
Holiday Inn Express, Manchester

Daylight & Sunlight Assessment

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V1	26/01/2024	JK	AA

Executive Summary

This document investigates the impact the extension of Holiday Inn Express, Manchester will have on daylight and sunlight levels to the surrounding buildings.

This impact has been evaluated using daylight and sunlight assessment methods from BRE guidance and the analysis conducted using the SunCast and RadianceIES modules from the IES Virtual Environment suite of software.

Shadow plots of the building and the surrounding area have been used to identify the main area of focus as the Artisan Heights student accommodation on the opposite bank of River Medlock. Detailed analysis of the facing elevation of the Artisan Heights building has been conducted to assess both daylight and sunlight impact from the hotel extension.

In both the case of daylight and sunlight levels, there are windows that have been shown to be negatively impacted by the new development. However, in most cases, these windows were already heavily compromised due to their position adjacent to the existing hotel and other surrounding buildings and as such there will be very little change in circumstance to the residents of these apartments.

Given the location of the site, it is not unreasonable to conclude that the daylight and sunlight levels for the whole elevation would not be considered low in the context of city living.

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Holiday Inn Express, Manchester

1. Introduction

This report specifically deals with the proposed two storey extension of Holiday Inn Express on Oxford Road in Manchester. The existing building is a 10-storey hotel situated adjacent to the River Medlock.

The proposal is to retain all the plant on the existing roof and construct 2 additional storeys above the plant deck. The plant deck will become the 11th floor and will have an open façade all around its periphery. The new 12th and 13th floors will have an additional 24 bedrooms between them.

1.1. Location

The Holiday Inn Express to be developed is located on the corner of Oxford Road and Hulme Street (Fig.1).



Fig.1 - Proposed Development Location

The site is bounded by the River Medlock to the northwest, Oxford Road to the east and Hulme Street to the south.

1.2. Influence of the new development on existing buildings

The graphic below (Fig.2) demonstrates that the development site lies predominately to the east of the nearest residential buildings with two student accommodation buildings in close proximity.

Being a city centre location, there is a diverse range of building usage profiles for the locality and the occupancy for these buildings will vary at different times of the day. The influence of overshadowing from the development will therefore vary in its significance on the surrounding buildings depending on the perceived buildings' hours of occupancy.

The analysis described in this report will support this statement and investigate the influence of overshadowing on the existing buildings in the surrounding areas. This analysis will then be used to identify any 'at risk' buildings that may be negatively impacted by the new development and assess their performance against the standards set out in the BRE guidance – '*Site Layout Planning for Daylight and Sunlight by Paul Littlefair*'.

2. Analysis

It is intended to demonstrate that at varying times of the year the additional shading from the proposed development will not significantly reduce the amount of daylight and sunlight received by the residential and non-domestic buildings in the surrounding area. This analysis will be carried out using the SunCast and RadianceIES module from the IES Virtual Environment suite of software.

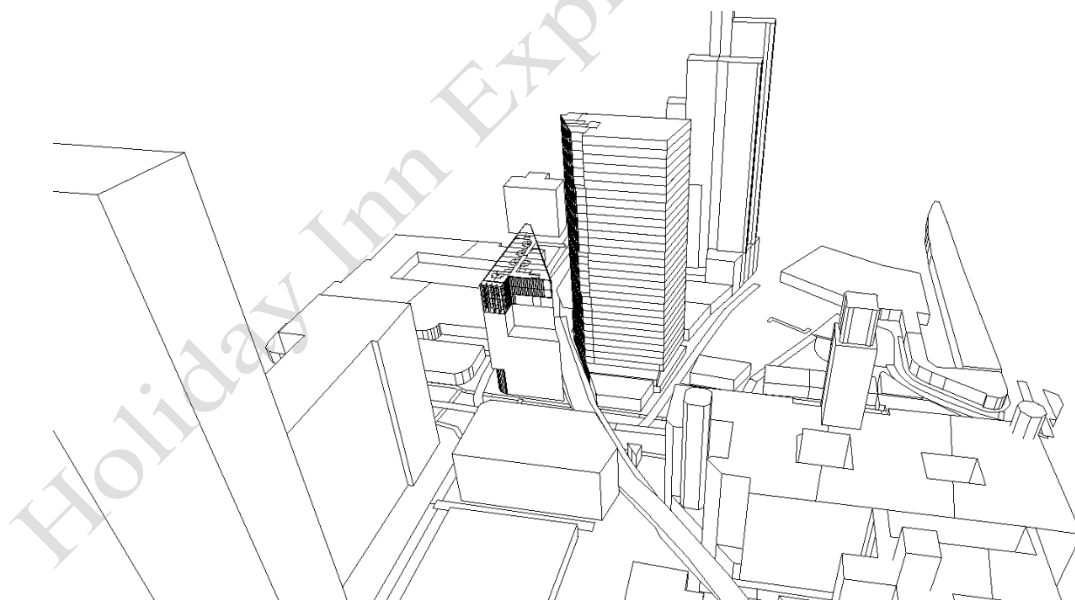


Fig.2 – IES model view of development and neighbouring residences

The software utilises location data to accurately simulate the local sun path at various times of the year. The nearest reference point for this data is located at Manchester Airport at 53° 35' latitude and 2° 28' longitude (Fig.3).

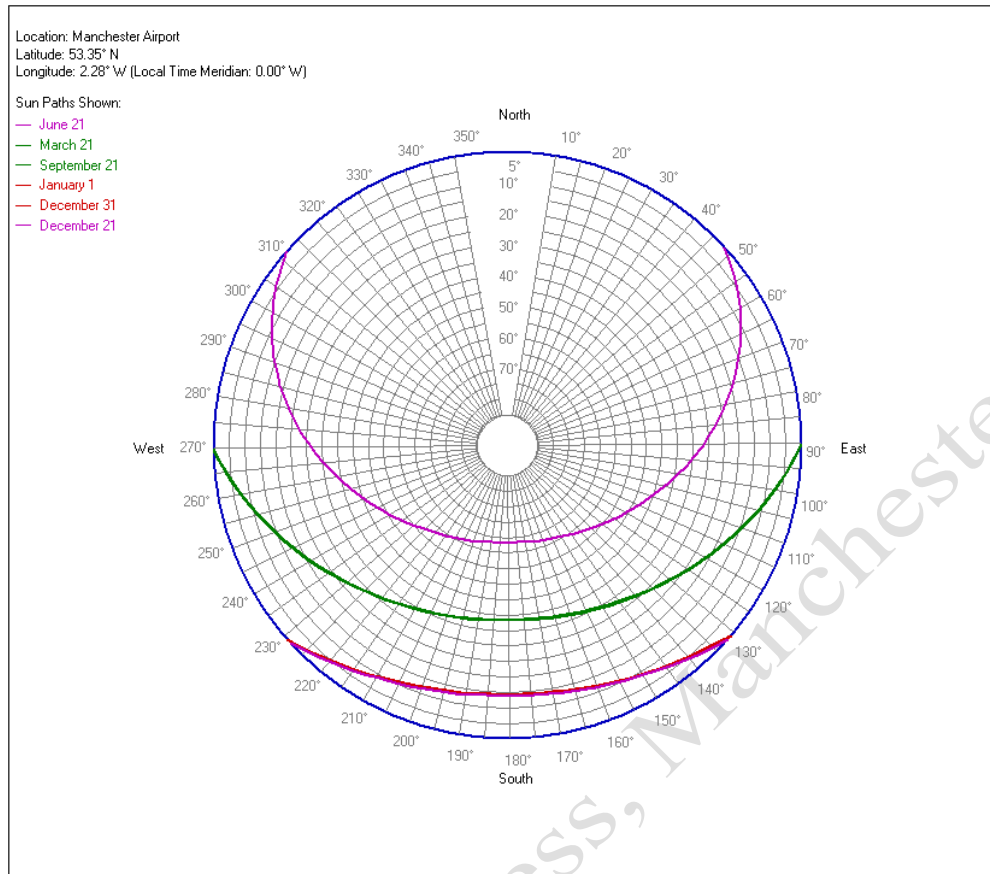


Fig.3 - Sunpath Diagram

The average level of shadowing is best measured on the equinox (21st March) but, for completeness, this report will also assess the levels of shadowing at both the winter and summer solstice to ascertain the shadowing impact throughout the year. Analysis has not been carried out at the September equinox as these results will be similar to the March equinox results.

The software will be used to produce images of the shadowing at hourly intervals to ascertain the approximate time when shadows from the development will be cast over the surrounding buildings in the local area.

3. Overshadowing

The images referenced within this section are contained in Appendices A, B & C of this report.

1.1. March Equinox

The shadow of the development will fall over the buildings to the west from approximately 7:00am Greenwich Mean Time (GMT) but these buildings are also impacted by the existing large buildings surrounding the development and the development is only responsible for an increase in shadowing over a portion of the south elevation of the Bridgewater Heights student accommodation building. By 9:00am the shadow of the development has moved away from Bridgewater Heights to fall over the Artisan Heights student accommodation block adjacent to the north until 2pm.

During the afternoon the development's shadow will fall across the buildings located on the far side of Oxford Road. Due to the orientation of the building the width of afternoon shadow from 15:00 to 16:00 is similar to the narrow width of the hotel. The shadow both lengthens and widens from this point onwards but merges with the lengthening shadows from the surrounding tall buildings rather than providing additional shadow.

1.2. June Solstice

At this time of the year British Summer Time (BST) is applicable and the times recorded reflect this. Sunrise is much earlier at this time of year and the shadow of the development will first fall on the buildings to the west of the development as part of an overall shadowing influence from the surroundings tall buildings in the area. As the sun follows its path to a more southerly position at higher altitude the development's shadow will fall over far less an area.

Negligible overshadowing occurs from the development during the afternoon until 16:00 when the lengthening shadows combine with the influence of the lengthening shadows from the existing buildings.

1.3. December Solstice

At the winter solstice the sun rises at a greater azimuth with no overshadowing occurring until 09:00 GMT. Due to the lower altitude of the sun at this time of the year the length of shadow produced by the development is much greater than in the previous instances. The development shadow will not fall over Bridgewater Heights to the west of the development. The reduced change in azimuth of the sun means that the development shadow will not travel around so far and not unduly influence the buildings on the opposite side of Oxford Road for any length of time before the sun sets sometime before 16:00.

