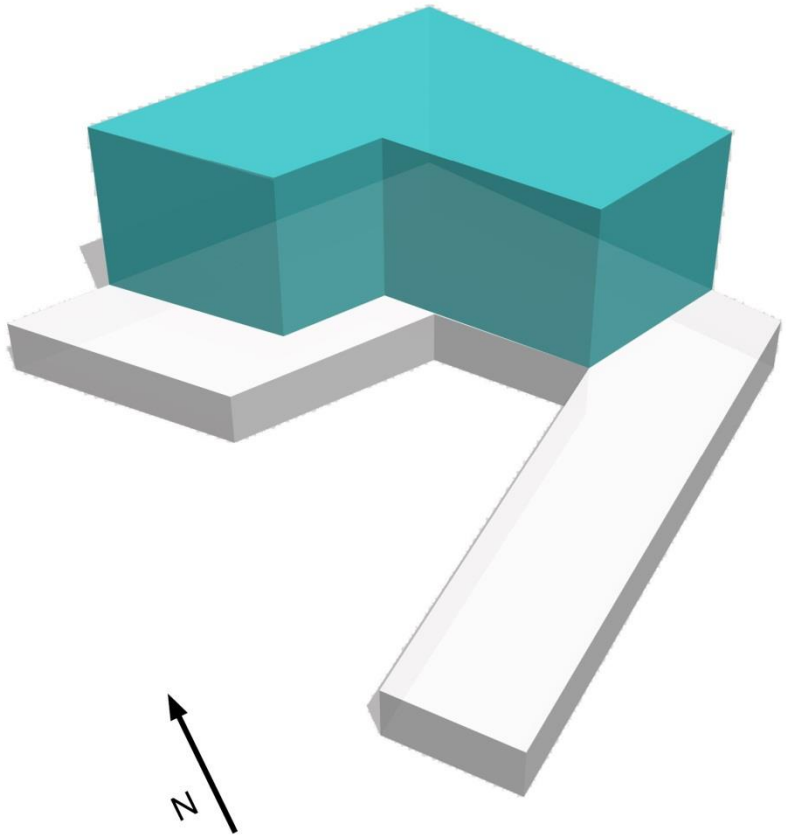


Site area:	4000 sq m
Existing building area:	29000 sq m
Proposed building area:	18000 sq m