1.4. Impact and Further Investigation

This analysis has led us to identify the key receptors for further analysis as the River Medlock elevation of Artisan Heights student accommodation.

The requirements for minimum levels of sunlight are only applicable to living areas whilst the daylight test should also be applied to both bedrooms and kitchens.

Internal layouts for the building have been obtained from planning documents so the type of room that each window serves has been accurately detailed. The ground level on the river elevation is plant space whilst the first floor is amenity space with a combination of kitchen and bedrooms to the floors above.

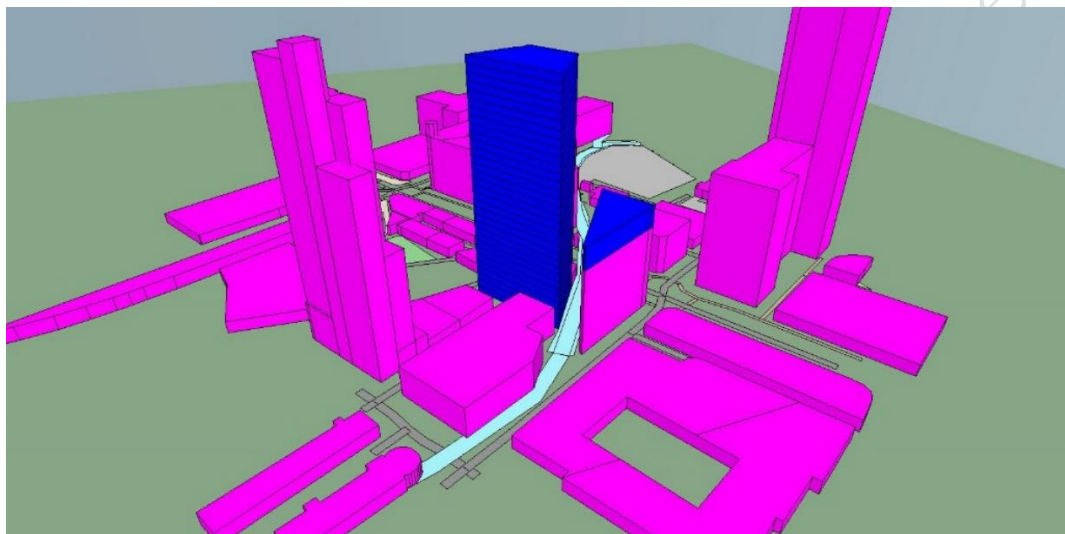


Fig.4 – Location of Artisan Heights in relation to Holiday Inn Express.

4. Daylight Assessment

The BRE guidance details conventions for assessing that adequate daylight provision is available to neighbouring buildings through conduction of a Vertical Sky Component test. The VSC is a tool to measure the amount of visible sky available at the face of an assessed window. The more unobstructed visible sky there is, the more available daylight there is to the room served by the applicable window. The BRE guidance for daylight provides a threshold for VSC of 27% with the maximum available VSC for any vertically orientated window being 50%.

When assessing the impact on existing buildings from a new development acceptable daylight can also be demonstrated if the VSC is not decreased by more than 20% from its former value before the new development is considered.

This guidance, however, has been designed with suburban locations in mind with typically low-level development as opposed to a city centre setting with high rise buildings closely packed together making such targets near impossible to achieve. In such instances, alternative targets for daylight can be set that consider the size and location of local obstructions independent of the new development. The angle between the window centre point reference point and top of the neighbouring obstructions will inform the appropriate alternative VSC target to be used which is referenced in Table F1 of the BRE guidance.

The obstruction angle for the lower floor windows of Artisan Heights is 72° , in excess of the maximum obstruction angle of 50° listed in Table F1 which has an equivalent VSC value of 13%. As our obstruction angle is in excess of this maximum listed value, a revised VSC target of 13% is appropriate in this instance and has been used as the benchmark for our analysis.

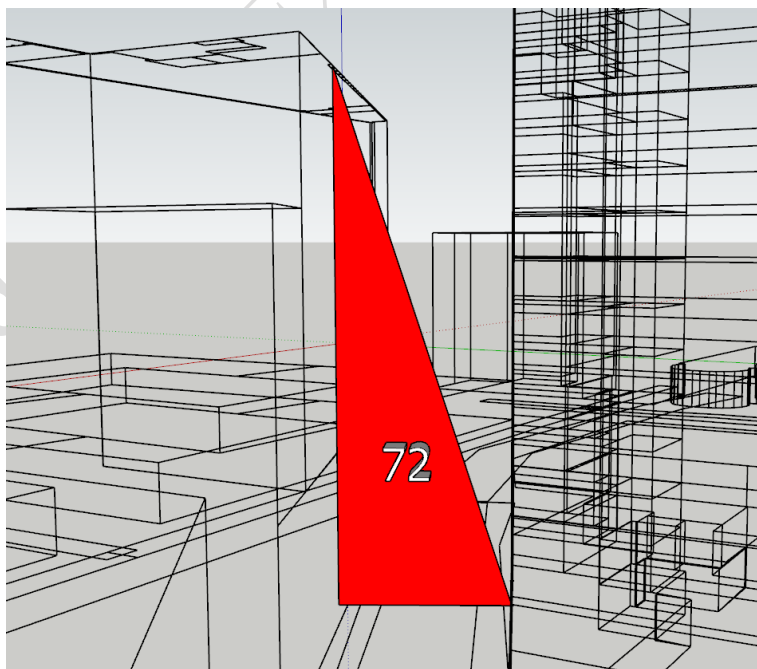


Fig.5 – Obstruction angle for Artisan Heights.

The results of the VSC assessment of Artisan Heights without the hotel extension in place are listed in Appendix D and visually represented below in Fig. 6. Of the 220 windows assessed, 163 passed outright (green) with a VSC in excess of 13%, whilst 57 windows (red) were found to not achieve guidance with a VSC less than 13%.

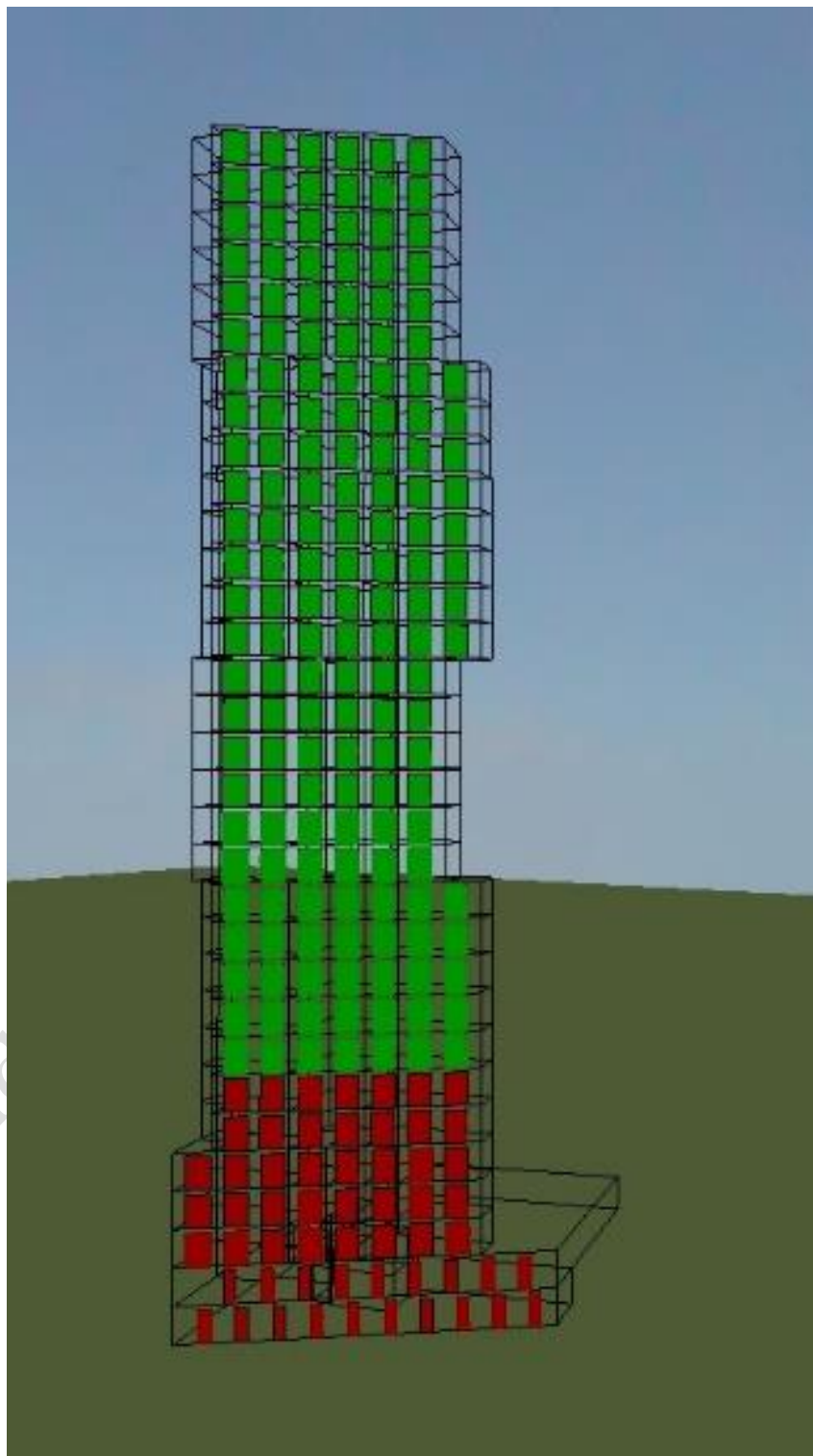


Fig.6 – Graphical illustration of VSC results without hotel extension.

The results of the VSC assessment of Artisan Heights with the hotel extension in place are listed in Appendix D and visually represented below in Fig. 7. Of the 220 windows assessed, 137 passed outright (green) with a VSC in excess of 13%, a further 20 (amber) were found to have a VSC reduction of less than 20% and deemed acceptable whilst 63 windows (red) were found to not achieve guidance for both testing criteria.

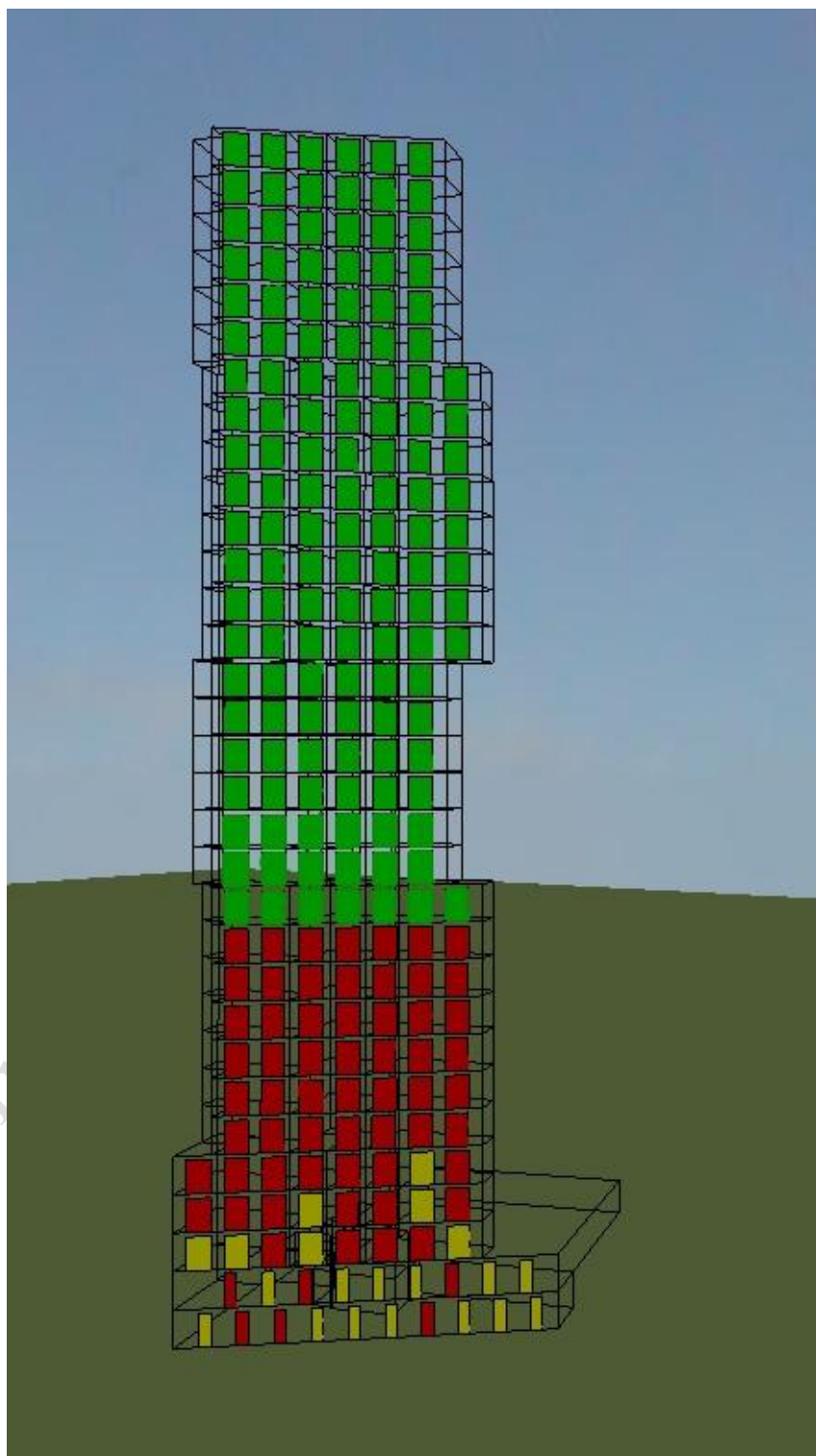


Fig.7 – Graphical illustration of VSC results with hotel extension.

The windows that have not achieved guidance are located on the lower 11 storeys of the tower and have the following results:

Window	V.S.C. without Extension	VSC with Extension	VSC Reduction	VSC % Reduction
4	5.73	4.48	1.25	21.8%
8	5.14	3.95	1.19	23.2%
9	5.26	3.89	1.37	26.0%
11	6.4	4.46	1.94	30.3%
13	5.98	4.59	1.39	23.2%
17	8.08	5.67	2.41	29.8%
20	7.46	5.16	2.3	30.8%
22	5.78	4.61	1.17	20.2%
26	7.54	5.67	1.87	24.8%
27	6.88	5.47	1.41	20.5%
29	6.94	5.37	1.57	22.6%
30	7.06	5.4	1.66	23.5%
31	7.83	5.59	2.24	28.6%
32	8.55	5.8	2.75	32.2%
33	9.68	7.09	2.59	26.8%
35	8.03	6.36	1.67	20.8%
36	8.54	5.2	3.34	39.1%
37	9.54	6.19	3.35	35.1%
38	8.55	5.94	2.61	30.5%
39	9.29	6.47	2.82	30.4%
40	9.34	6.85	2.49	26.7%
41	10.53	8.33	2.2	20.9%
43	8.93	6.59	2.34	26.2%
44	9.45	5.68	3.77	39.9%
45	10.92	6.02	4.9	44.9%
46	9.92	6.22	3.7	37.3%
47	10.08	6.79	3.29	32.6%
48	11.65	8.82	2.83	24.3%
49	10.86	7.5	3.36	30.9%
50	10.26	7.44	2.82	27.5%
51	11.81	6.62	5.19	43.9%
52	11.73	6.37	5.36	45.7%
53	11.39	6.89	4.5	39.5%
54	11.67	7.25	4.42	37.9%
55	12.84	9.14	3.7	28.8%
56	12.58	8.78	3.8	30.2%
57	12.66	8.28	4.38	34.6%
58	14.52	7.99	6.53	45.0%
59	13.89	7.9	5.99	43.1%
60	14.28	7.53	6.75	47.3%
61	14.55	7.99	6.56	45.1%
62	15.94	10.03	5.91	37.1%
63	15.18	8.67	6.51	42.9%
64	14.7	9.1	5.6	38.1%
65	17.74	8.06	9.68	54.6%
66	17.7	9.06	8.64	48.8%
67	18.1	8.51	9.59	53.0%
68	18	9.35	8.65	48.1%
69	18.33	10.69	7.64	41.7%

Window	V.S.C. without Extension	VSC with Extension	VSC Reduction	VSC % Reduction
70	19.02	10.75	8.27	43.5%
71	18.52	10.53	7.99	43.1%
72	22.26	9.61	12.65	56.8%
73	22.11	10.14	11.97	54.1%
74	22.11	10.55	11.56	52.3%
75	22.46	10.41	12.05	53.7%
76	22.45	12.45	10	44.5%
77	22.61	11.84	10.77	47.6%
78	22.59	11.14	11.45	50.7%
79	28.16	11.65	16.51	58.6%
80	28.22	11.89	16.33	57.9%
81	27.85	12.35	15.5	55.7%
82	27.44	12.31	15.13	55.1%
85	28.09	12.98	15.11	53.8%

The majority of the windows above have been shown to have reduced daylight capability before considering the impact of the extension to the hotel. Without the extension 78 of the windows on the river elevation of Artisan Heights had a VSC below 27%, indicating an already below optimal level of visible sky.

Because the existing VSC is small, the extension would in the first instance appear to have larger negative impact on the VSC values of these windows. However, the absolute reduction in VSC in over half of the impacted windows is below 5, representing less of a reduction than other windows which have been shown to follow the guidance. In this special context we would consider the reduction attributed to the new development to have negligible impact on those windows.

Summary

The results of the VSC assessments have highlighted that before the new development is taken into consideration there are 163 out of 220 windows that achieve the VSC target. When the new development is added and assessed, for both absolute VSC target and acceptable VSC reduction, there are 157 compliant windows out of 220 windows.

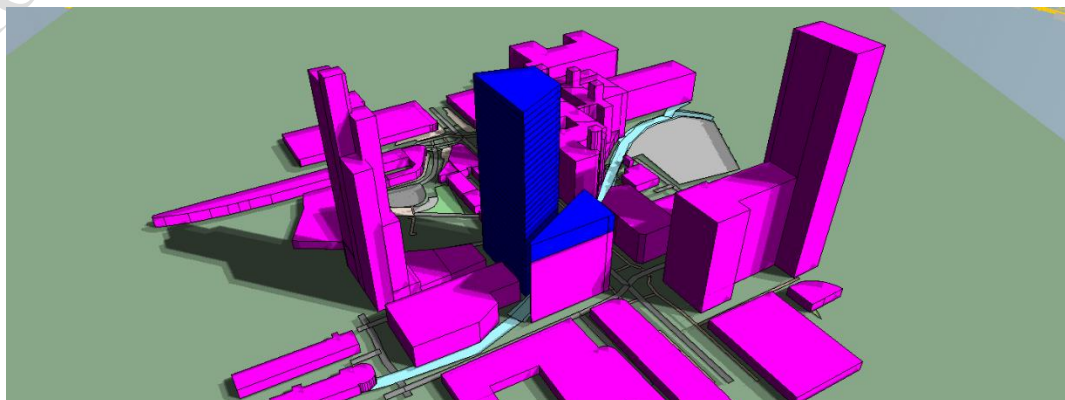
5. Sunlight Assessment

In addition to assessing the daylight levels of the existing building, the levels of sunlight available to the building's room should also be investigated to determine if the presence of the new development will negatively impact them.

BRE guidance for assessing sunlight in existing buildings considers the impact on the amount of Annual Probable Sunlight Hours (APSH) that the new development will have.

The guidance states that for rooms where there is an expectation of sunlight, the room should receive at least 25% of the APSH. During the winter months (21st September to 21st March) at least 5% of the APSH should be available.

Again, as with the VSC assessment, where the APSH values are not met, BRE guidance states that it would be acceptable to have a reduction of no more than 20% to both annual and winter month values.



The results of the APSH assessment of Artisan Heights without the hotel extension in place are listed in Appendix E and visually represented below in Fig. 20. Of the 105 rooms assessed, 82 passed outright (green) whilst 23 rooms (red) were found to not achieve guidance for either one or both of the annual and winter testing criteria.