m/s
2.00+
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
-0.00

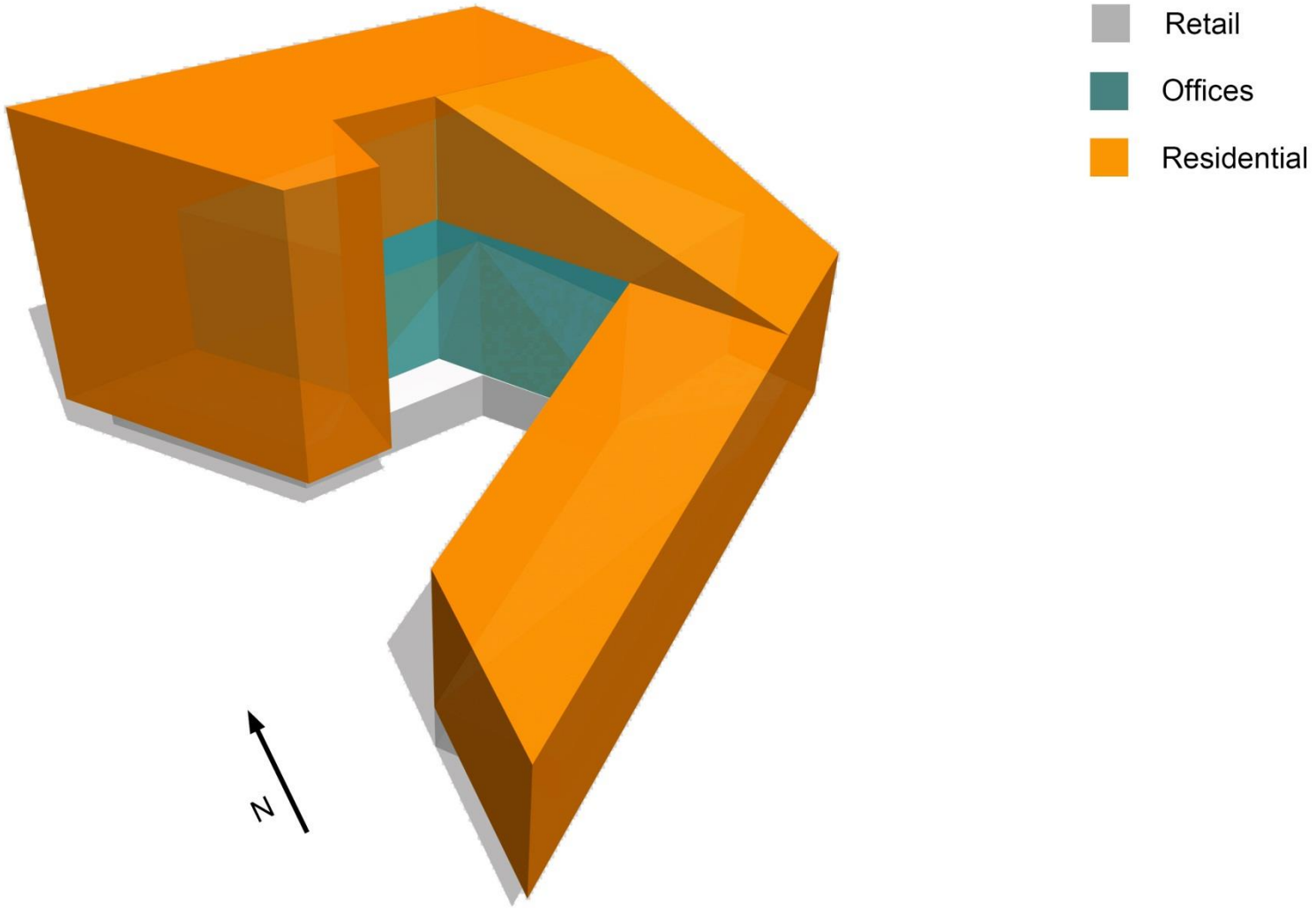


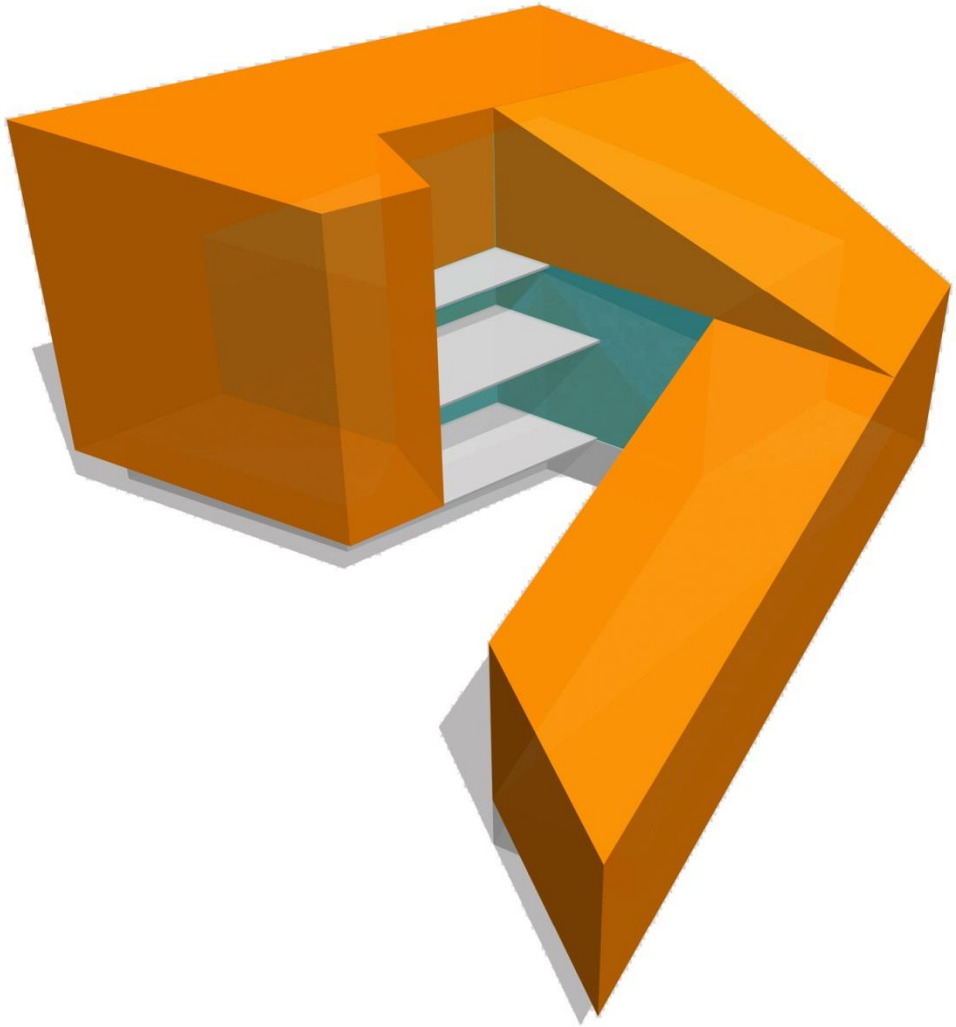
Retail



Retail

Offices


Retail
Offices
Residential
N

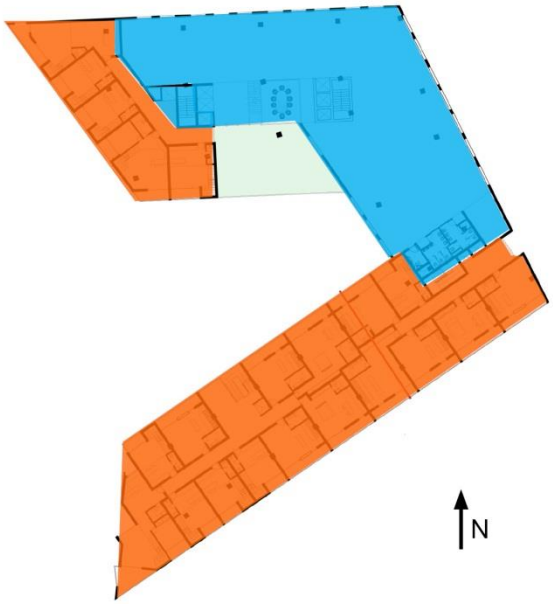


Retail

Offices

Residential

External areas



3m
3m
6m
6m
6m

cafes / restaurants

retail

retail- groceries

N

cafes / restaurants

retail

retail- groceries

N

cafes / restaurants

retail

retail- groceries

N

cafes / restaurants

retail

retail- groceries

N

cafes / restaurants

retail

retail- groceries

residential lobbies

N

cafes / restaurants

retail

retail- groceries

residential lobbies

office lobbies

N

cafes / restaurants

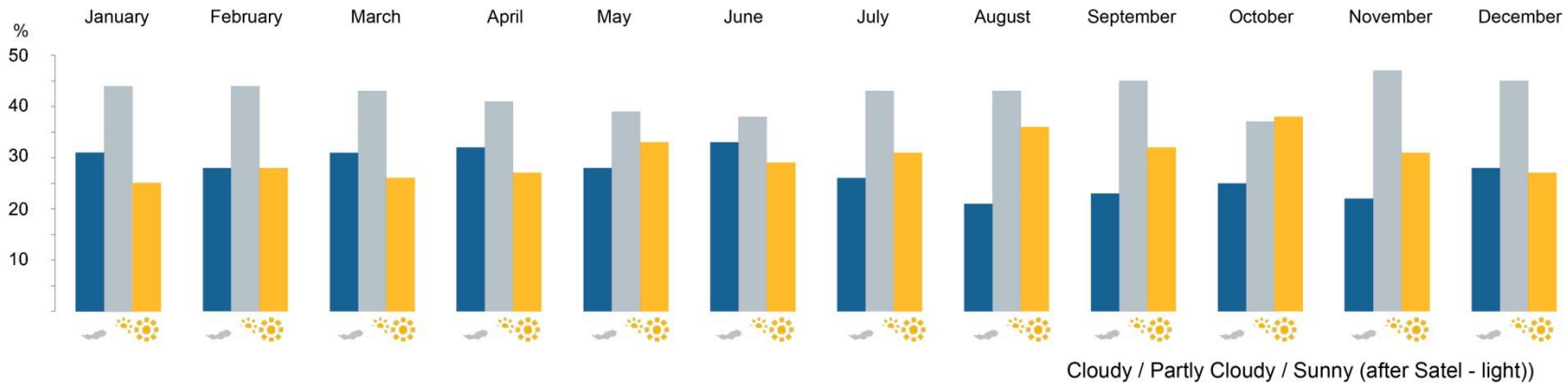
retail

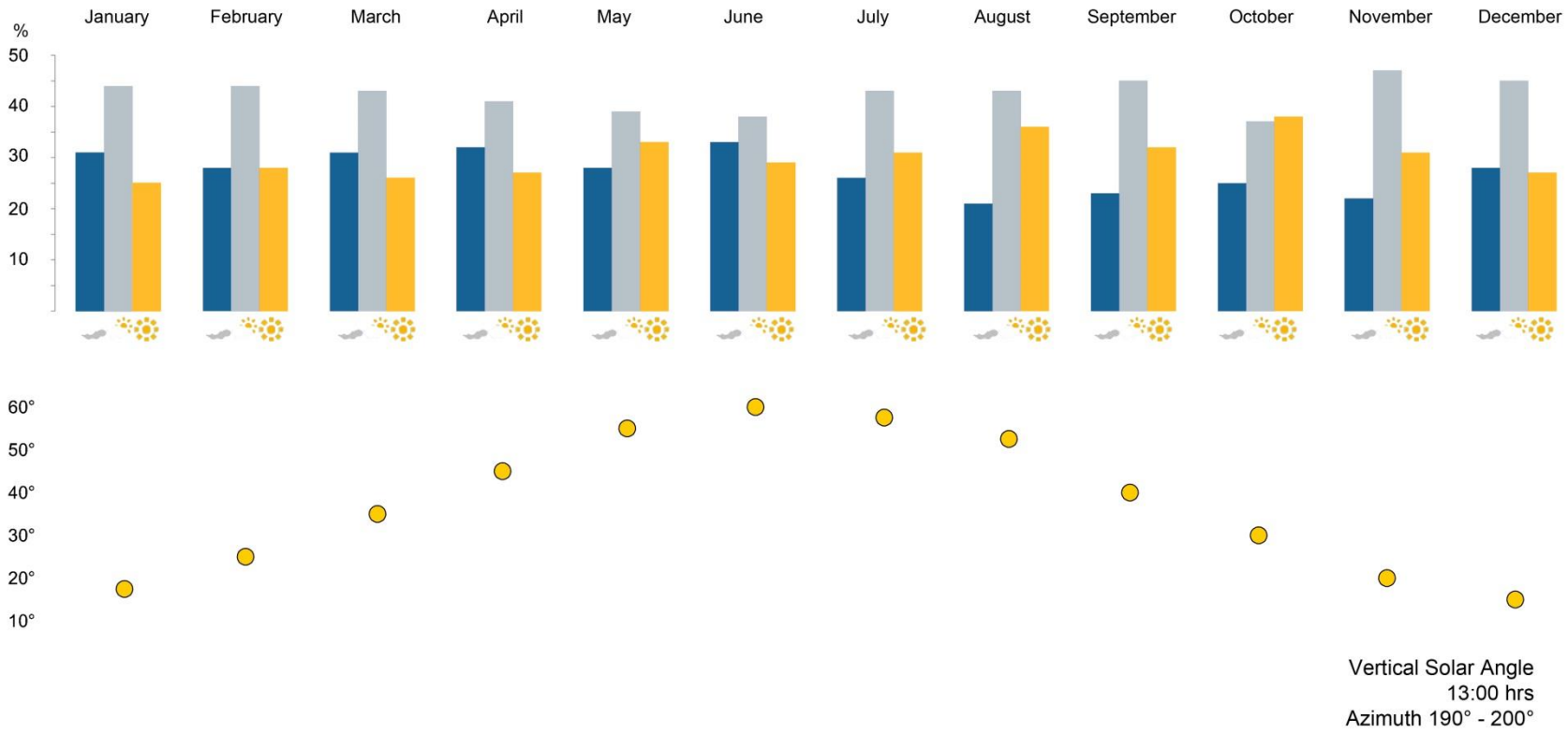
retail- groceries

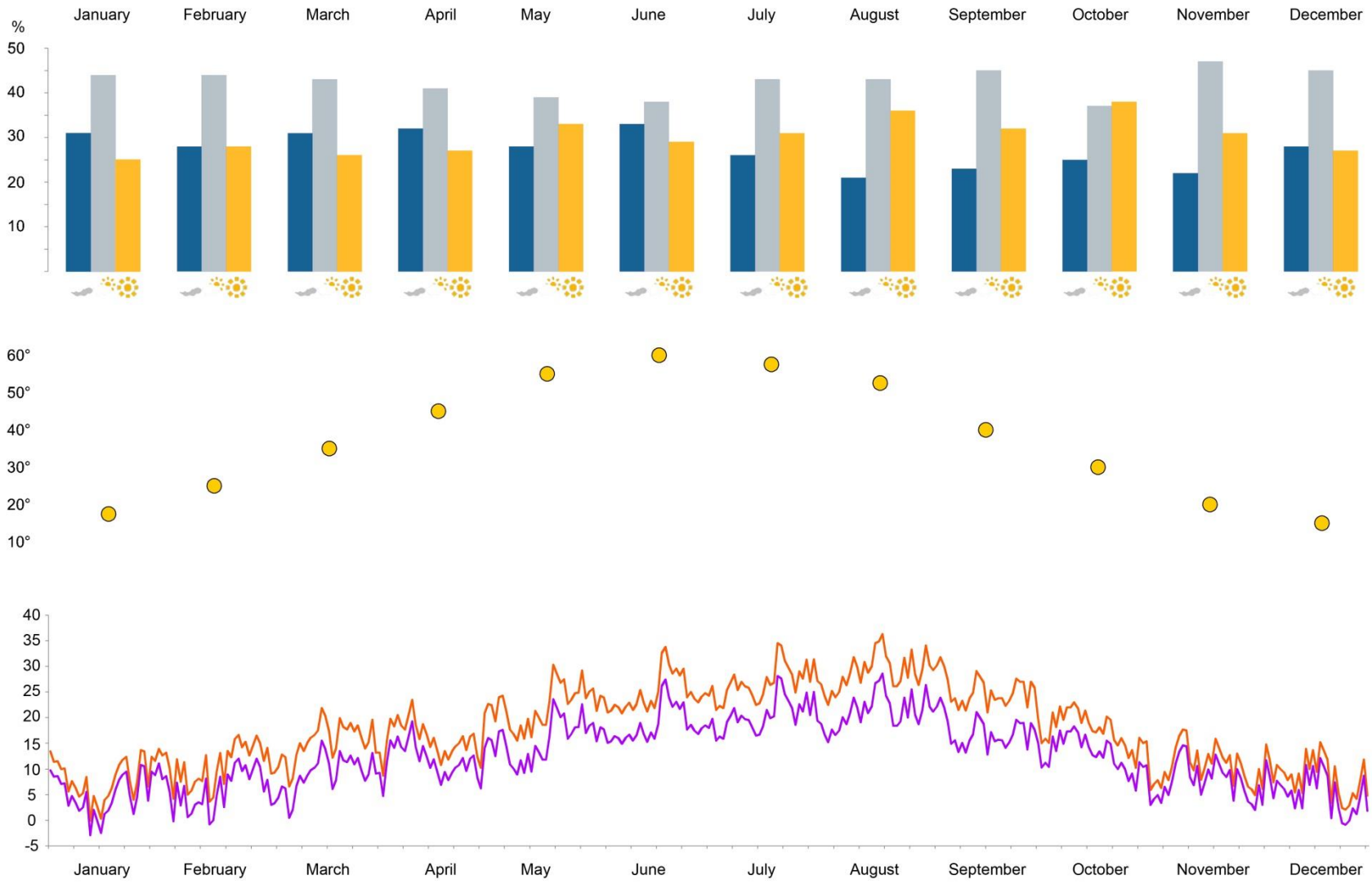
residential lobbies

office lobbies

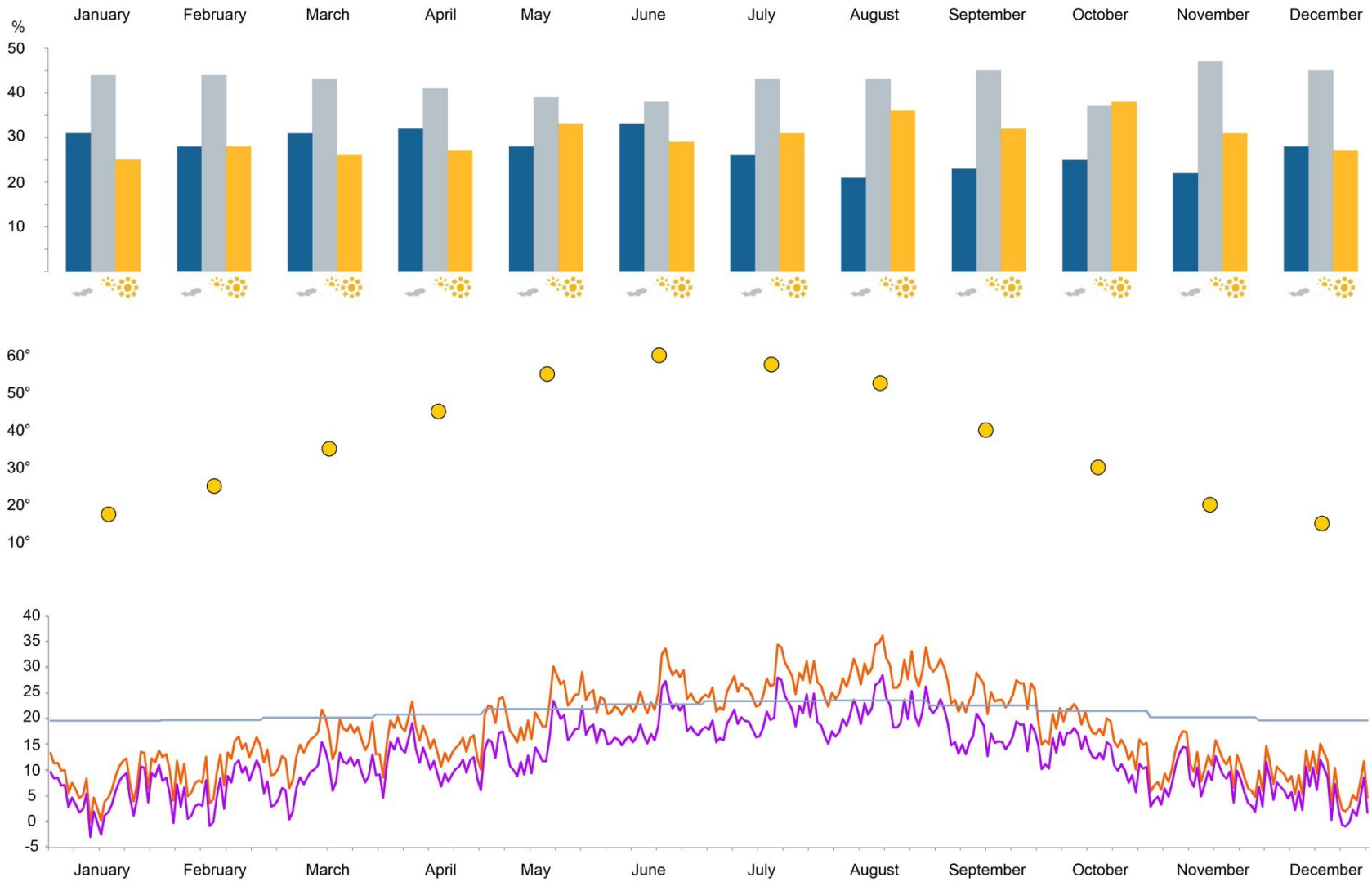
N


January
February
March
April
May
June
July
August
September
October
November
December
%
50
40
30
20
10
Cloudy / Partly Cloudy / Sunny (after Satel - light))

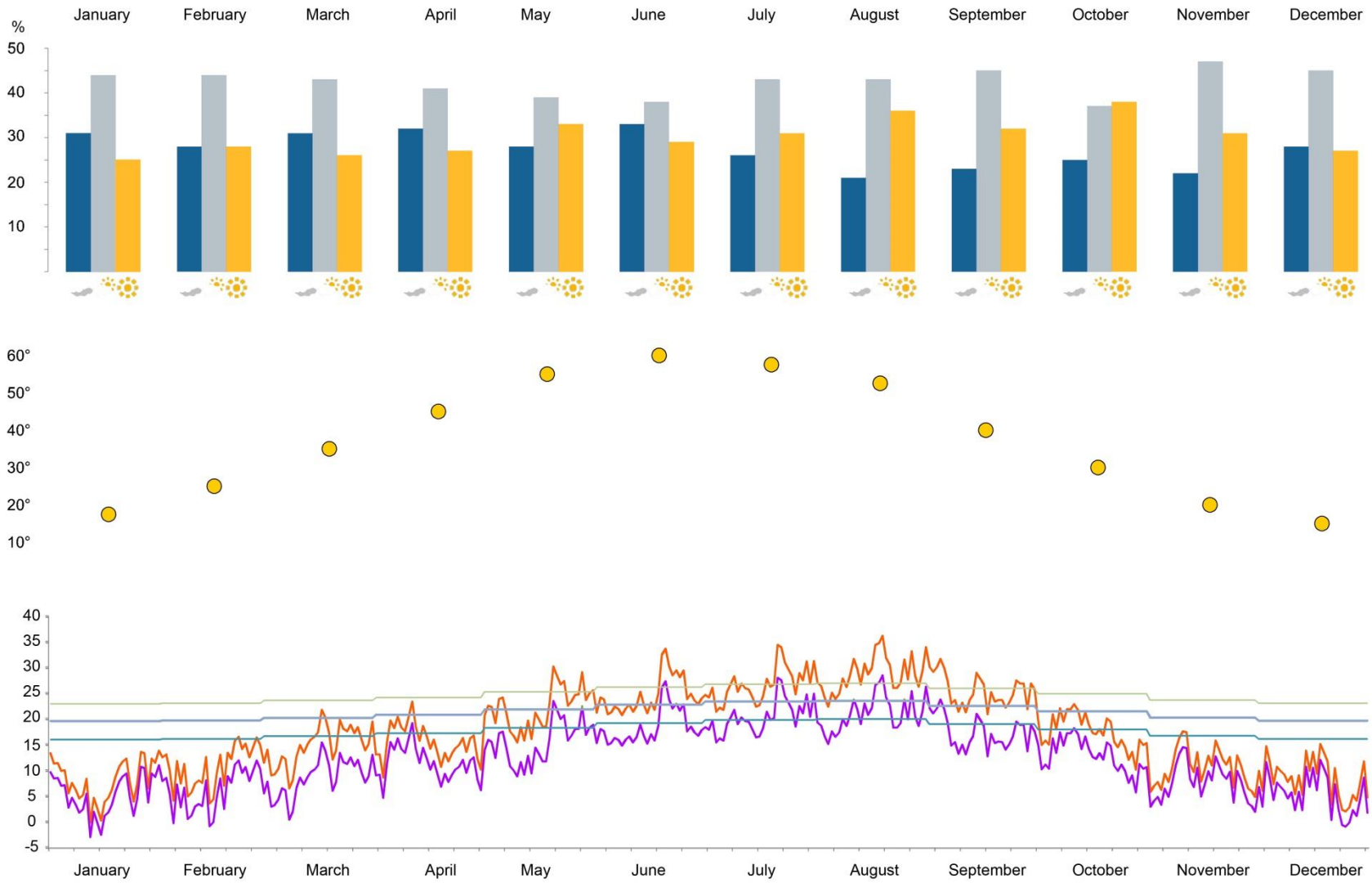

January
February
March
April
May
June
July
August
September
October
November
December
%
50
40
30
20
10
60°
50°
40°
30°
20°
10°
Vertical Solar Angle
13:00 hrs
Azimuth 190° - 200°