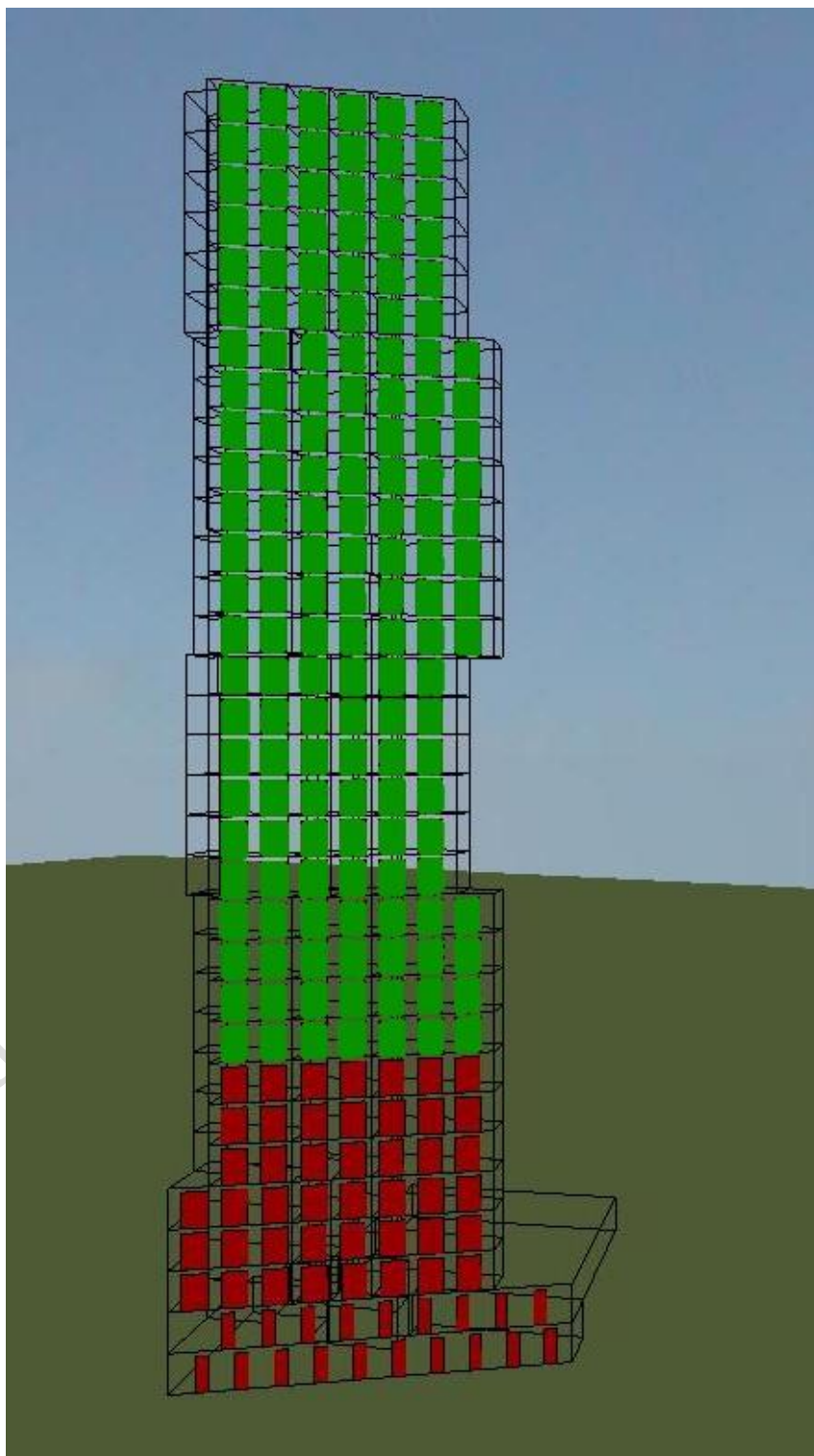


Fig.20 – Graphical illustration of APSH results.

The results of the APSH assessment of Artisan Heights with the hotel extension in place are listed in Appendix E and visually represented below in Fig. 21. Of the 105 rooms assessed, 73 passed outright (green), a further 18 (amber) were found to have an APSH reduction of less than 20% and deemed acceptable whilst 14 rooms (red) were found to not achieve guidance for both testing criteria.

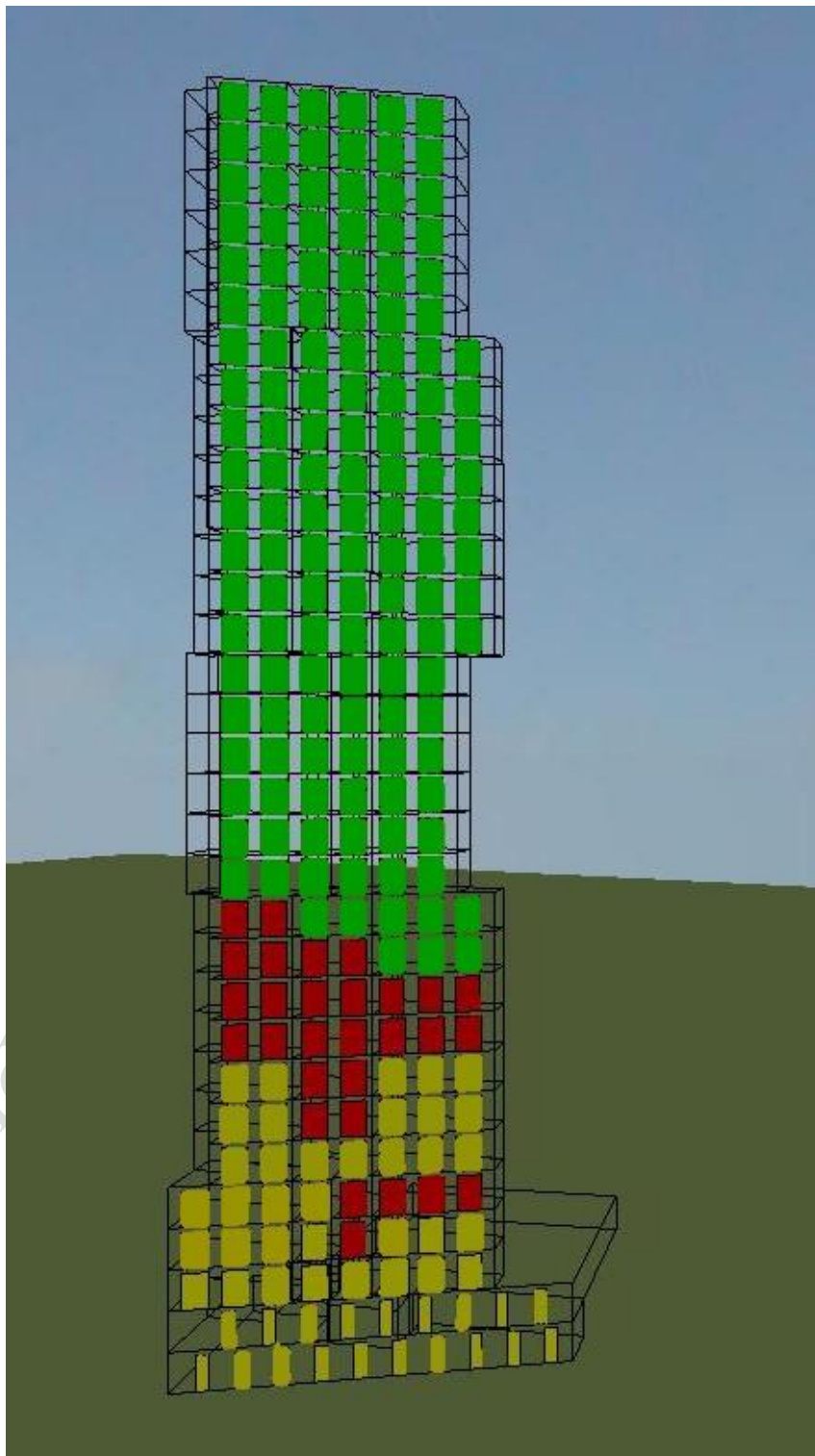


Fig.21 – Graphical illustration of APSH results.

The rooms that have not achieved guidance are located on the lower 12 storeys of the tower and have the following results:

Room Name	Annual			Winter		
	Existing	Proposed	Reduction	Existing	Proposed	Reduction
L03 Double 2	13.09	10.29	2.8	5.52	5.52	0
L04 Double 2	14.64	11.17	3.47	5.56	5.56	0
L04 Kitchen Room 2	16.14	12.67	3.47	5.56	5.56	0
L06 Double 2	20.35	15.99	4.36	7.12	6.75	0.37
L07 Double 2	23.47	18.73	4.74	7.64	6.75	0.89
L08 Double 1	25.03	18.28	6.75	9.61	8.53	1.08
L08 Double 2	27.85	18.54	9.31	8.45	6.75	1.7
L08 Kitchen Room	27.61	21.88	5.73	8.41	6.25	2.16
L09 Double 1	32.2	19.21	12.99	11.9	8.53	3.37
L09 Double 2	30.85	19.48	11.37	11.32	6.75	4.57
L09 Kitchen Room	30.81	21.76	9.05	11.26	6.25	5.01
L10 Double 1	44.36	21.52	22.84	18.1	8.73	9.37
L10 Double 2	47.46	23.24	24.22	18.02	7.41	10.61
L11 Double 1	56.51	24.52	31.99	26.39	8.75	17.64

The rooms identified as not achieving guidance are mostly located on floors 8 to 11, being directly impacted by the extension of the hotel to the south. The presence of the new development has impacted negatively on the annual APSH results but not the winter APSH results which are still above the 5% minimum guidance.

Of the rooms impacted, three of them are communal kitchen rooms whilst the other 11 are double bedrooms. The guidance in BR 209 stipulates that the main requirement for sunlight is in living rooms and is viewed as less important in bedrooms and kitchens. The extension of the hotel should therefore not be considered as having a major impact on this small number of rooms.

Summary

The results of the APSH assessments have highlighted that before the new development is taken into consideration there are 82 out of 105 rooms that achieve the APSH targets. When the new development is added and assessed for both absolute APSH targets and acceptable APSH reduction there are 91 compliant rooms out of 105 rooms assessed.

6. Conclusion

The results as reported above and accompanied by the relevant shadow plots within Appendices A, B & C demonstrate that whilst shadow from the development will impact on buildings in the surrounding area, the main area of focus is the impact on Artisan Heights student accommodation on the opposite bank of River Medlock. This impact has been evaluated using daylight and sunlight assessment methods from BRE guidance.

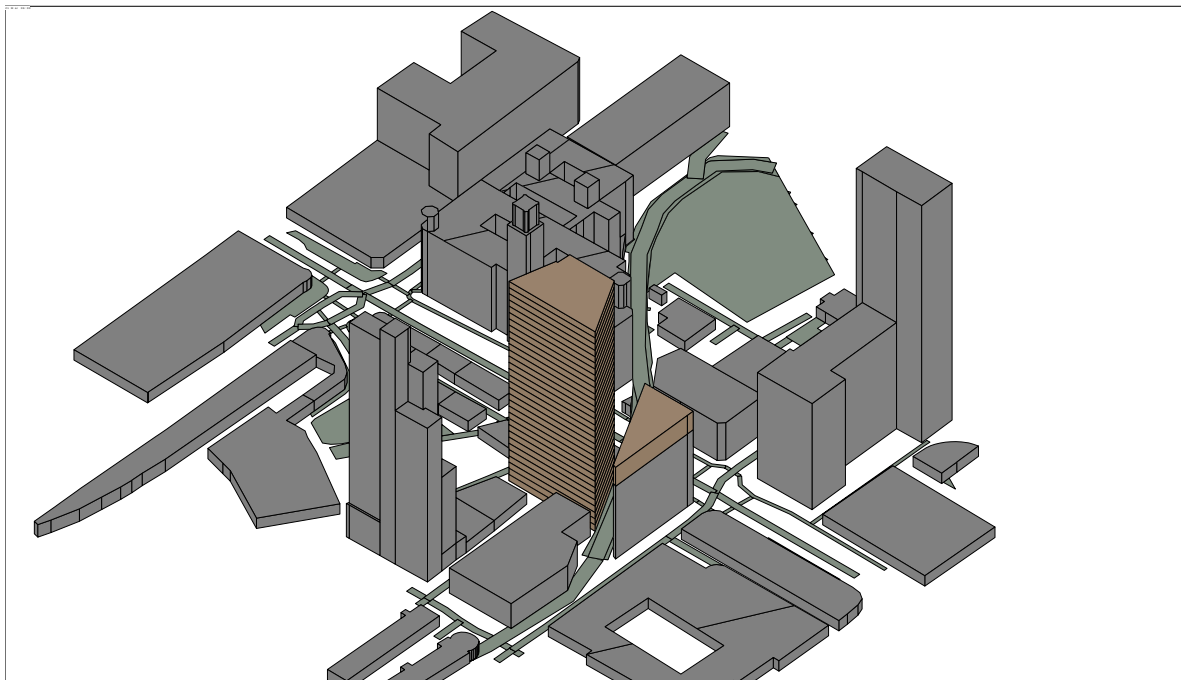
In both the case of daylight and sunlight levels, there are windows that have been shown to be negatively impacted by the new development. However, in most cases, these windows were already heavily compromised due to their position adjacent to the existing hotel and other surrounding buildings and as such there will be very little change in circumstance to the residents of these apartments.

Given the location of the site, it is not unreasonable to conclude that the daylight and sunlight levels for the whole elevation would not be considered low in the context of city living.

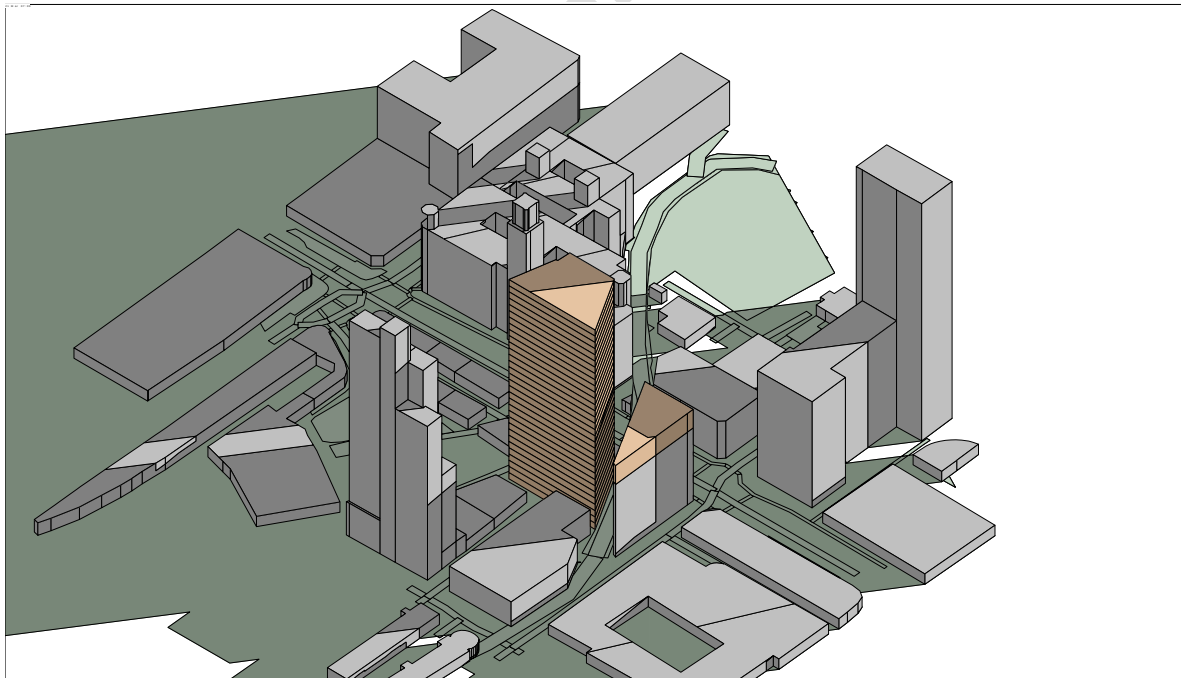
Appendix

Holiday Inn Express, Manchester

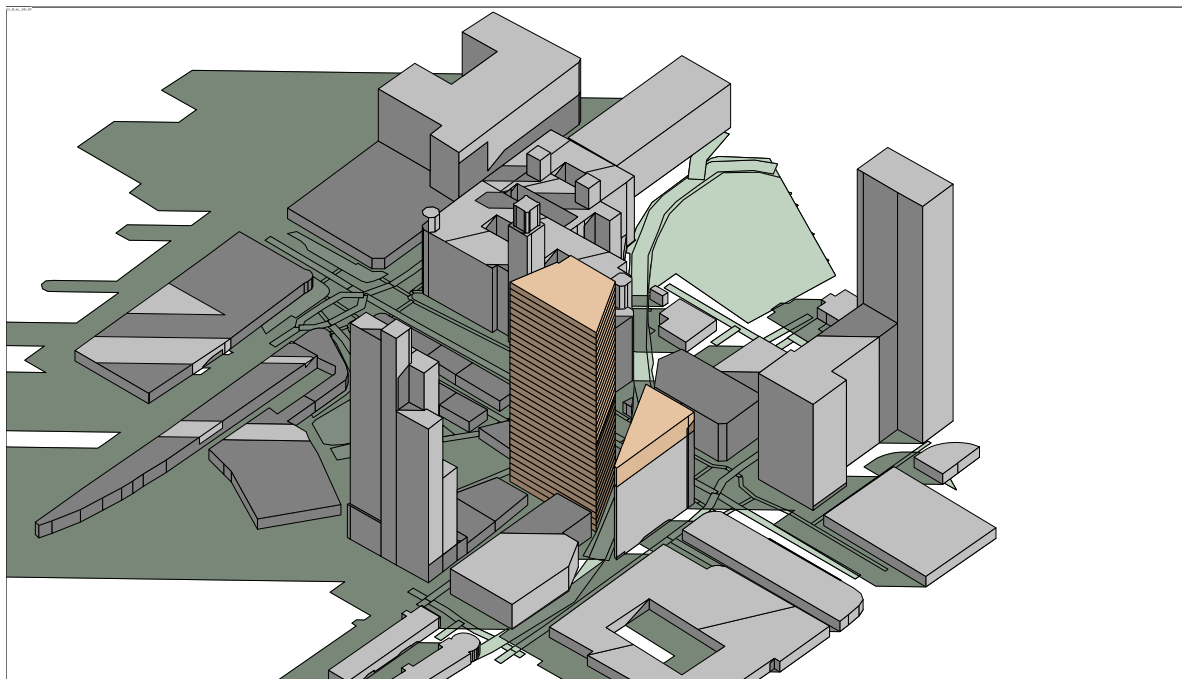
Appendix A – Shadowing Analysis on 21st March