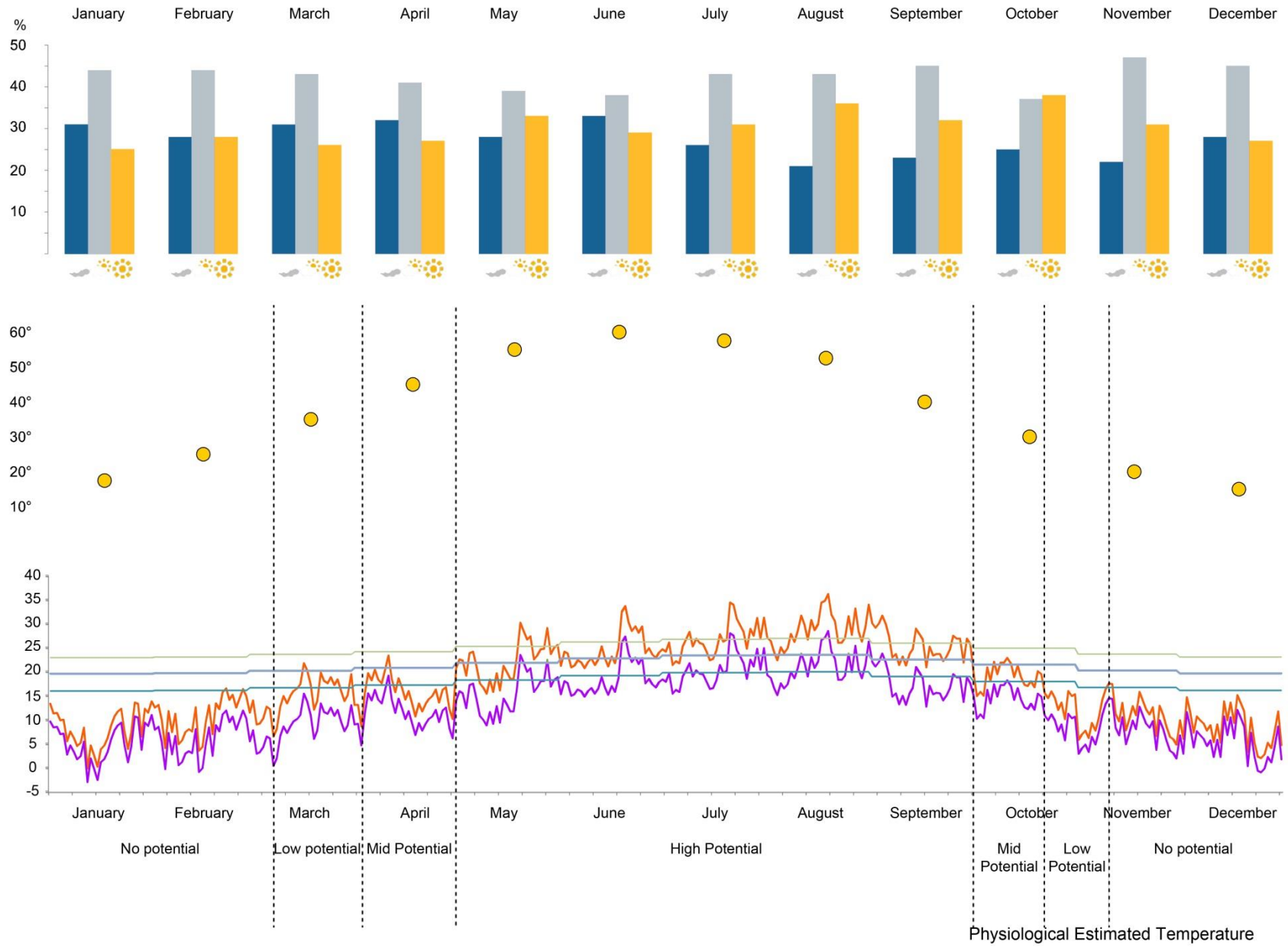
Physiological Estimated Temperature



Physiological Estimated Temperature



Physiological Estimated Temperature


January
February
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%
50
40
30
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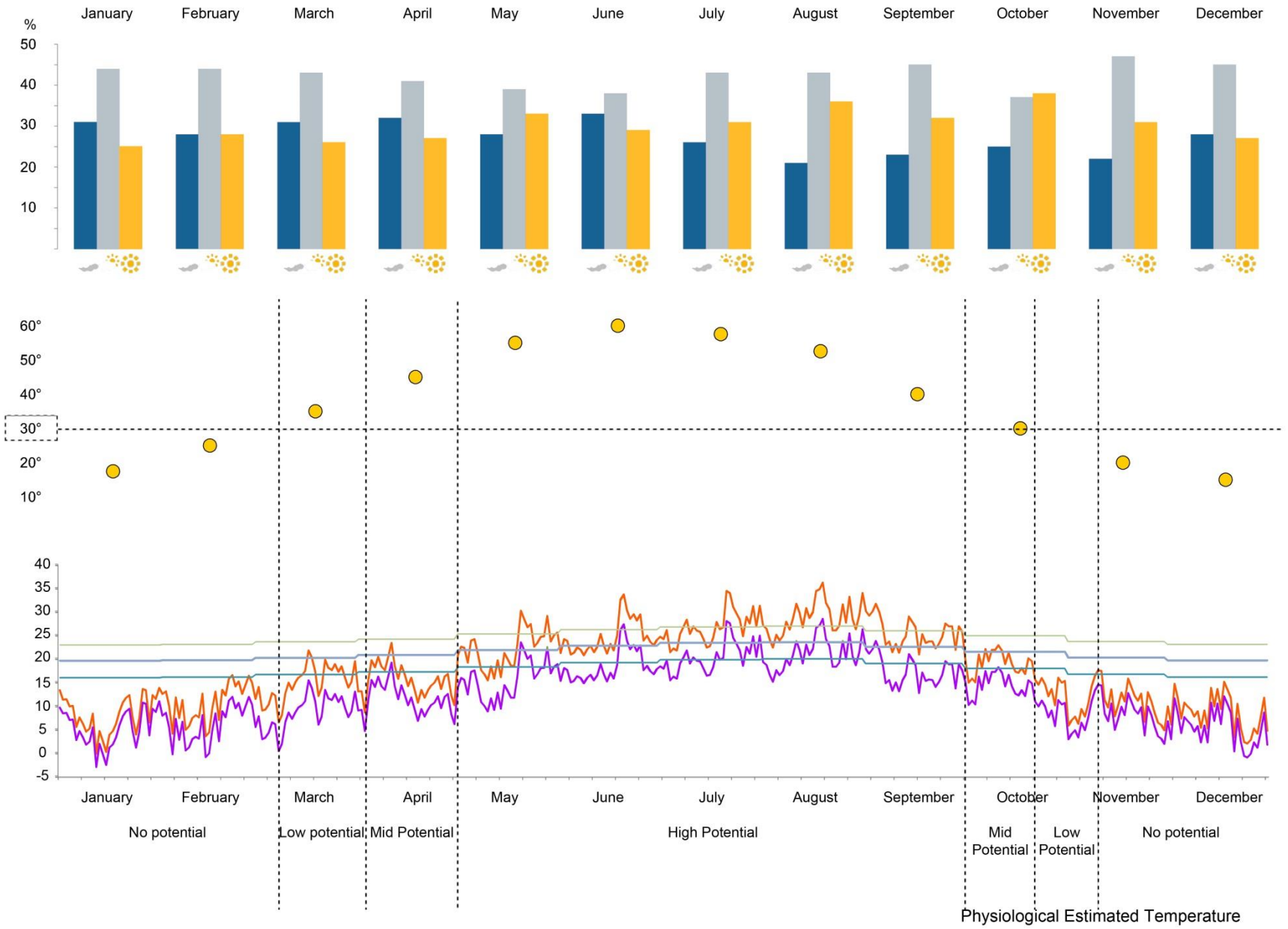
50°
40°
30°
20°
10°
40
35
30
25
20
15
10
5
0
-5
No potential
Low potential
Mid Potential
High Potential
Mid Potential
Low Potential
No potential
Physiological Estimated Temperature


January
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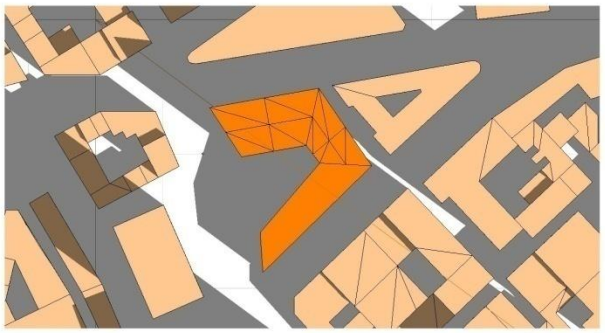
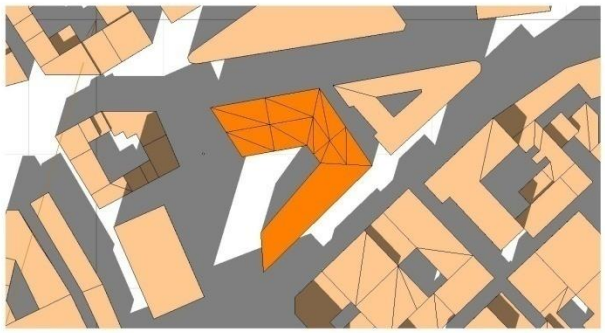
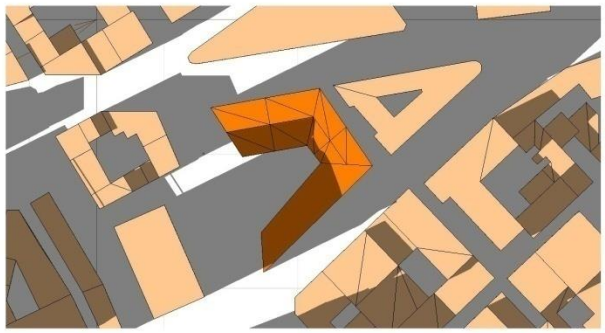
October
November
December
%
50
40
30
20
10
60°
50°
40°
30°
20°
10°
40
35
30
25
20
15
10
5
0
-5
No potential
Low potential
Mid Potential
High Potential
Mid Potential
Low Potential
No potential
Physiological Estimated Temperature



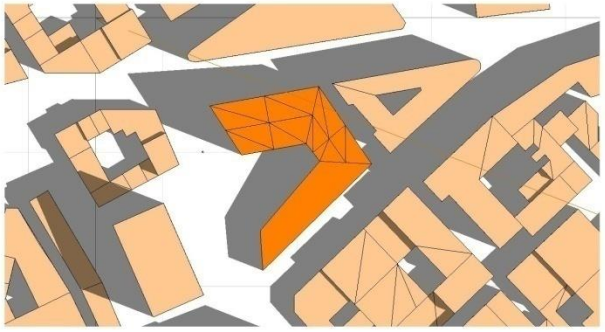
March 09:00



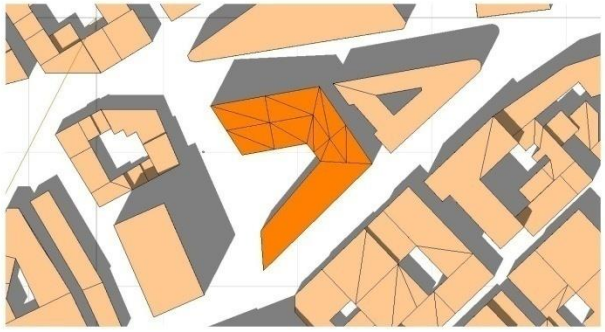
March 13:00



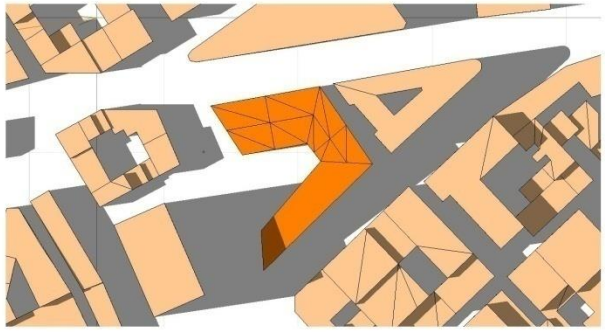
March 16:00



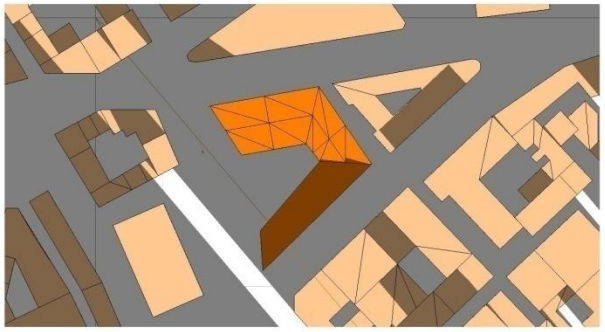
June 09:00



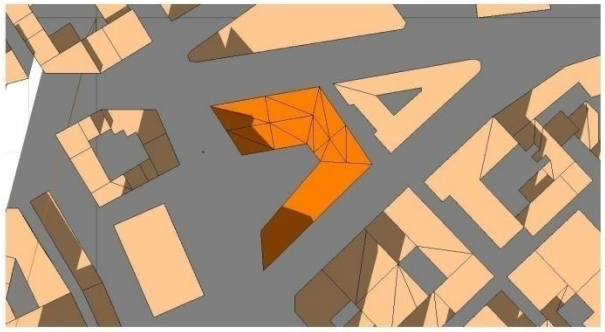
June 13:00



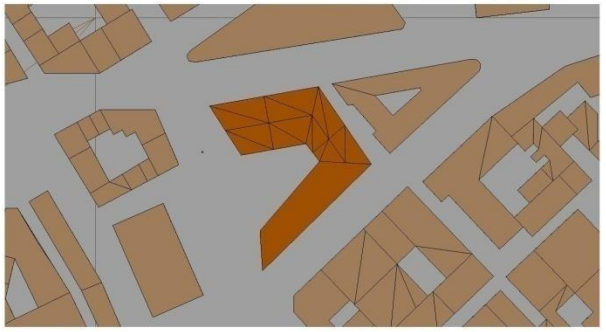
June 16:00



Dec 09:00



Dec 13:00



Dec 16:00

Autumn Equinox 13:00
Air temperature 14.8 C

Autumn Equinox 13:00
Air temperature 14.8 C

Wind: 0,5 m/s
Global Radiation – Shaded Areas 57 W/m²

P.E.T. 13.0 C

Autumn Equinox 13:00
Air temperature 14.8 C

Comfort Band 24
17

Wind: 0,5 m/s
Global Radiation Sunny Areas 280 W/m²

Autumn Equinox 13:00
Air temperature 14.8 C

Wind: 0,5 m/s
Global Radiation Sunny Areas 280 W/m²

P.E.T. 18.5 C

Autumn Equinox 13:00
Air temperature 14.8 C

Comfort Band 24
17

Typical Summer day 13:00
Air temperature 24.1 C

Wind: 0,5 m/s
Global Radiation Sunny Areas 322 W/m²

Typical Summer day 13:00
Air temperature 24.1 C

Wind: 0,5 m/s
Global Radiation Sunny Areas 322 W/m²

P.E.T. 28.1 C

Typical Summer day 13:00
Air temperature 24.1 C

Comfort Band 26.5
19.5

Wind: 0,5 m/s
Global Radiation Shaded Areas 104 W/m²

Typical Summer Day 13:00
Air temperature 24.1 C

Wind: 0,5 m/s
Global Radiation Shaded Areas 104 W/m²

P.E.T. 22.6 C

Typical Summer Day 13:00
Air temperature 24.1 C

Comfort Band 26.5
19.5

Typical Summer Afternoon – 17:00
Air temperature 18.9 C

Wind: 0,5 m/s
Global Radiation Sunny Areas 251 W/m²

Typical Summer Afternoon – 17:00
Air temperature 18.9 C

Wind: 0,5 m/s
Global Radiation Sunny Areas 251 W/m²

P.E.T. 22.9 C

Typical Summer Afternoon – 17:00
Air temperature 18.9 C

Comfort Band 26.5
19.5

Wind: 0,5 m/s
Global Radiation Shaded Areas 60 W/m²

Typical Summer Afternoon – 17:00
Air temperature 18.9 C

Wind: 0,5 m/s
Global Radiation Shaded Areas 60 W/m²

P.E.T. 17.6 C

Typical Summer Afternoon – 17:00
Air temperature 18.9 C

Comfort Band 26.5
19.5

Summer 13:00

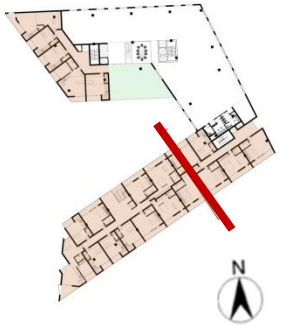
Equinox 13:00

Apartments Location

1 Bedroom Apartment

Lower Level

Upper Level



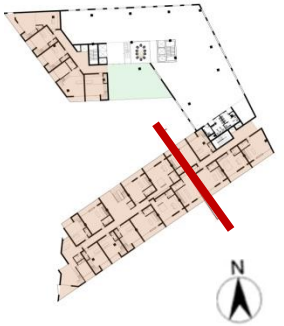
COURTYARD

HIGH HOLBORN STREET

1 BEDROOM APARTMENT

CORRIDOR

3 BEDROOM APARTMENT



COURTYARD

HIGH HOLBORN STREET

1 BEDROOM APARTMENT

CORRIDOR

3 BEDROOM APARTMENT

Appliances:

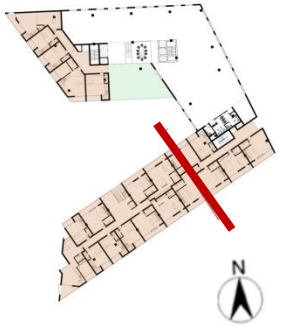
Kitchen/Living: **4.0 W/m²**

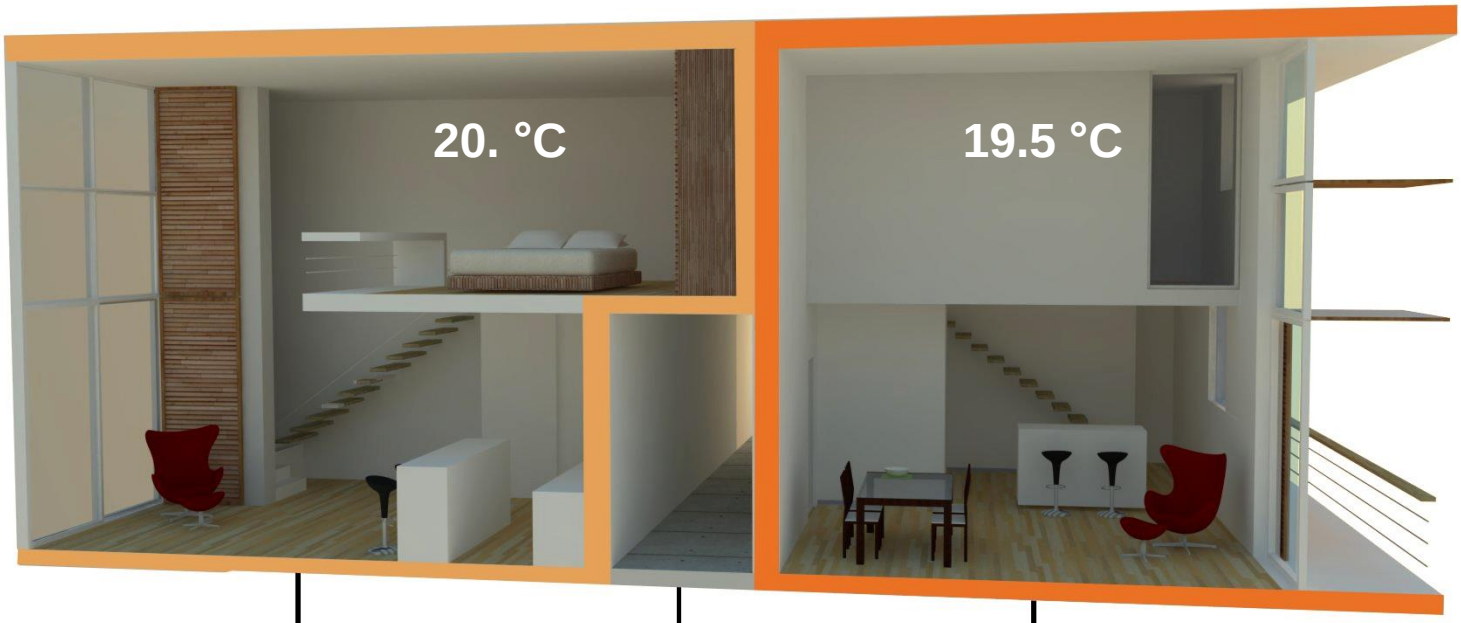
Bedrooms: **2.1 W/m²**

Infiltration Rate: 0.20 ACH

Heat Recovery System

Typical January Day
09:00





5.8 °C

COURTYARD

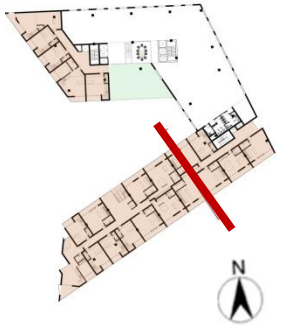
HIGH HOLBORN STREET

1 BEDROOM APARTMENT

CORRIDOR

3 BEDROOM APARTMENT

Typical January Day
12:00



COURTYARD

11.40 °C

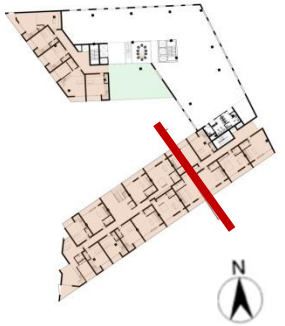
HIGH HOLBORN STREET

1 BEDROOM APARTMENT

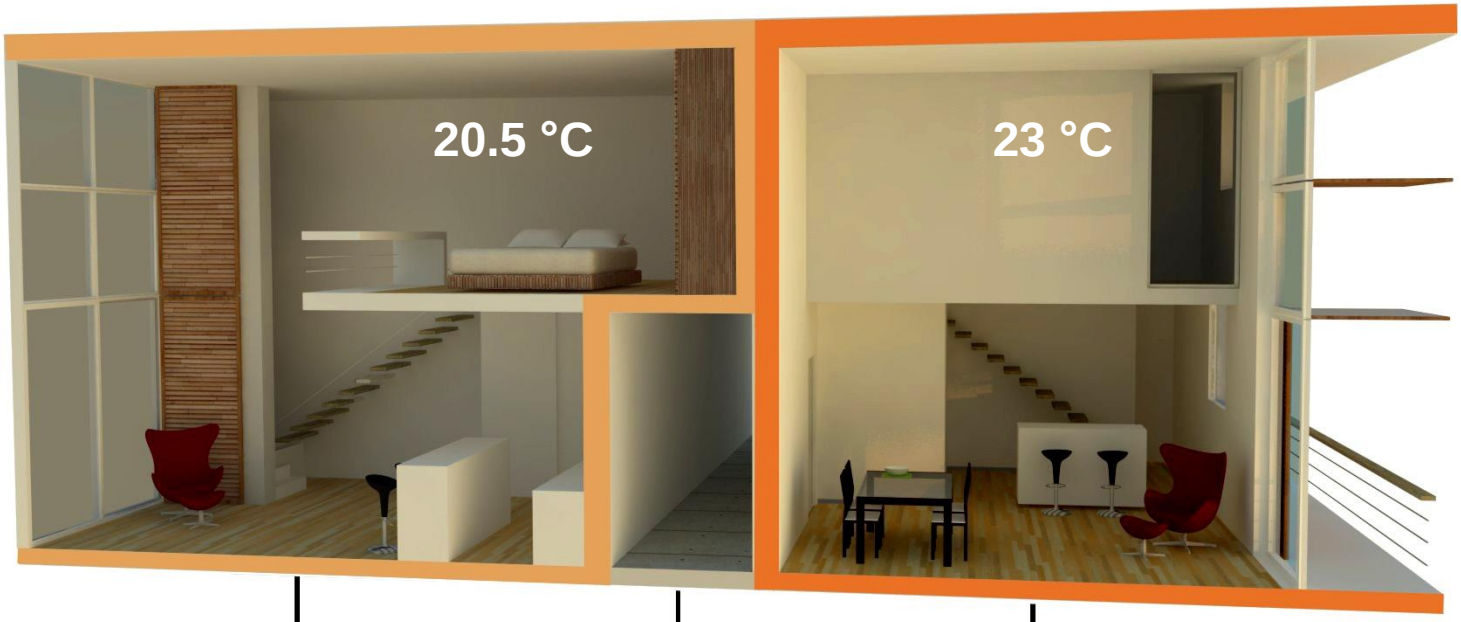
CORRIDOR

3 BEDROOM APARTMENT

Typical January Day
15:00



COURTYARD



13.40 °C

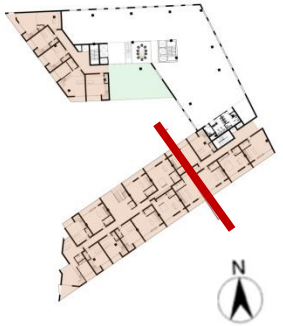
HIGH HOLBORN STREET

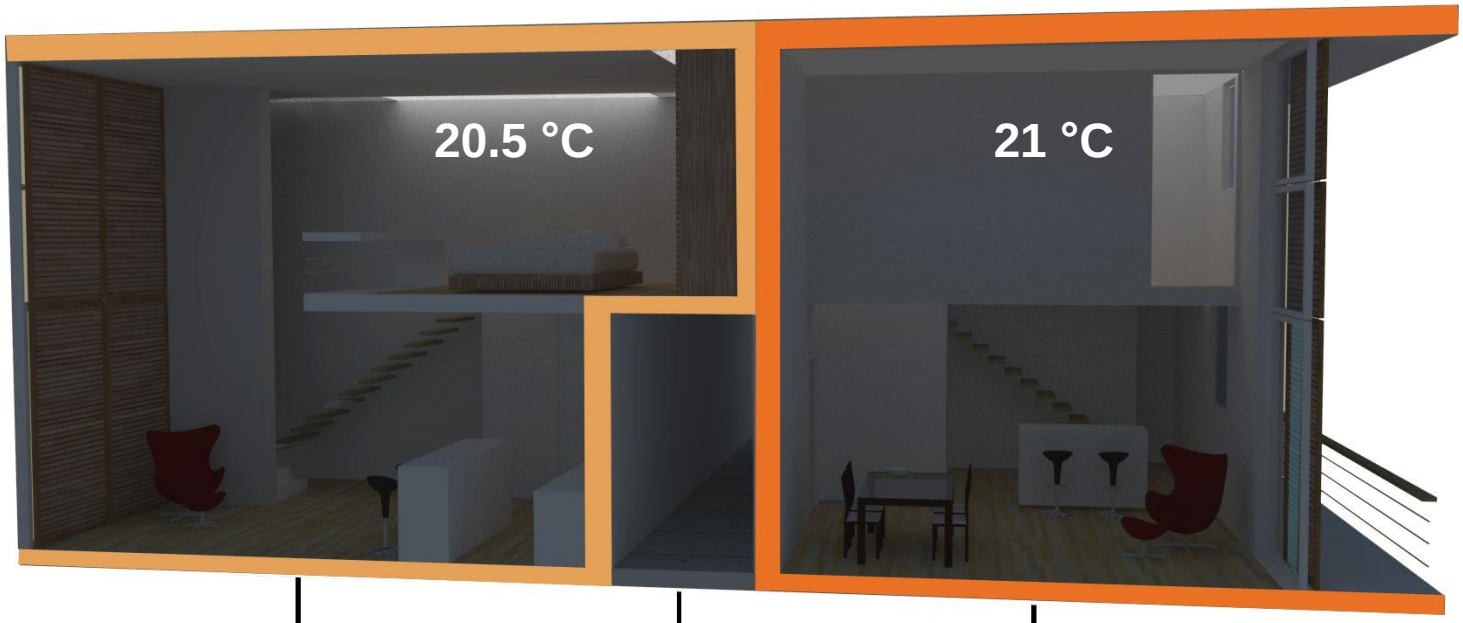
1 BEDROOM APARTMENT

CORRIDOR

3 BEDROOM APARTMENT

Typical January Night
19:00





10.20 °C

COURTYARD

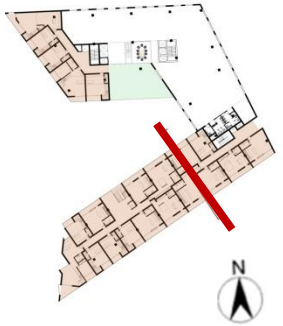
HIGH HOLBORN STREET

1 BEDROOM APARTMENT

CORRIDOR

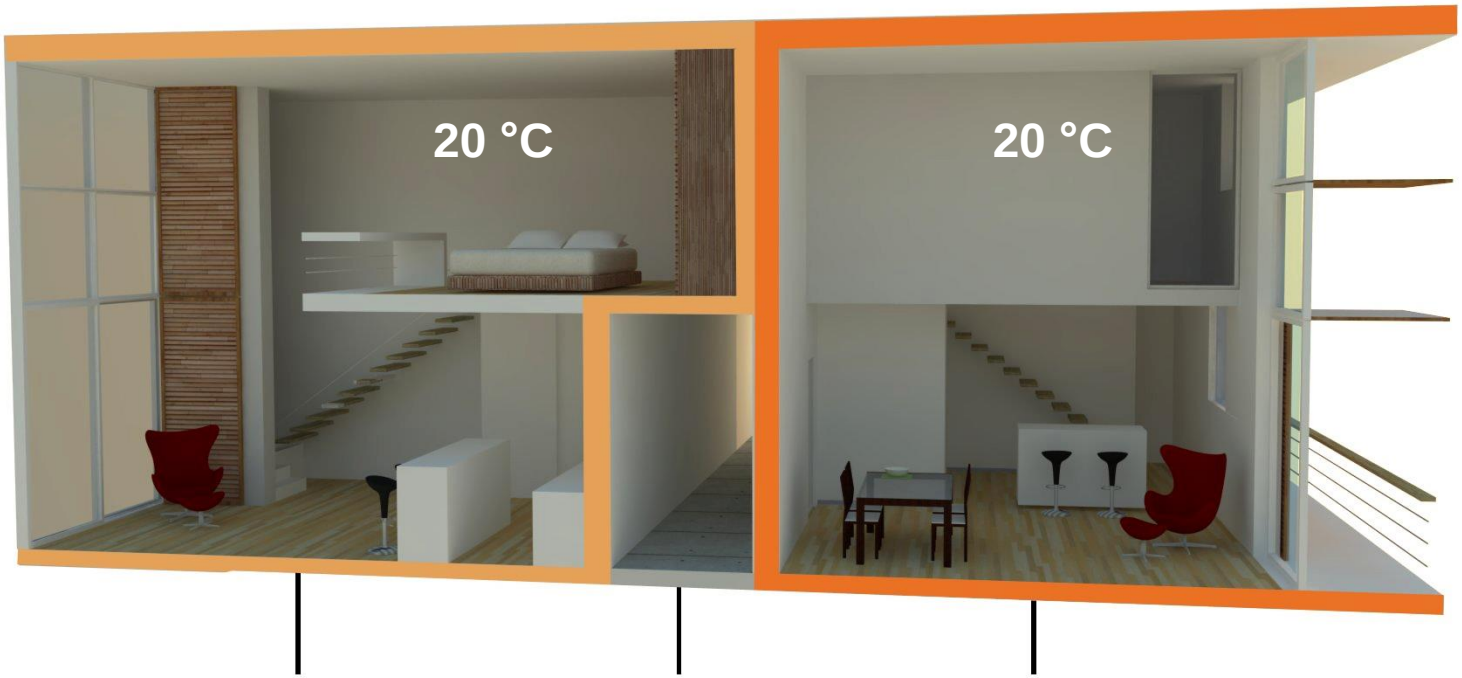
3 BEDROOM APARTMENT

Typical January Day



COURTYARD

HIGH HOLBORN STREET

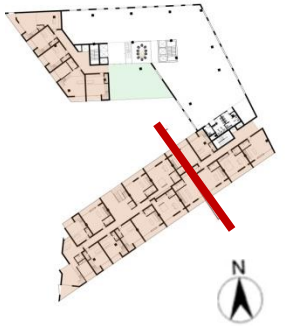


1 BEDROOM APARTMENT

CORRIDOR

3 BEDROOM APARTMENT

Daylight Factor Living Rooms
Overcast Sky 5000 Lux



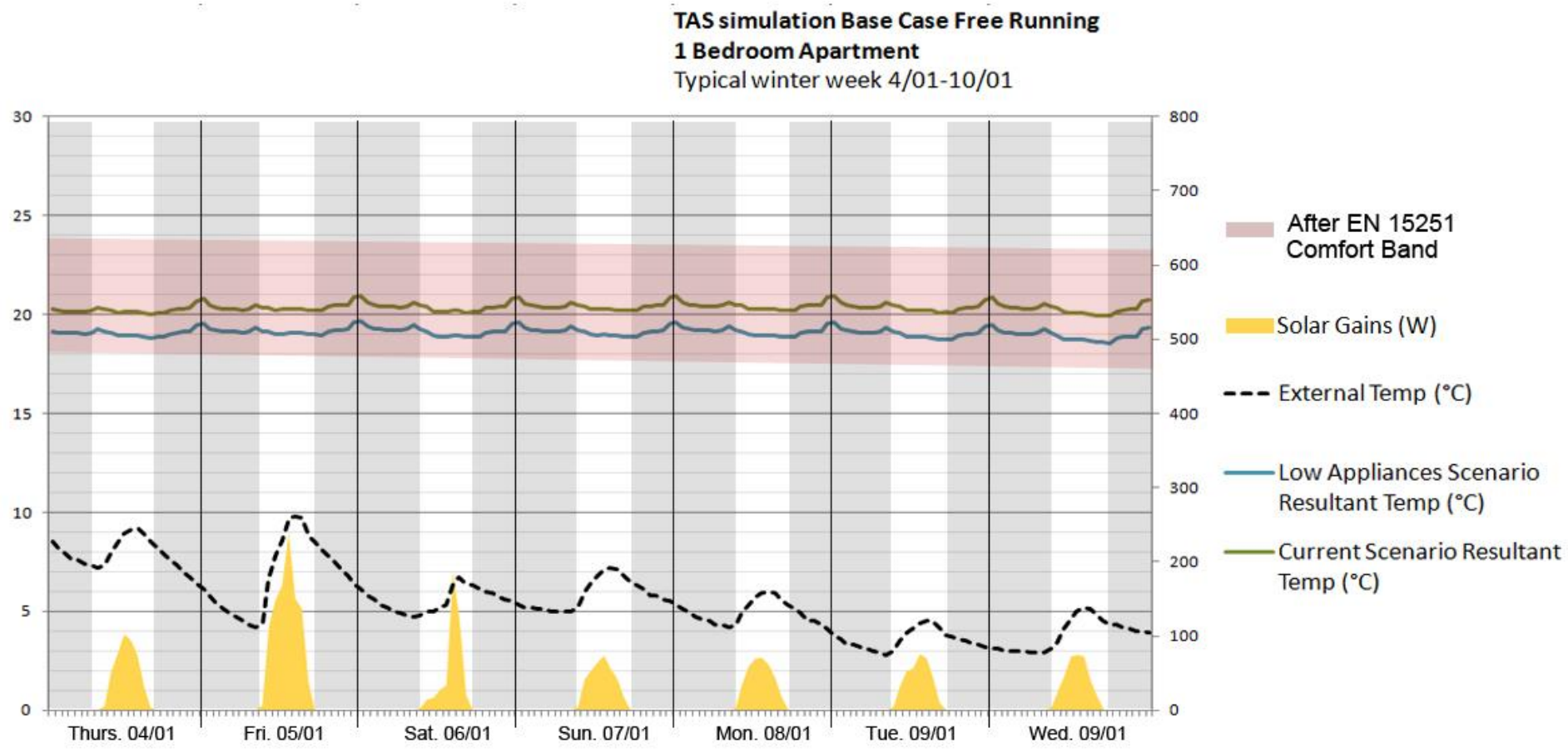
COURTYARD

HIGH HOLBORN STREET

1 BEDROOM APARTMENT

CORRIDOR

3 BEDROOM APARTMENT



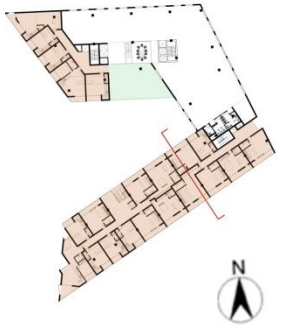
Current Scenario Internal Gains:

Kitchen/Living: **4.0 W/m^2**
Bedrooms: **2.1 W/m^2**

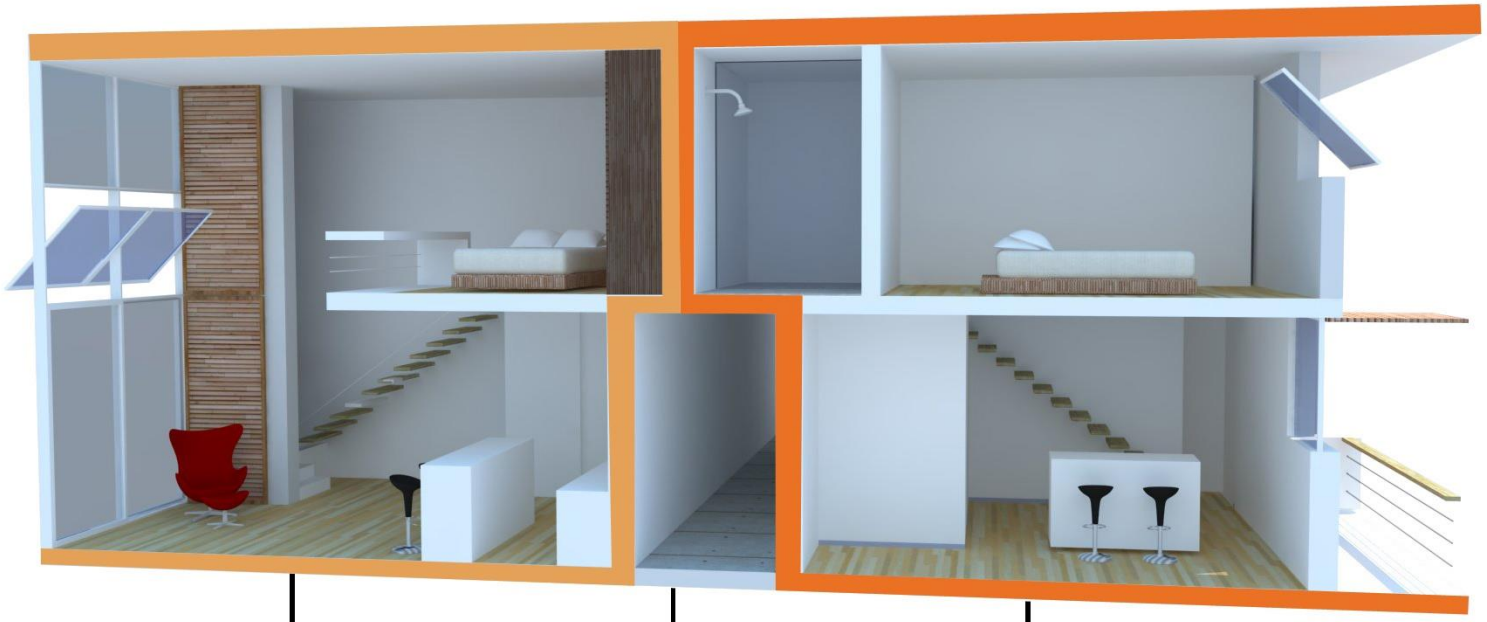
Low Appliances Scenario Internal Gains:

Kitchen/Living: **2.1 W/m^2**
Bedrooms: **1.8 W/m^2**

Typical August Day
09:00



COURTYARD



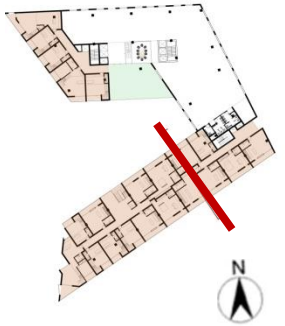
HIGH HOLBORN STREET

1 BEDROOM APARTMENT

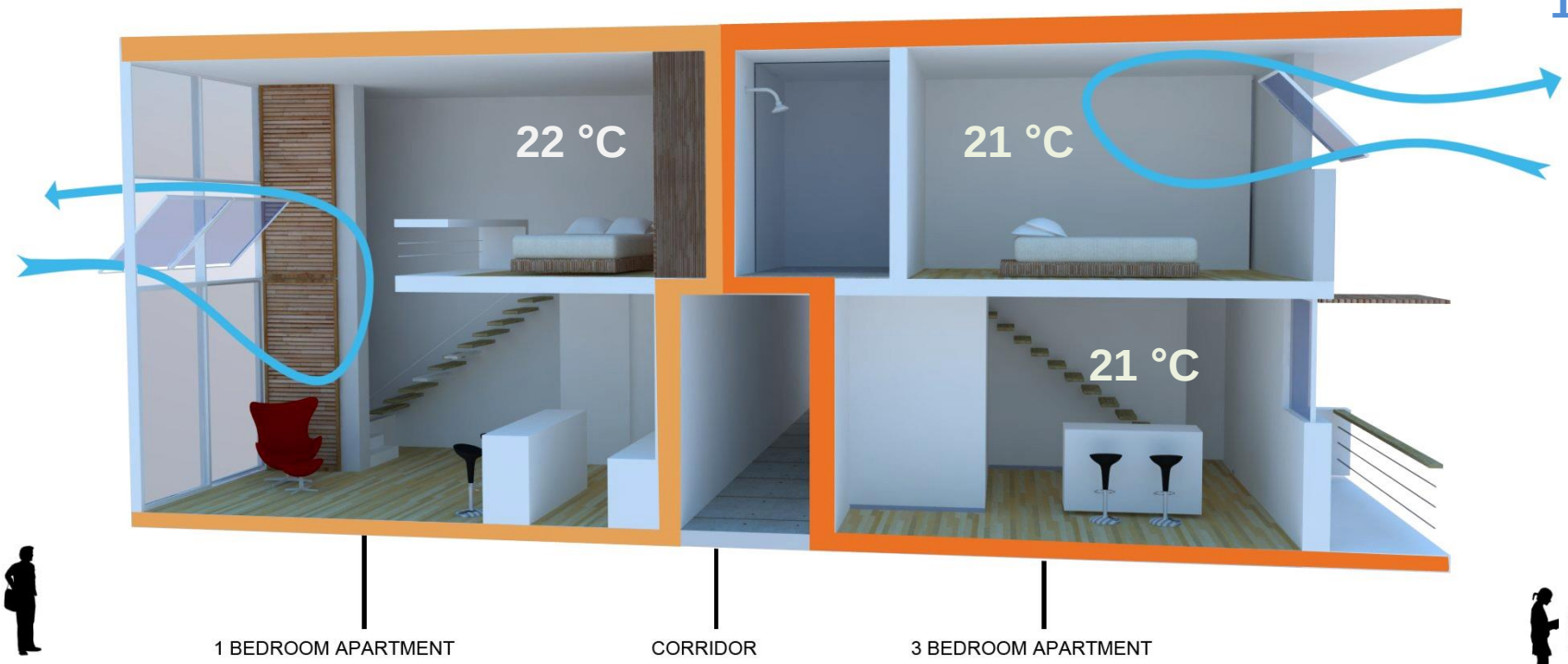
CORRIDOR

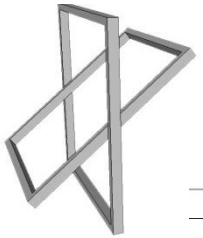
3 BEDROOM APARTMENT

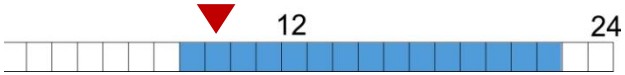
Typical August Day
09:00

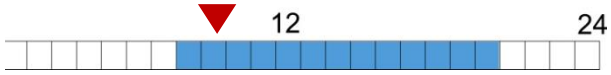


18.5 °C

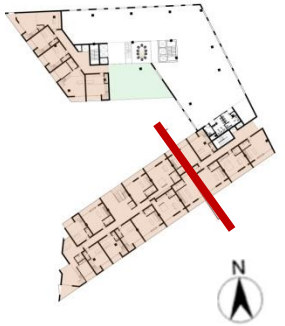








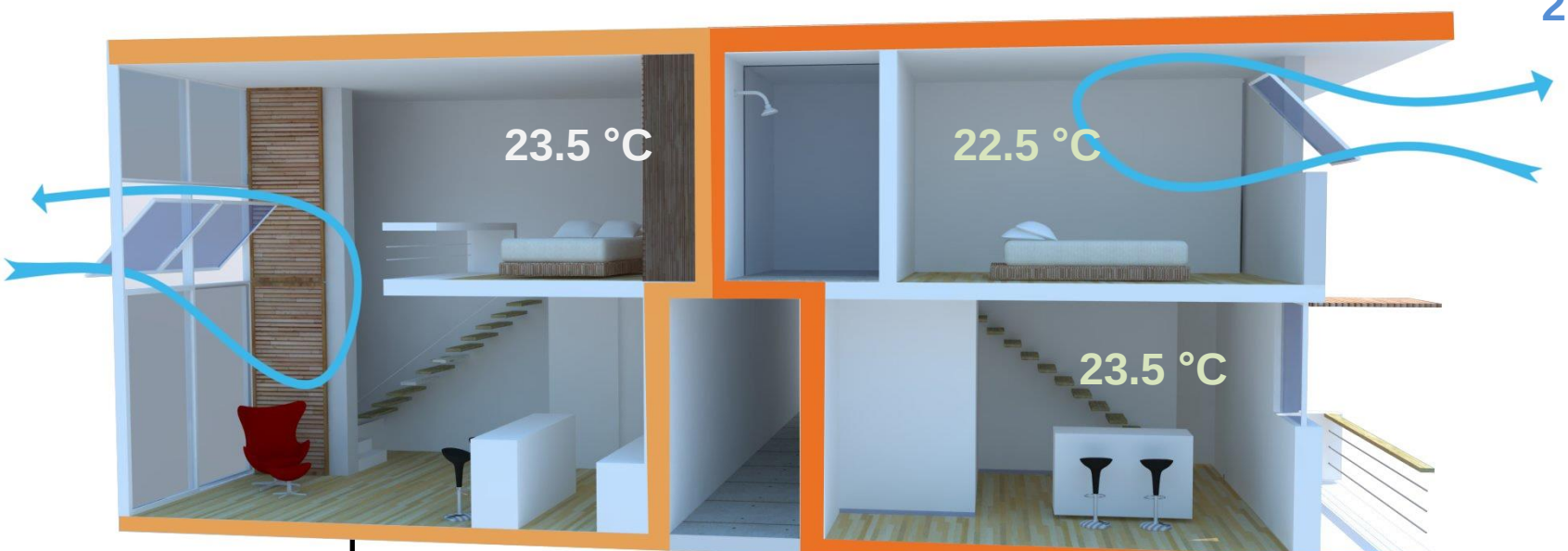
Typical August Day
12:00



21.5 °C

COURTYARD

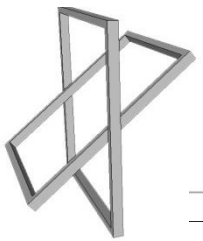
HIGH HOLBORN STREET

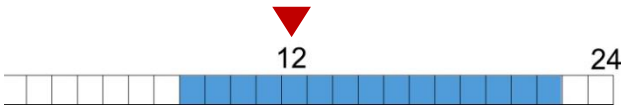


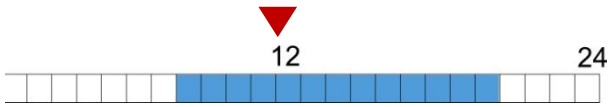
1 BEDROOM APARTMENT

CORRIDOR

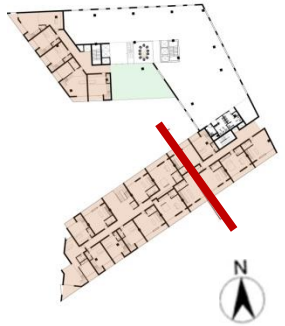
3 BEDROOM APARTMENT





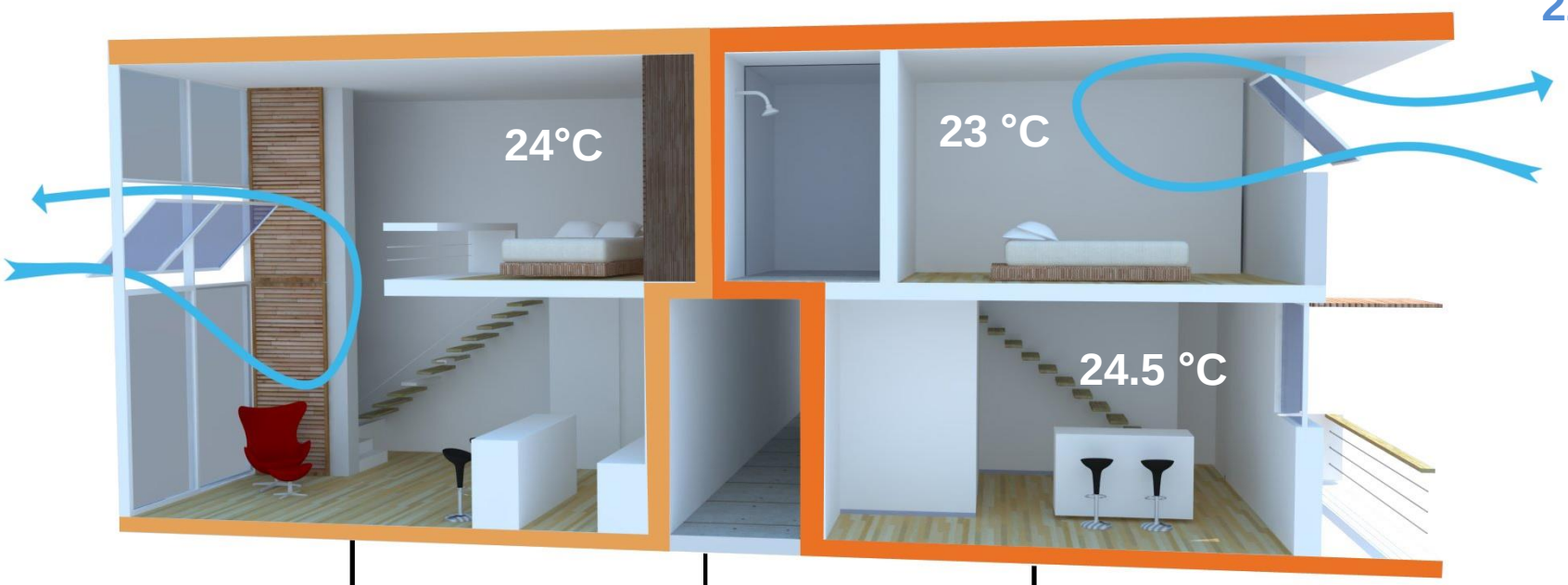


Typical August Day
15:00



22.5 °C

COURTYARD

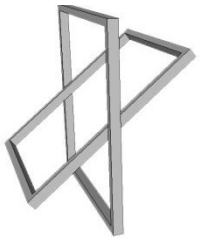


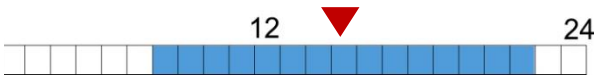
HIGH HOLBORN STREET

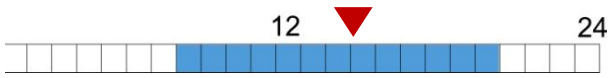
1 BEDROOM APARTMENT

CORRIDOR

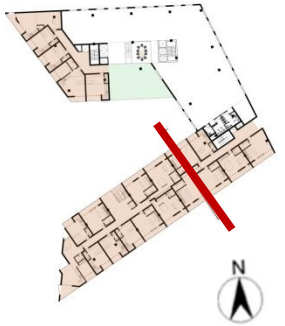
3 BEDROOM APARTMENT







Typical August Night
22:00



18.6 °C

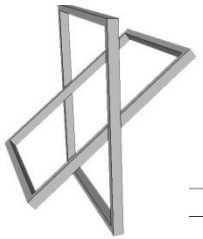
COURTYARD

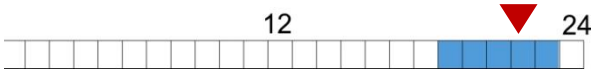
HIGH HOLBORN STREET

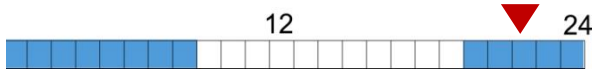
1 BEDROOM APARTMENT

CORRIDOR

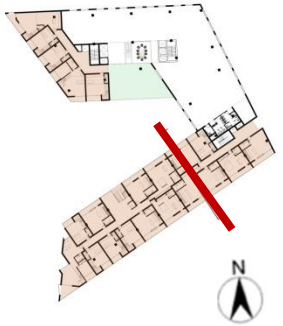
3 BEDROOM APARTMENT



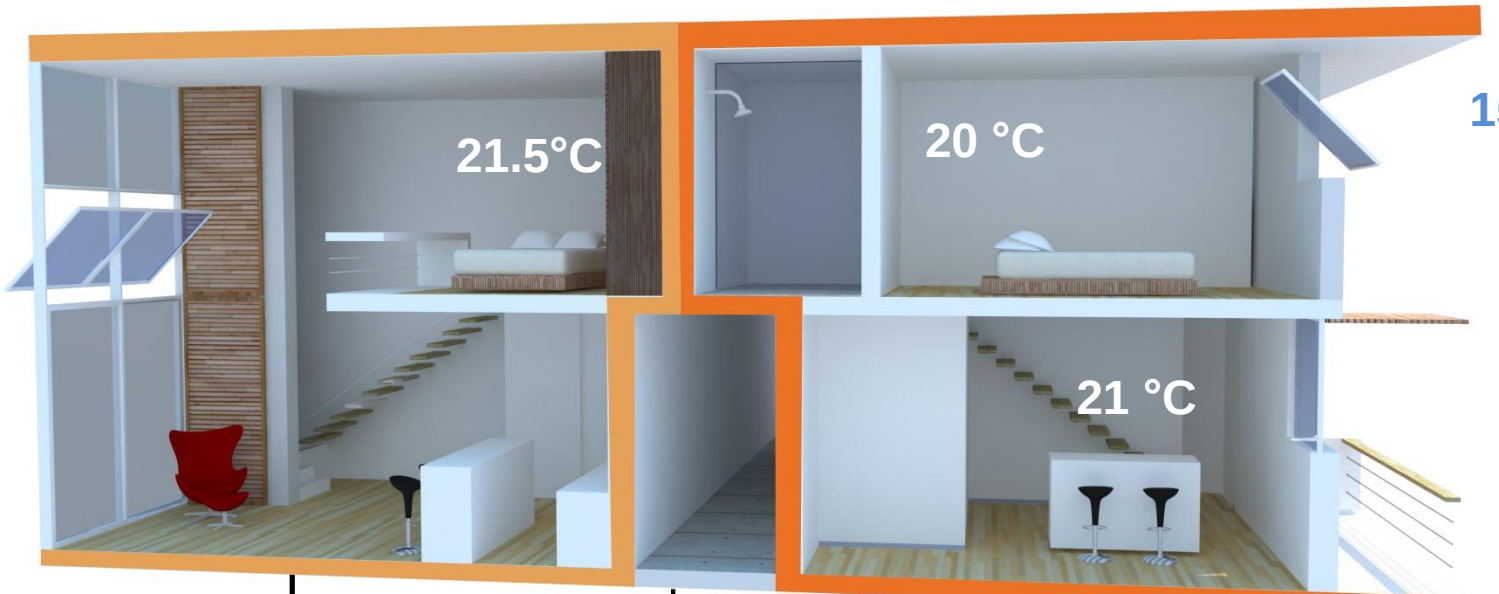




Typical August Day



COURTYARD



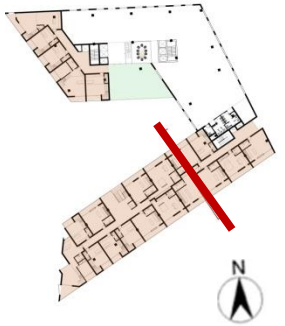
HIGH HOLBORN STREET

1 BEDROOM APARTMENT

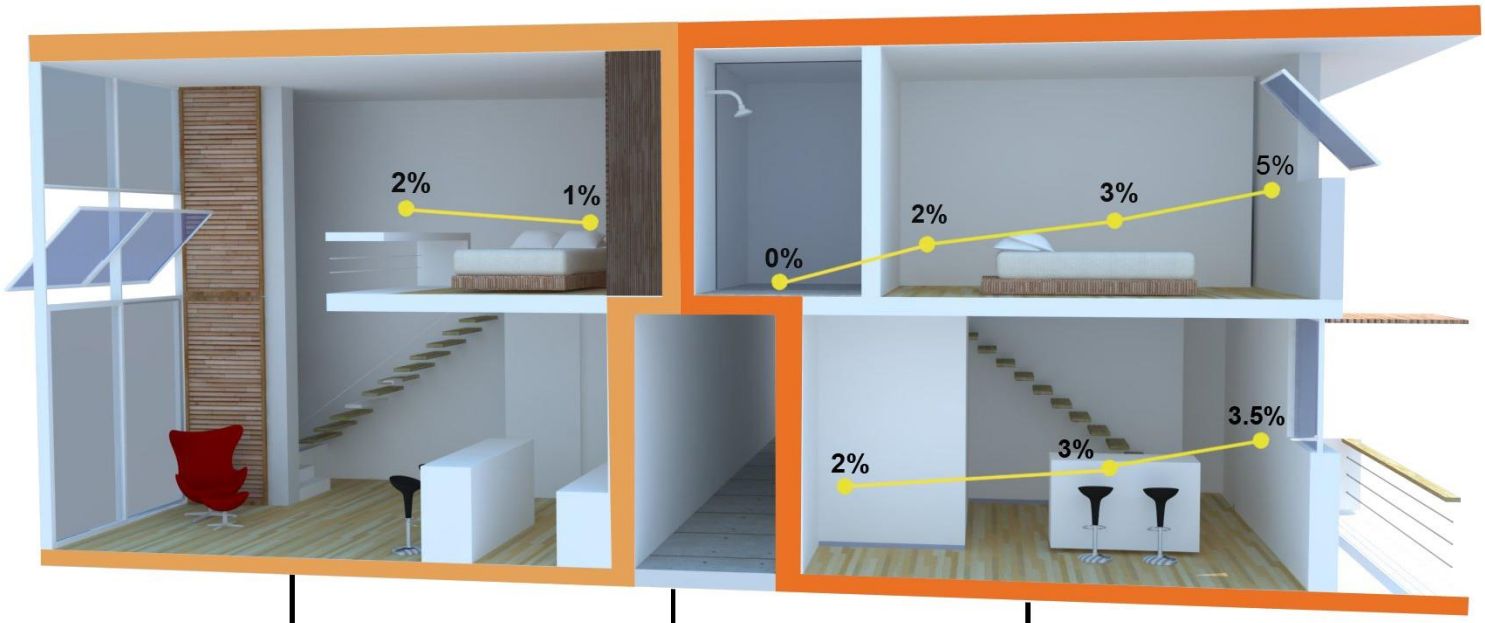
CORRIDOR

3 BEDROOM APARTMENT

Daylight Factor Bedrooms/ Kitchen
Overcast Sky 5000 Lux



COURTYARD

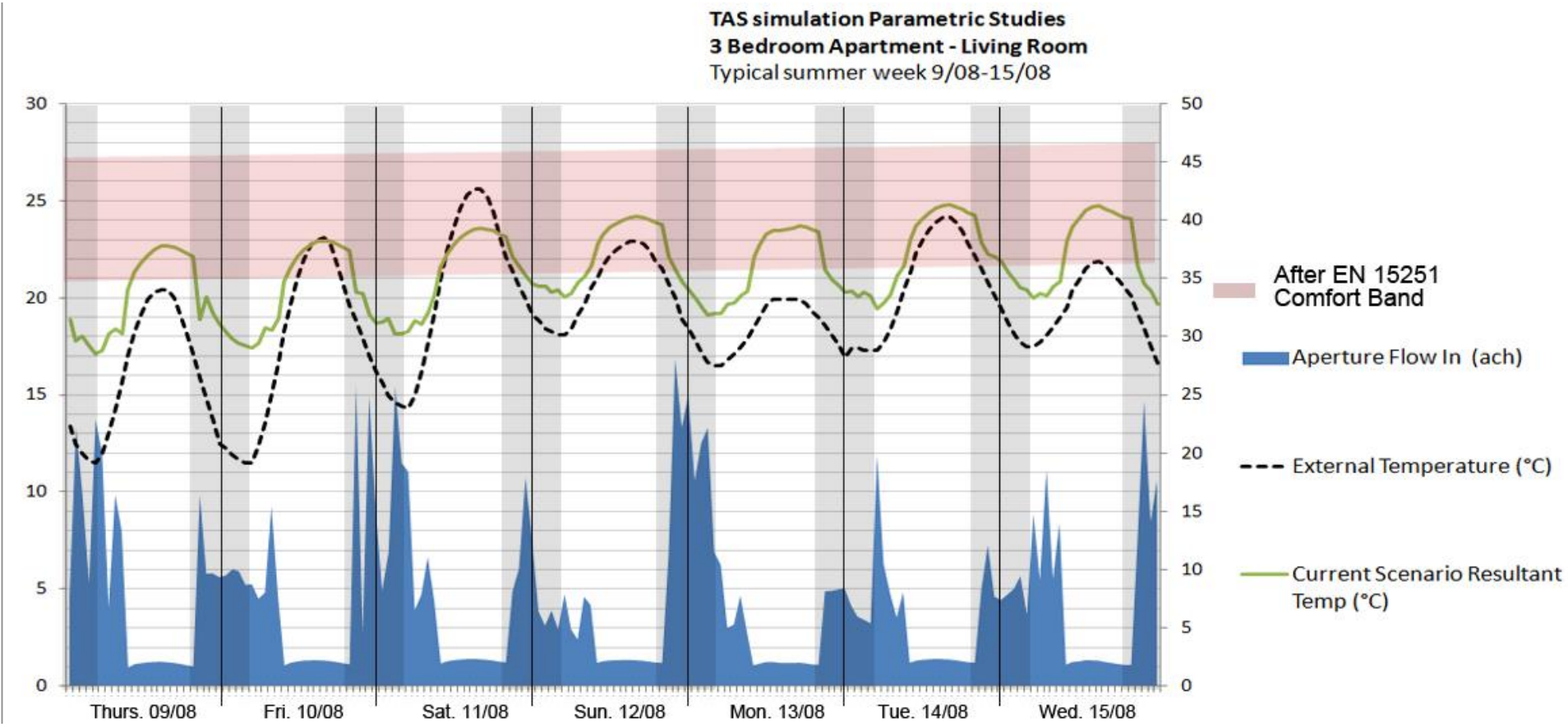


HIGH HOLBORN STREET

1 BEDROOM APARTMENT

CORRIDOR

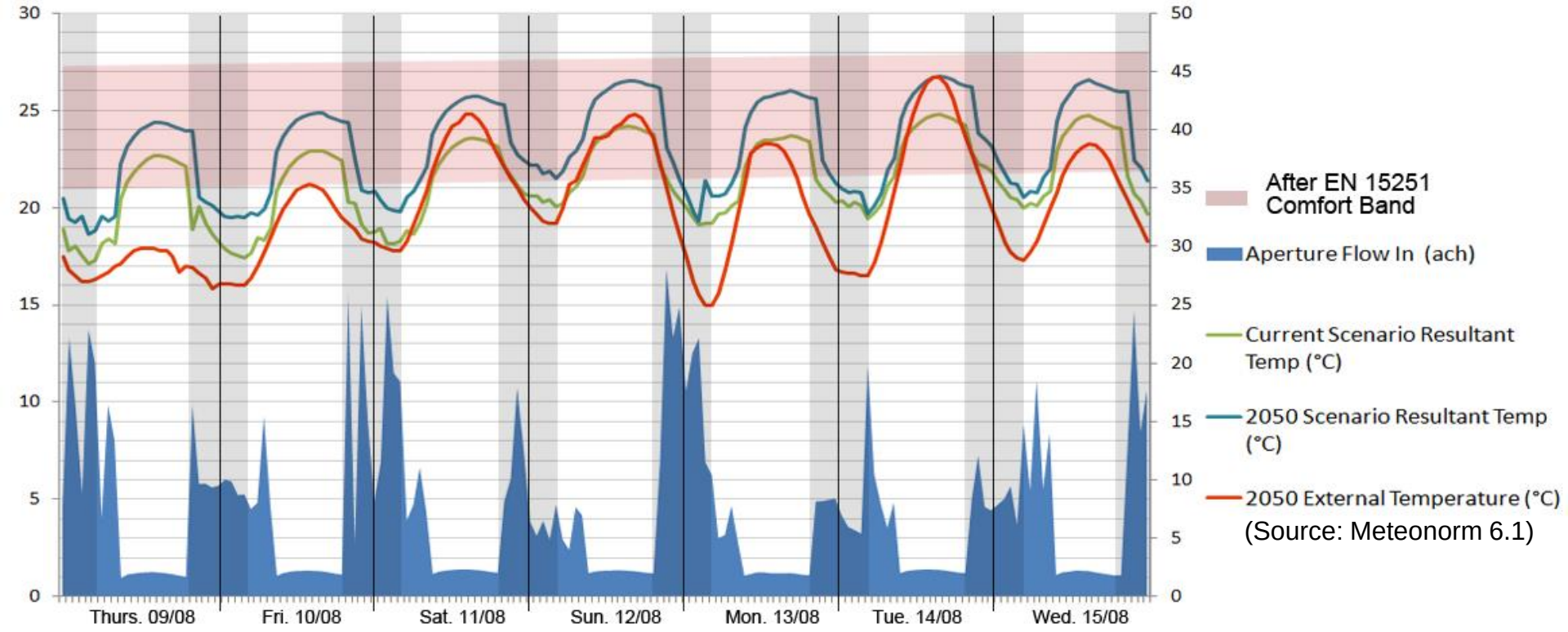
3 BEDROOM APARTMENT



Current Scenario Internal Gains:

Kitchen/Living: **4.0 W/m^2**
Bedrooms: **2.1 W/m^2**

TAS simulation Parametric Studies
3 Bedroom Apartment - Living Room
Typical summer week 9/08-15/08



(Source: Meteonorm 6.1)

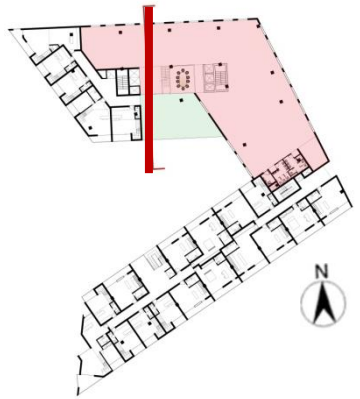
Current Scenario Internal Gains:

Kitchen/Living: **4.0 W/m²**
Bedrooms: **2.1 W/m²**

Occupancy: 30% Increase

Offices Location

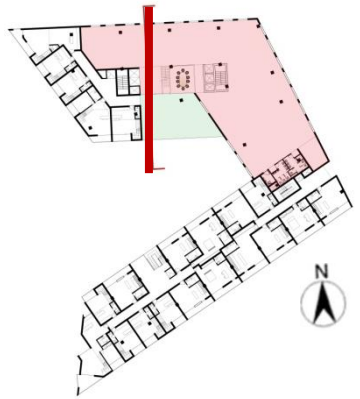
Offices



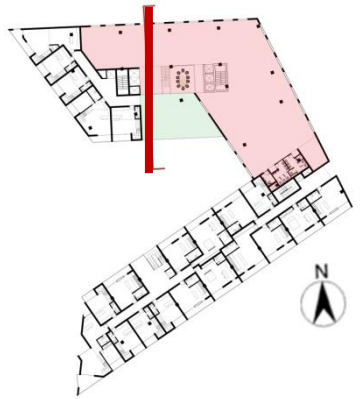
Offices

Daylight Factor

Overcast Sky 5000 Lux



Offices

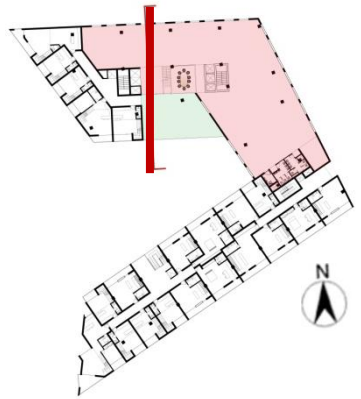


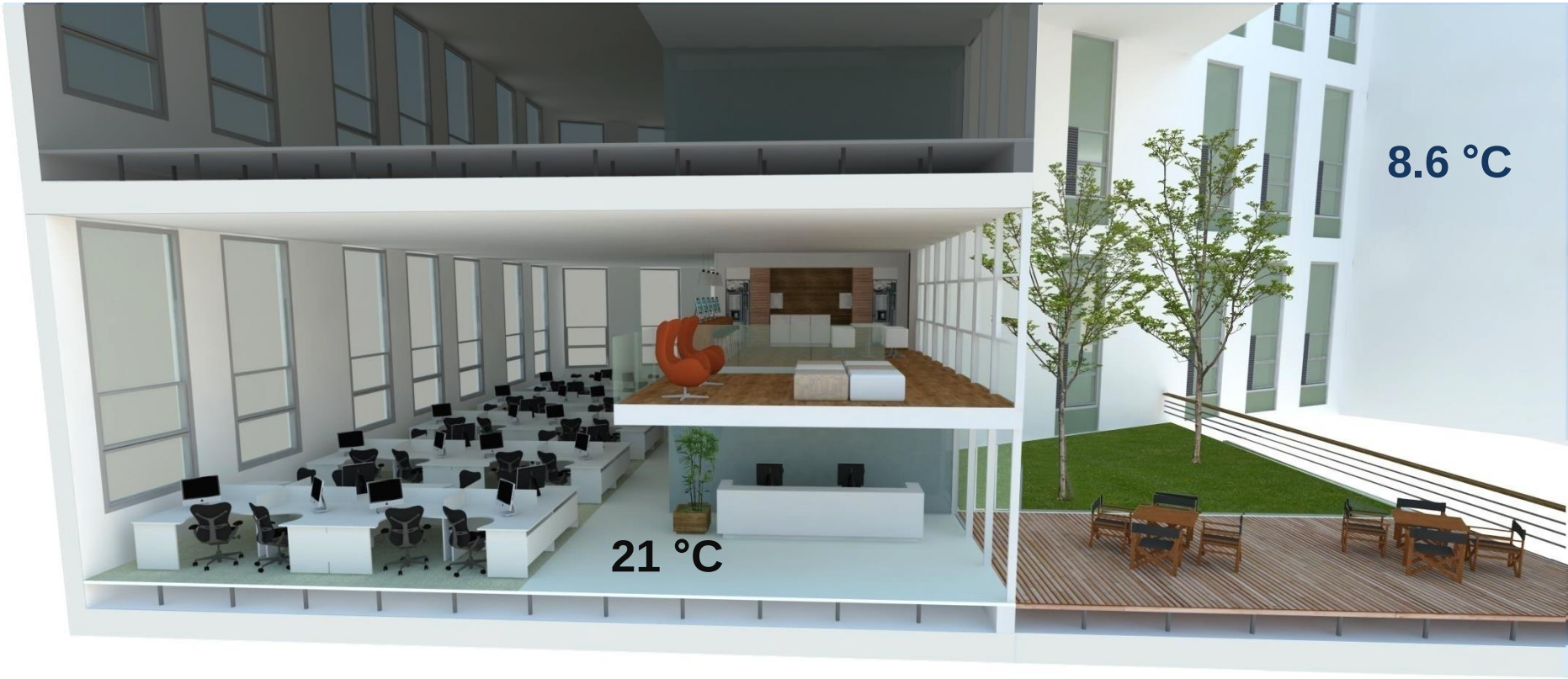
Appliances: 16 W/m²

Lights: 11 W/m²

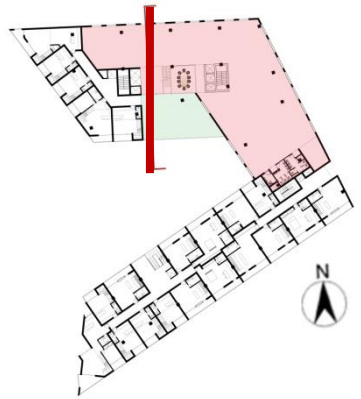
Density: 10 m²/Person

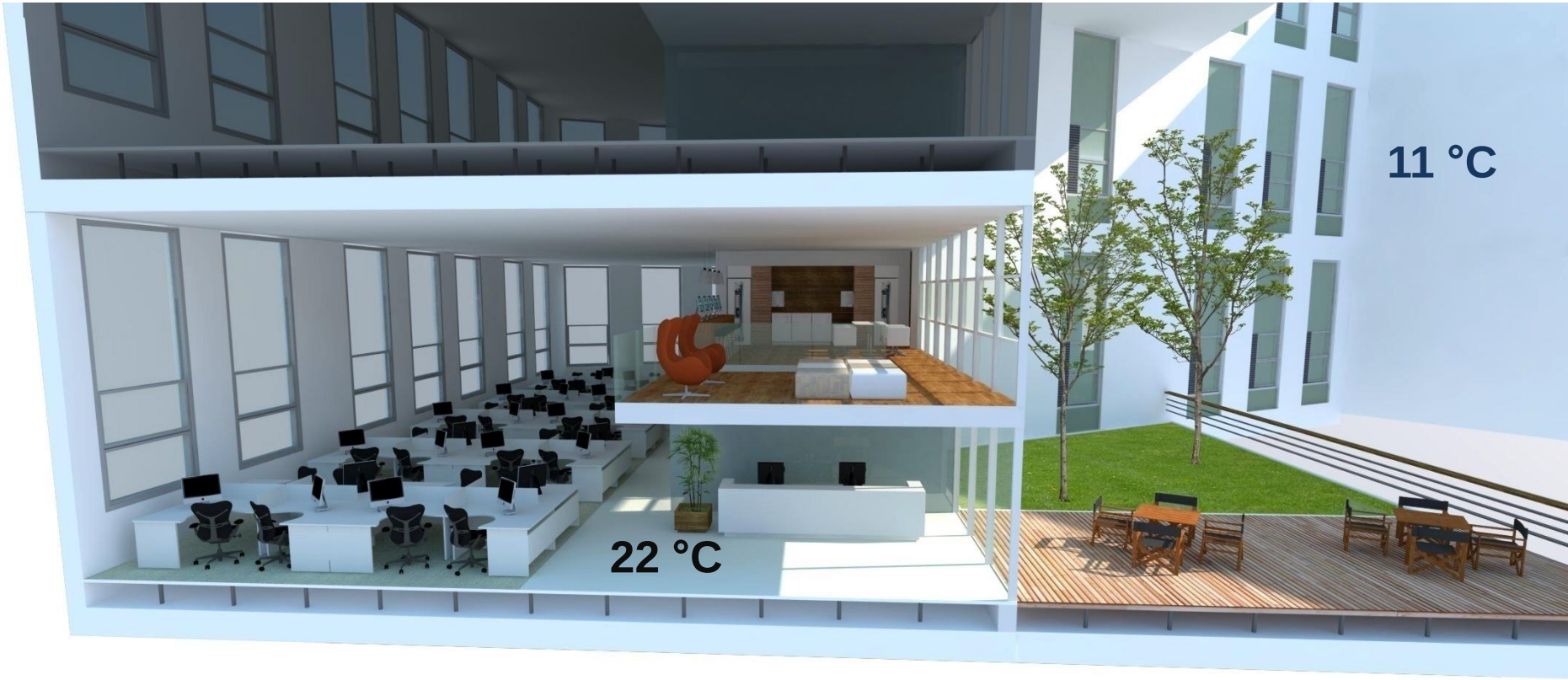
Typical January Day



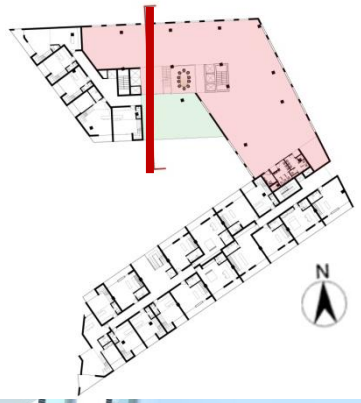


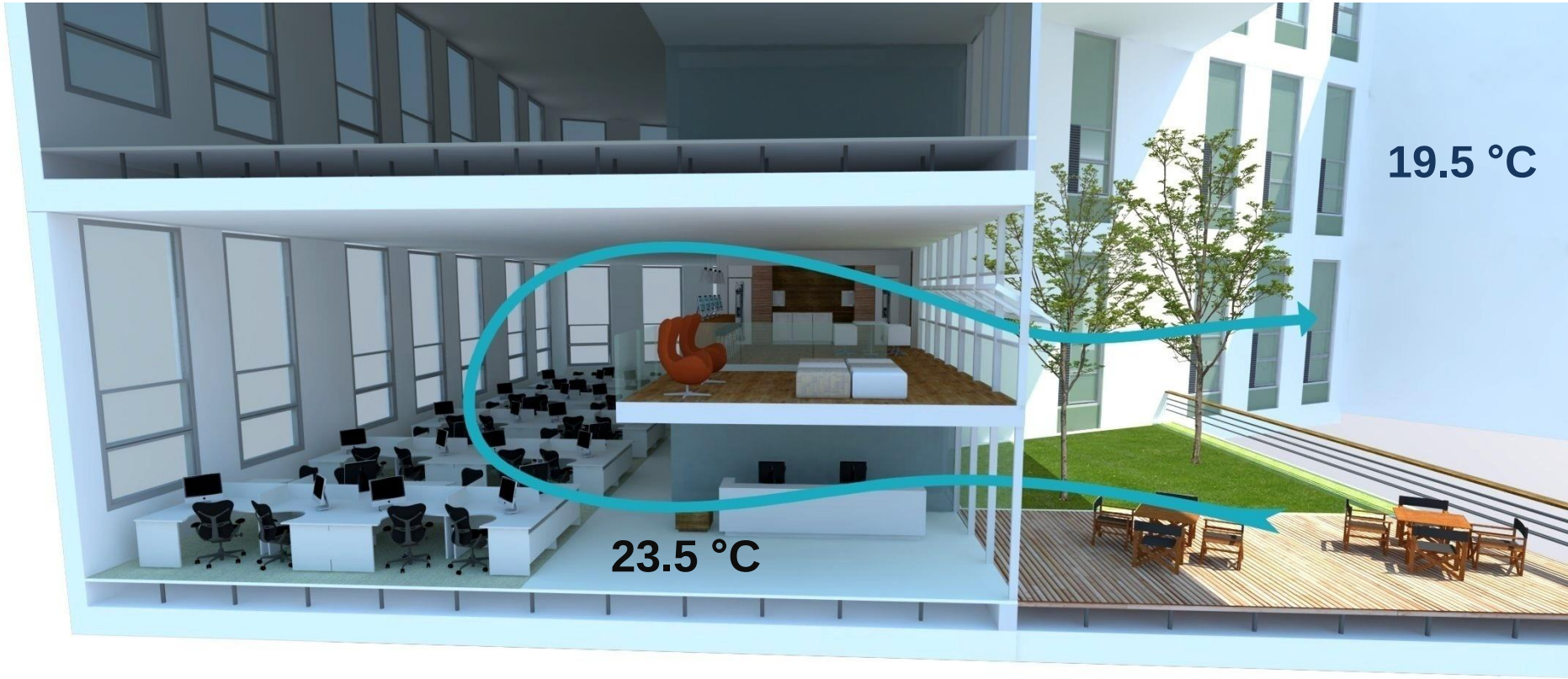
Typical March Day



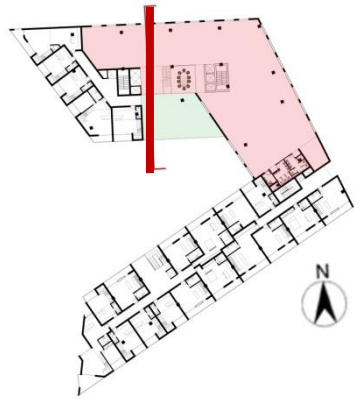


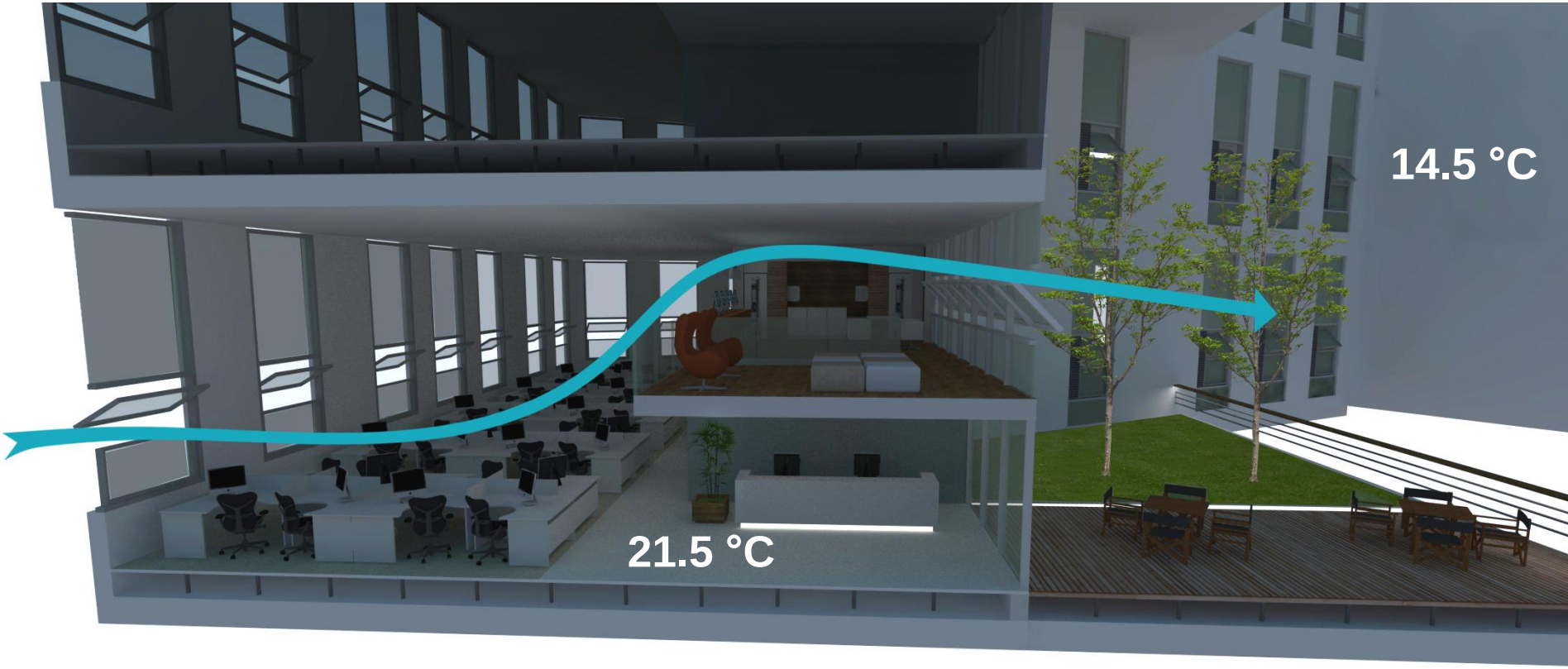
July Typical Day



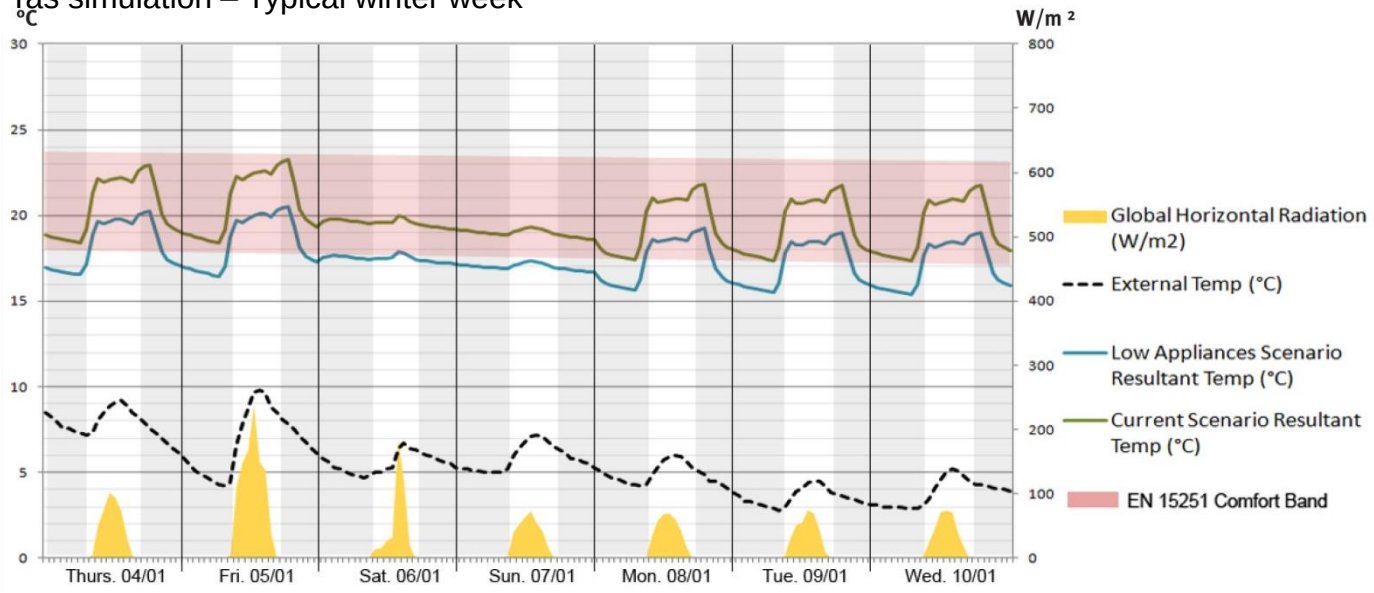


July Typical Night

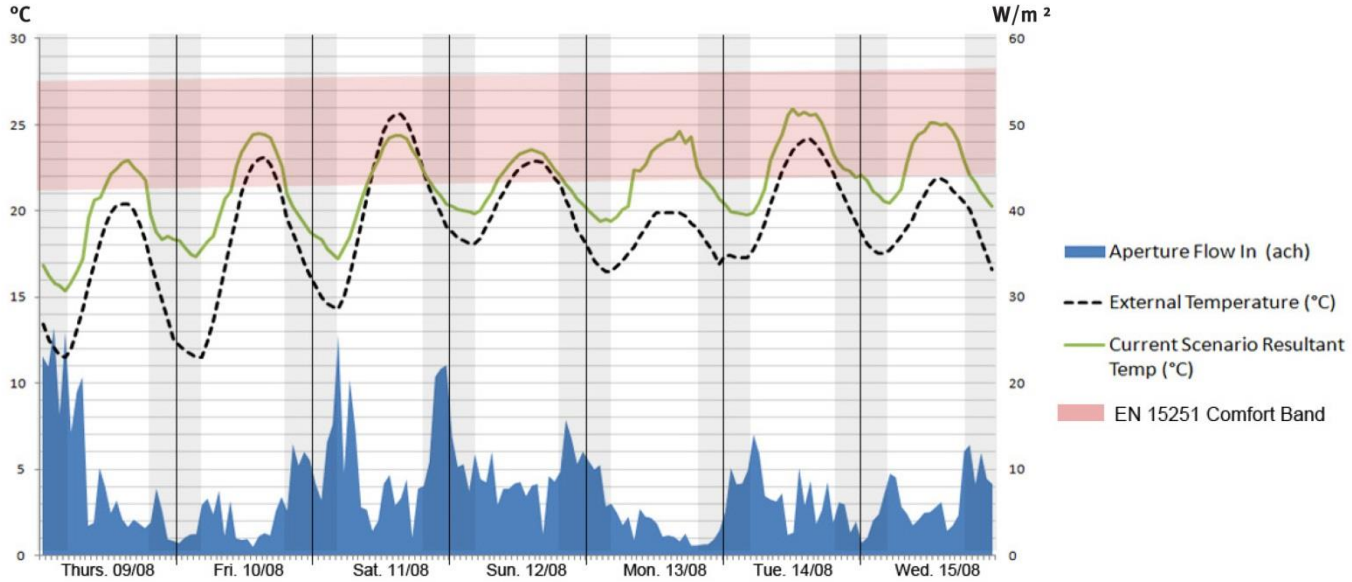




Tas simulation – Typical winter week



Tas simulation – Typical Summer week



Photovoltaic Panels

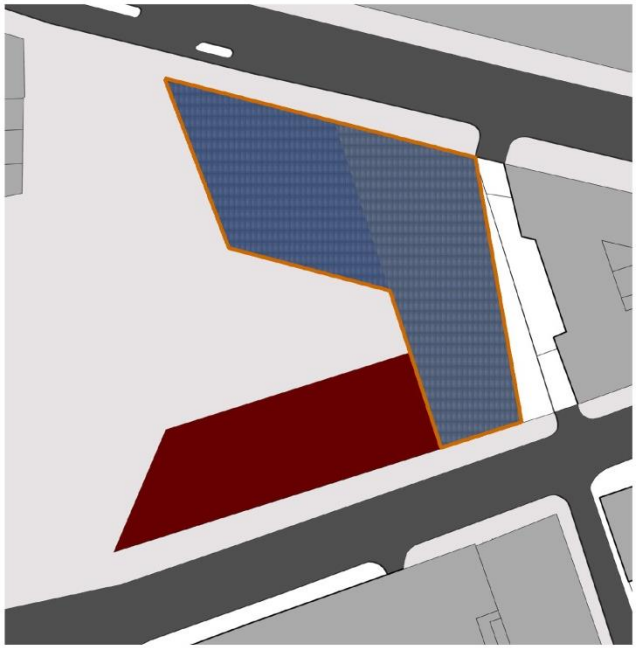


Figure 123: Roof plan with the position of the PV-T panels

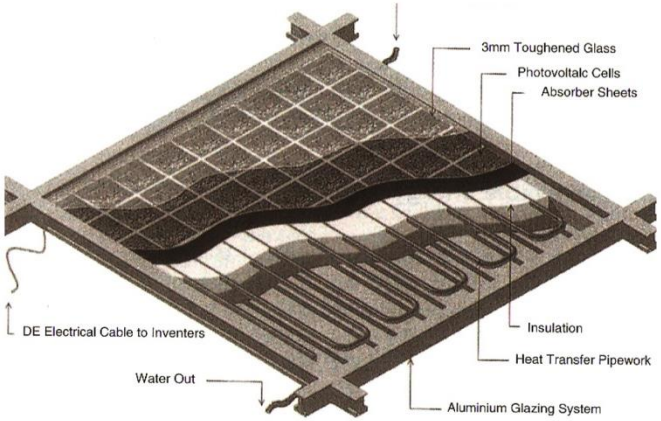
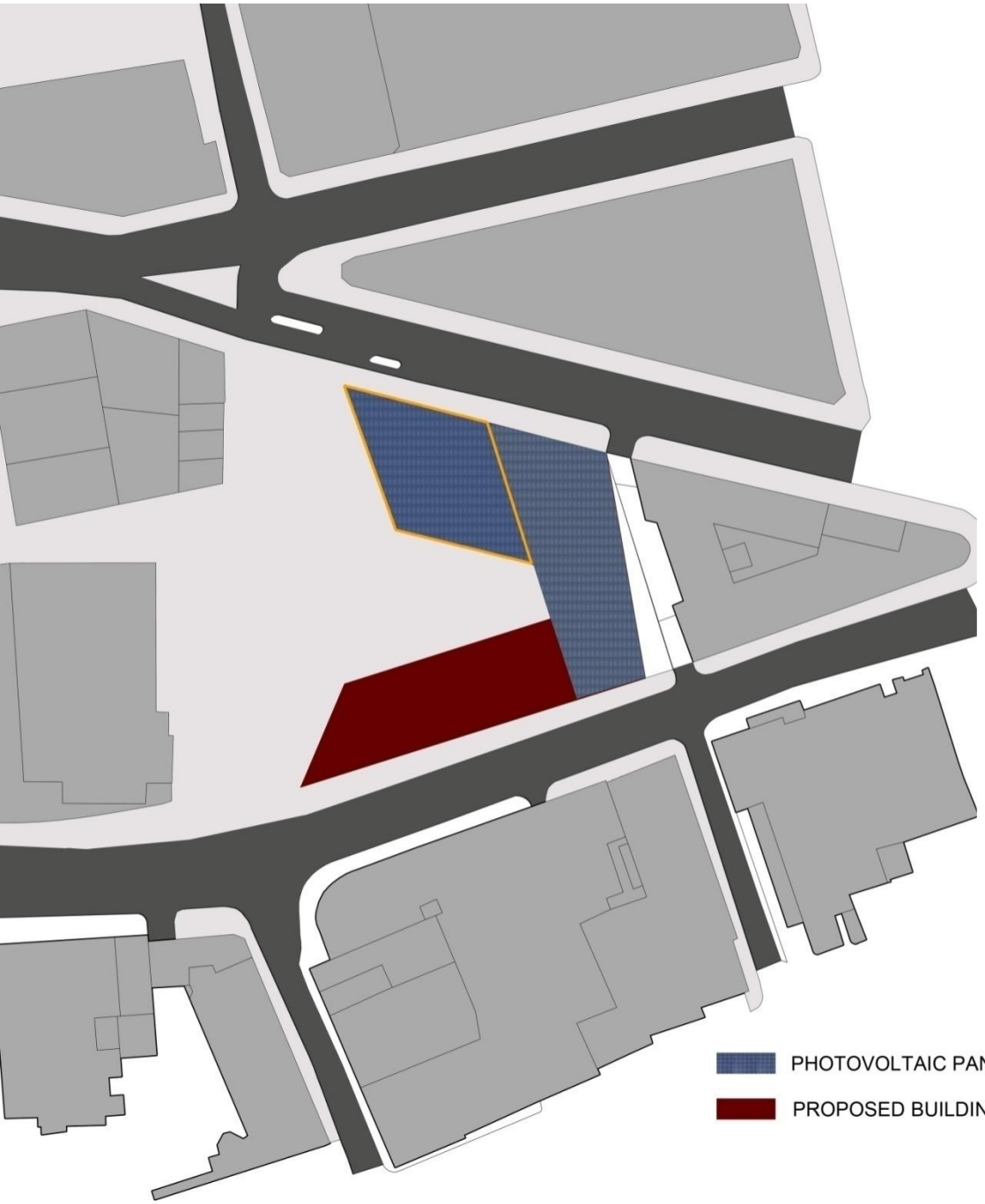


Figure 124: Arrangement of a PV-T Panel
(Source: Smith, P. 2005)

Appliances		Quantity	Power	Usage (Hours per day)	Usage (Days)	Electric Consumption Yearly
	Panasonic Touch Control Microwave	1	0.8 kW	0.16	365	47 kWh/year
	Hotpoint Built-In Electric Multifunction Oven	1	1.1 kW	1	135	149 kWh/year
	Hotpoint 10.7 Cu.Ft Capacity Fridge Freezer	1				263 kWh/year
	Hotpoint Aquarius Graphite Dishwasher	1	1.05 kW	1	183	220 kWh/year
	Beko Washing Machine	1	1.01 kW	2	121	245 kWh/year
	Hotpoint Ultima Graphite Washer Dryer	1	4.7 kW	1	121	568 kWh/year