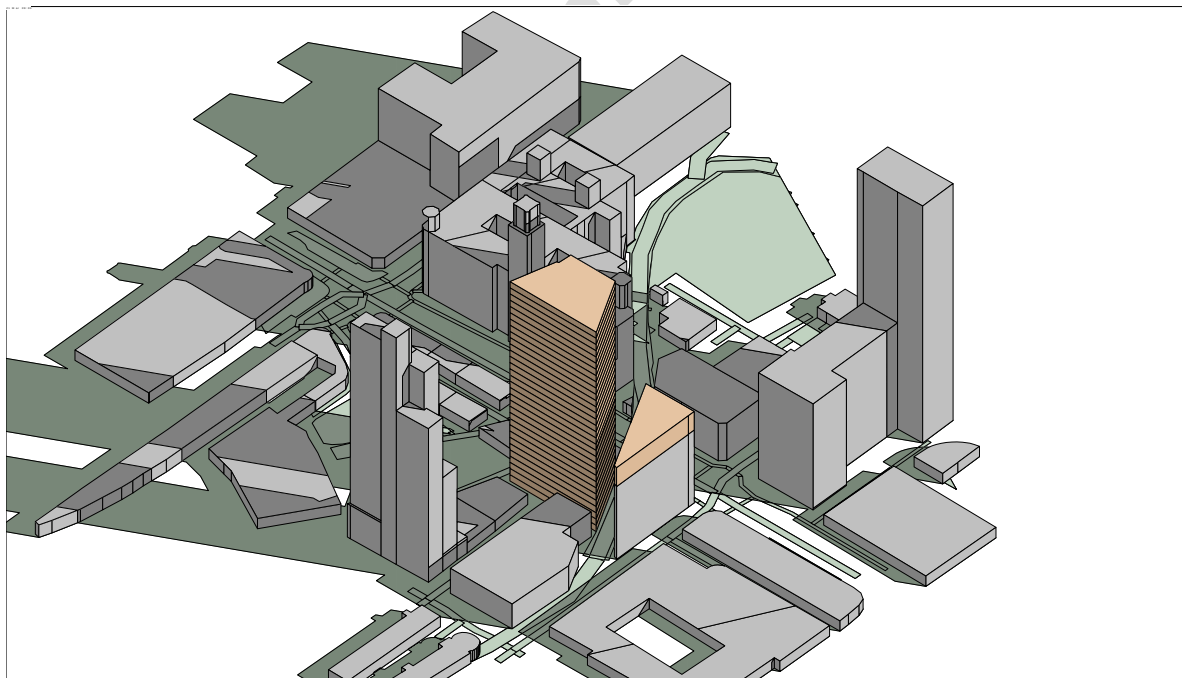
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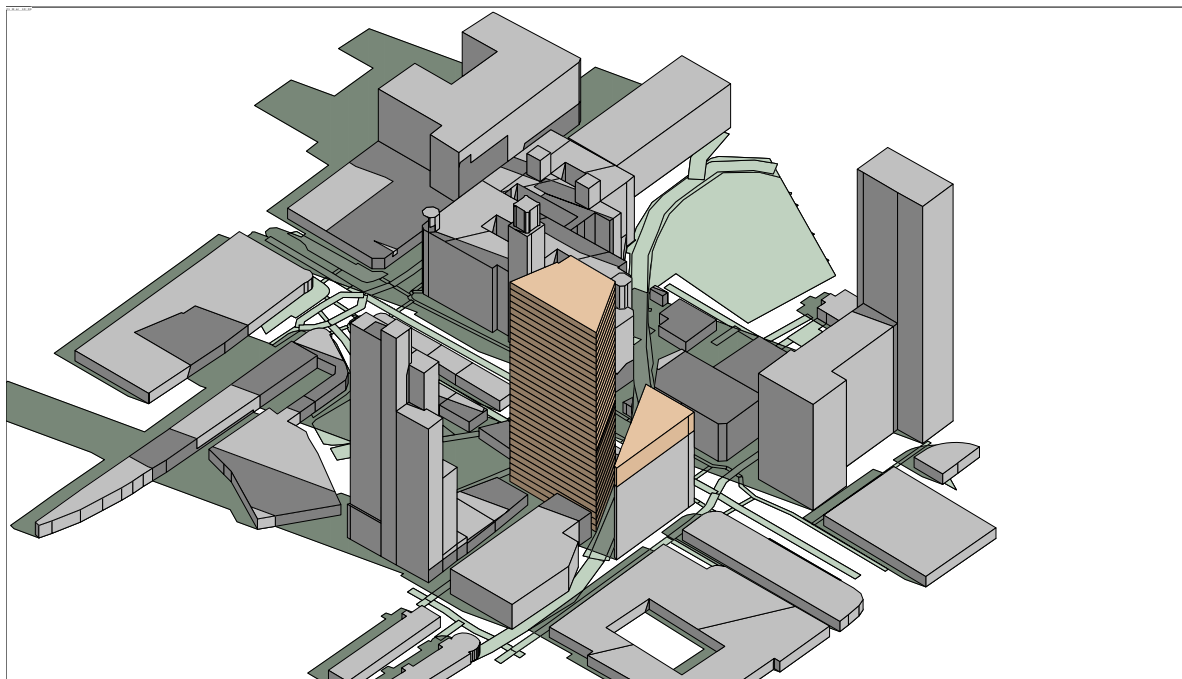
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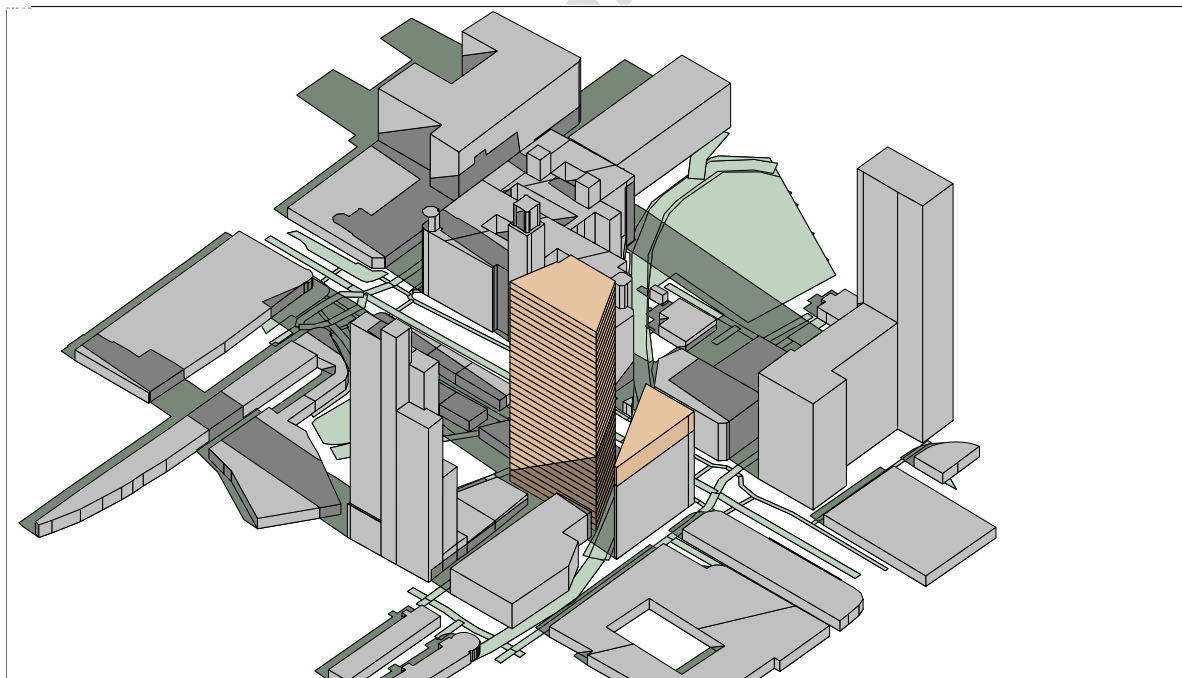
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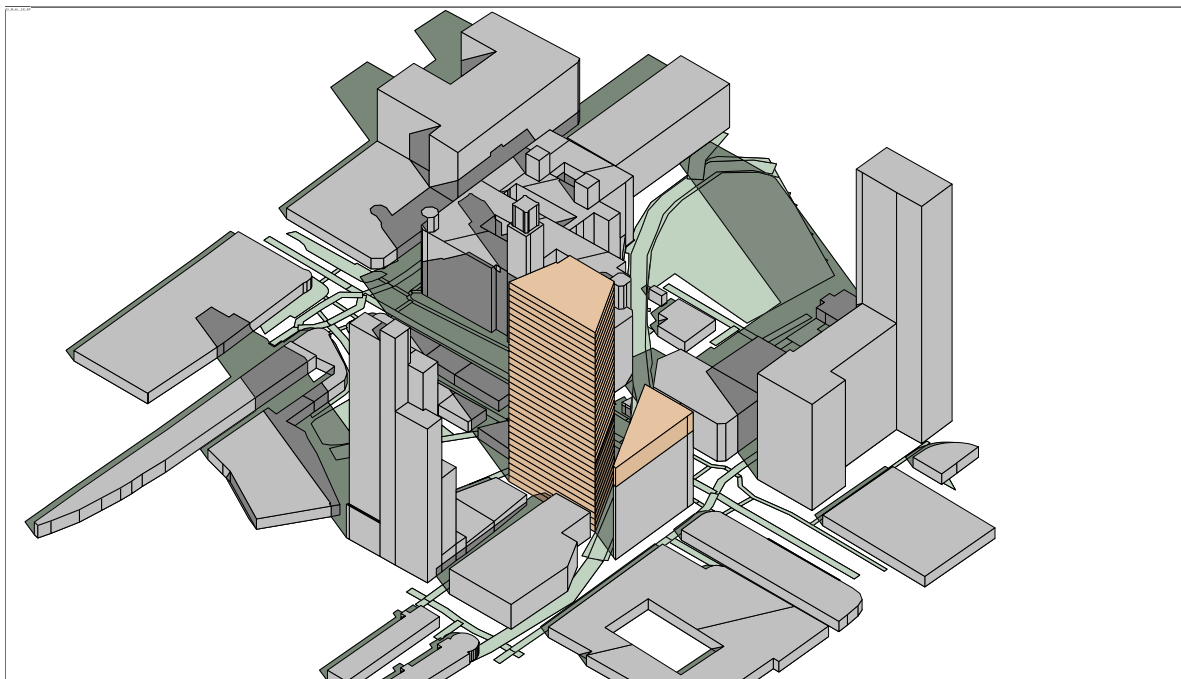
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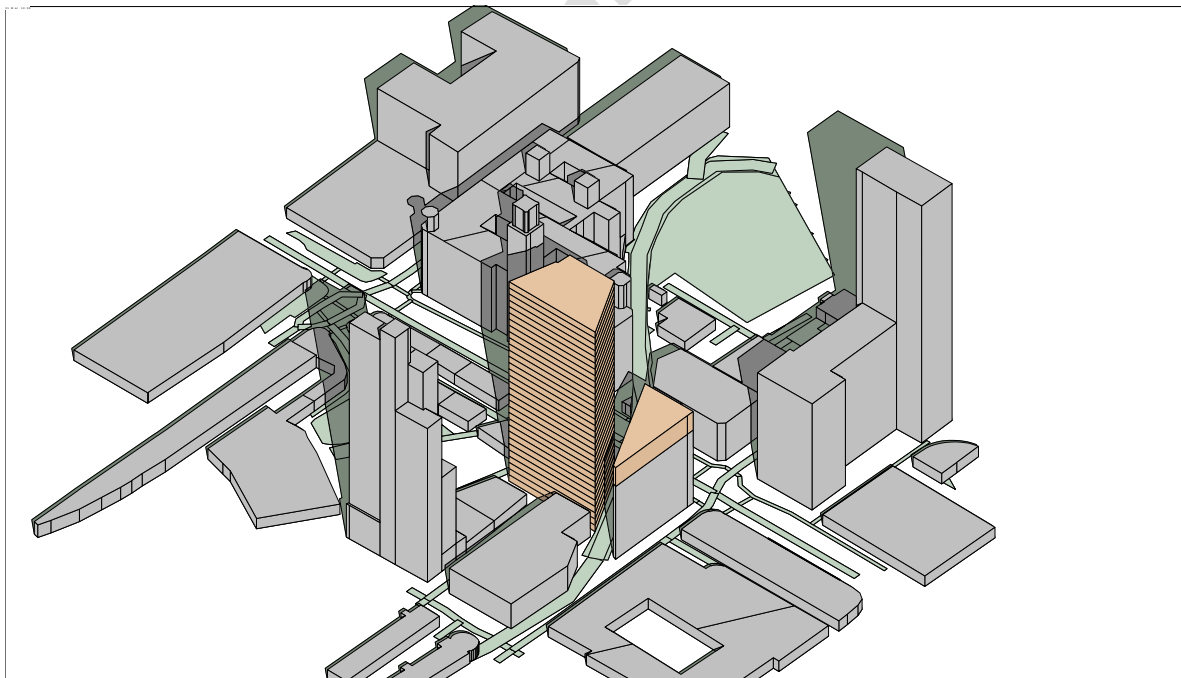
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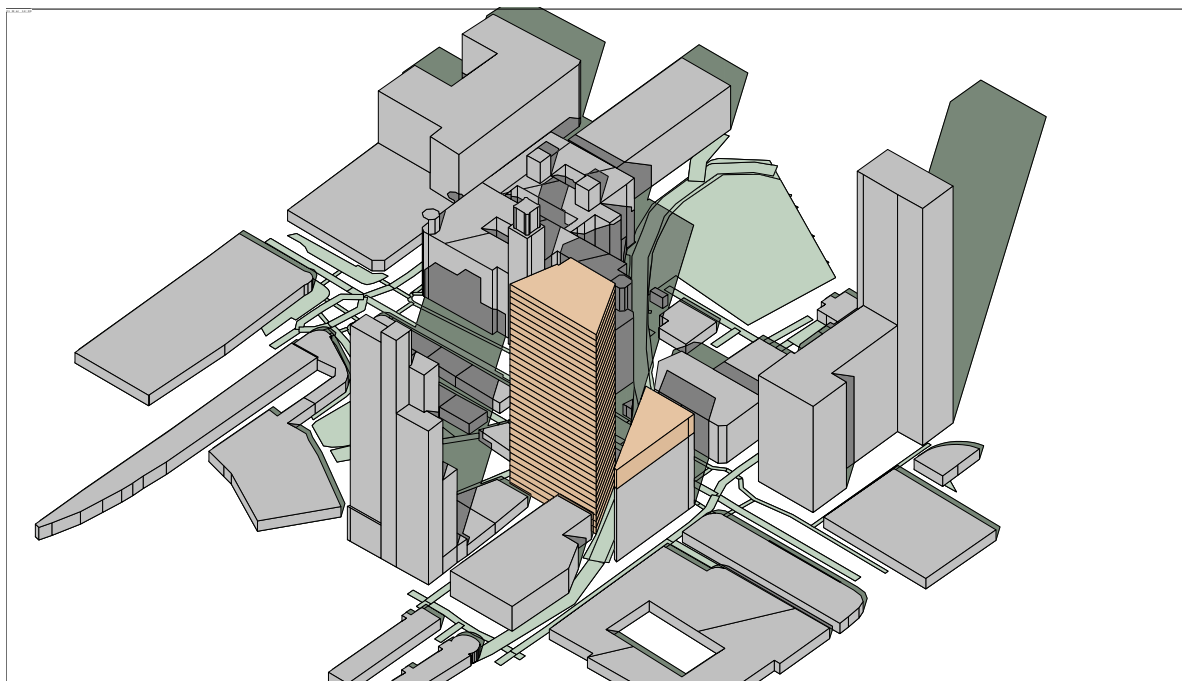
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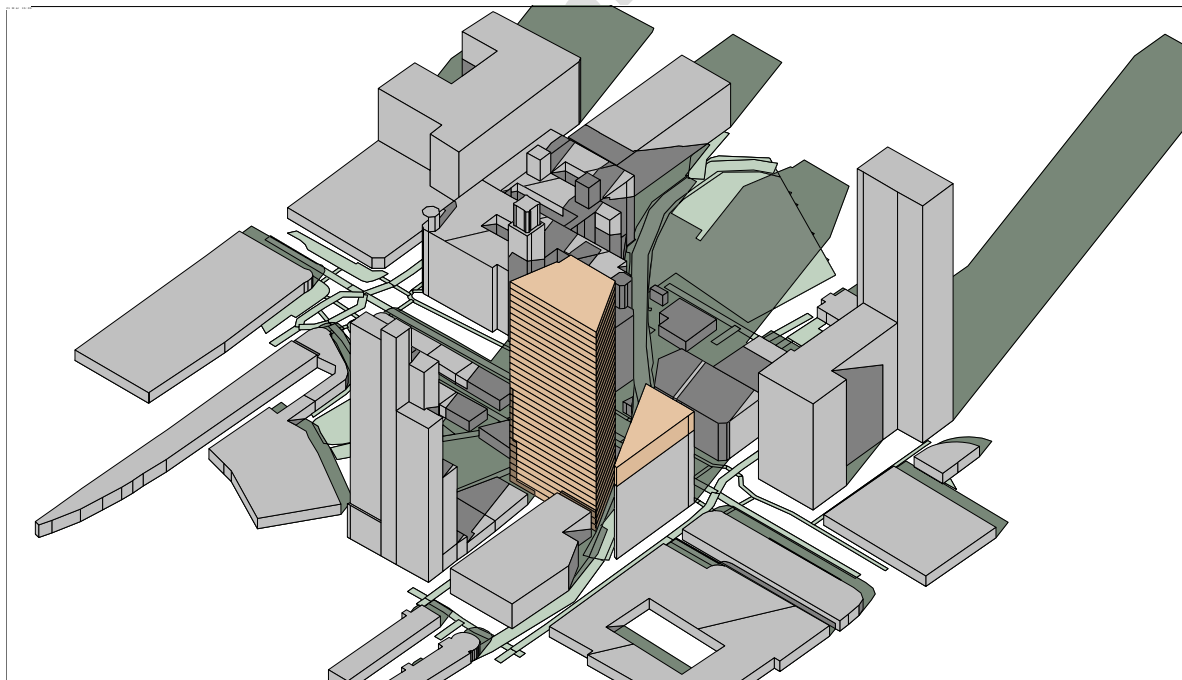
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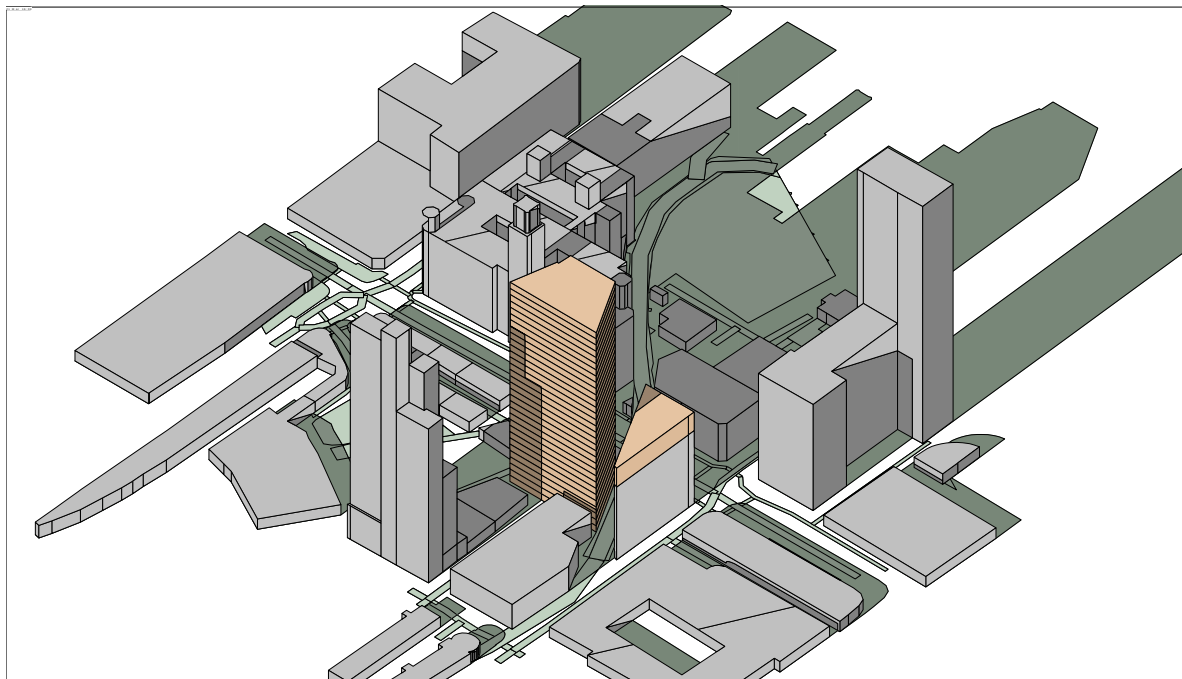
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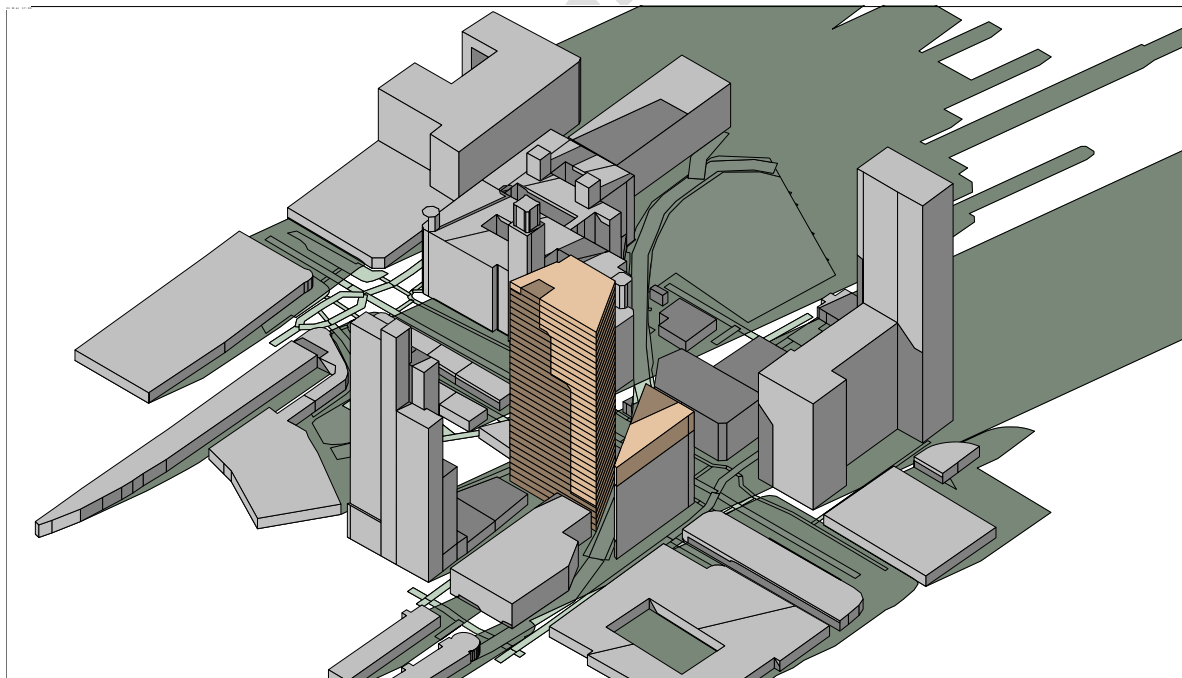