	Miele Cylinder Vacuum Cleaner	1	2.0 kW	1	52	104 kWh/year
	Russell Hobbs Steam Iron	1	2.4 kW	1	104	250 kWh/year
	HP All-In-One Computer PC	1	0.12 kW	3	365	131 kWh/year
	Samsung 32" Lcd Tv	1	0.12 kW	3	365	131 kWh/year
Total electric consumption from appliances for 82 apartments						173,000 kWh/year [1]
Lighting						
Studio Apartment (6 No.)	Toilets	2	0.20 kW	1	365	15
	Living Room	4		3		88
	Kitchen	2		2		29
1 Bedroom Apartment (27 No.)	Bedroom	3	0.20 kW	2	365	44
	Toilets	2		1		15
	Living Room	4		3		88
	Kitchen	2		2		29
2 Bedroom Apartment (32 No.)	1 Bedroom	3	0.20 kW	2	365	44
	2 Bedroom	3		2		44
	Toilets	4		3		88
	Living Room	2		1		15
	Kitchen	2		2		29
3 Bedroom Apartment (17 No.)	1 Bedroom	3	0.20 kW	2	365	44
	2 Bedroom	3		2		44
	3 Bedroom	3		2		44
	Toilets	2		1		15
	Living Room	4		3		88
	Kitchen	2		2		29
Total electric consumption from lighting for 82 apartments						17,000 kWh/year [2]
Total electric consumption for Residential unit (Appliances + Lighting)						190,000 kWh/year

Table 1: Estimated electric loads for a typical residential unit.

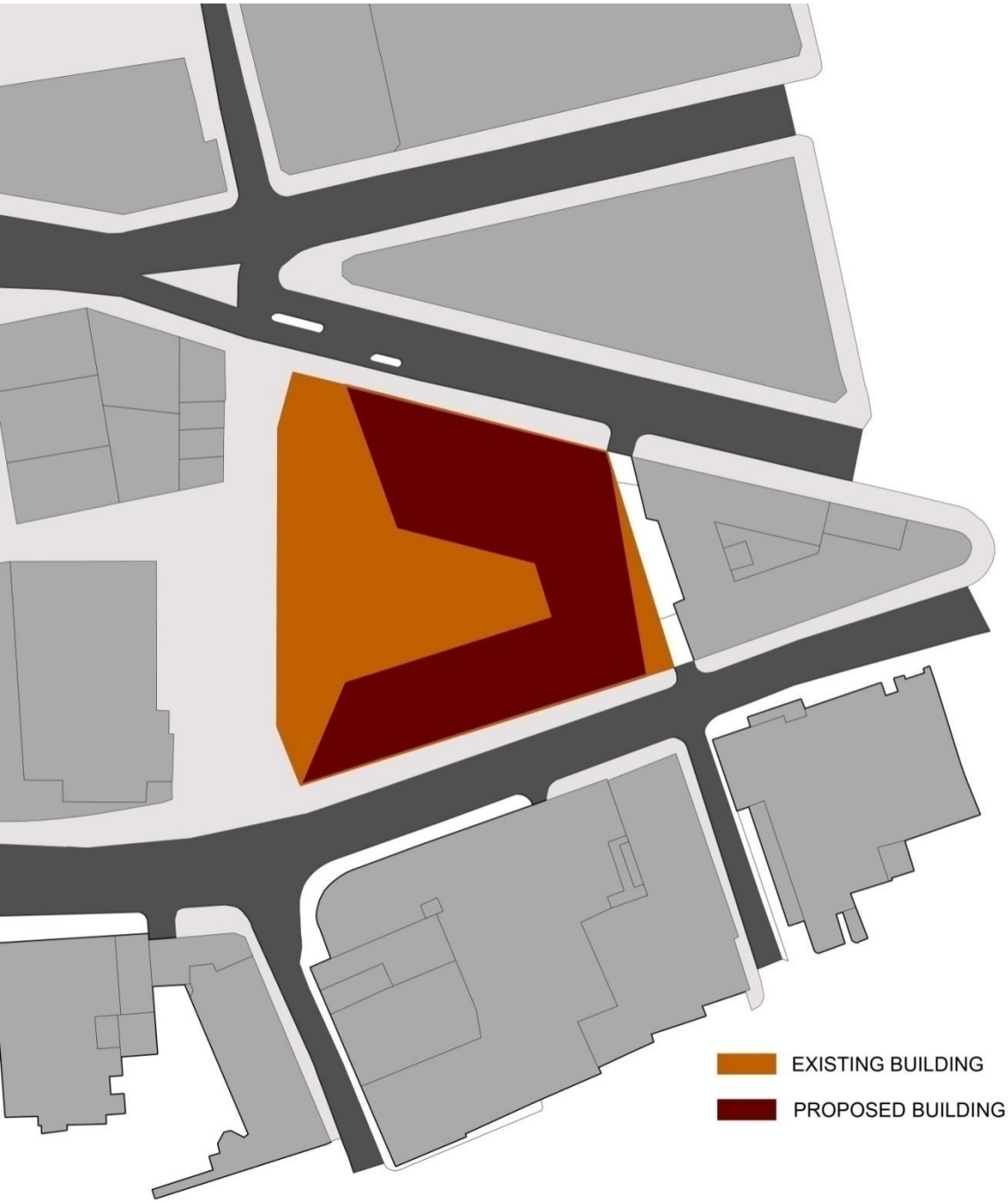
PHOTOVOLTAIC ANALYSIS



TOTAL ELETRIC CONSUMPTION FOR 82 RESIDENTIAL UNITS (LIGHTING + APPLIANCES) = **190,000 kWh/y**

ÁREA OF PV PANEL: 1500 M²

APROXIMATE ANNUAL ENNERGY PRODUCTION (EFFICIENCY OF 17%): **200,700 kWh/year**



VOLUMETRIC ANALYSIS OF CONCRETE RETAINED AND DEMOLISHED

EXISITING BUILDING

CONCRETE FLOOR	10,500 m^3
CORES	2400m^3
CONCRETE COLUMNS	700 m^3
TOTAL	**13600 m^3**

PROPOSED BUILDING

CONCRETE FLOORS DEMOLISHED	3700 m^3
CORES DEMOLISHED	2400 m^3
COLUMNS DEMOLISHED	400 m^3
TOTAL DEMOLISHED	**6500 m^3**

CONCRETE RETAINED	**7100 m^3**
PERCENTAGE OF CONCRETE RETAINED	**52 %**