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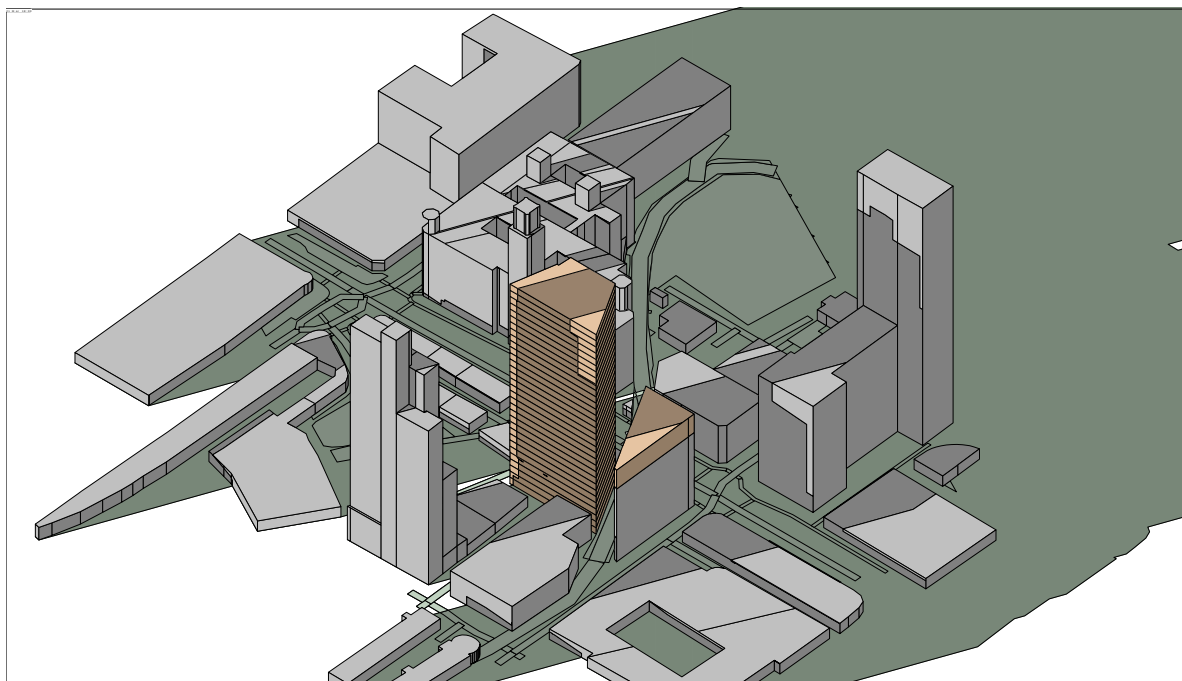
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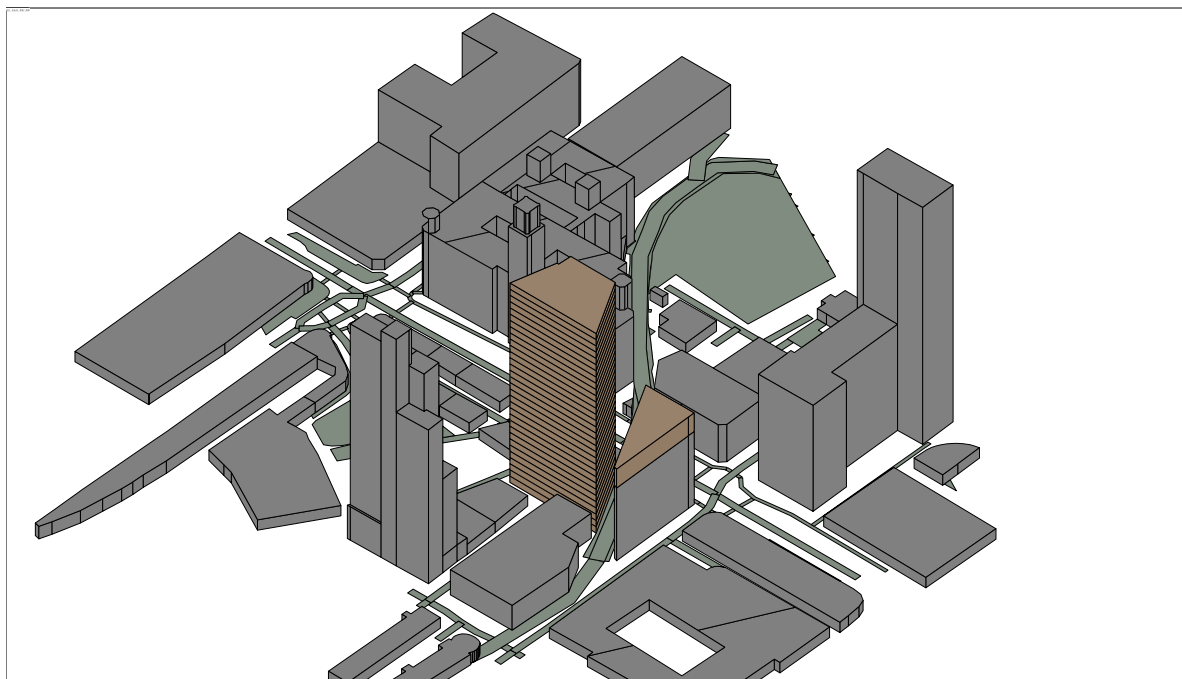
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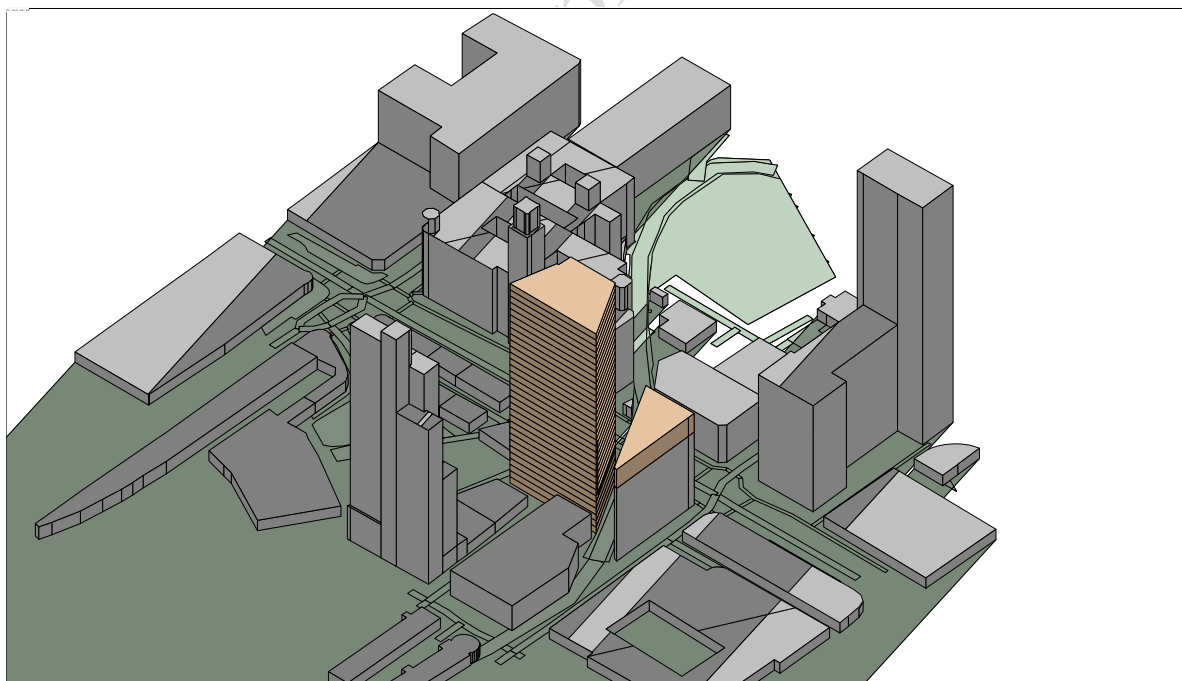
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Holiday Inn Express,

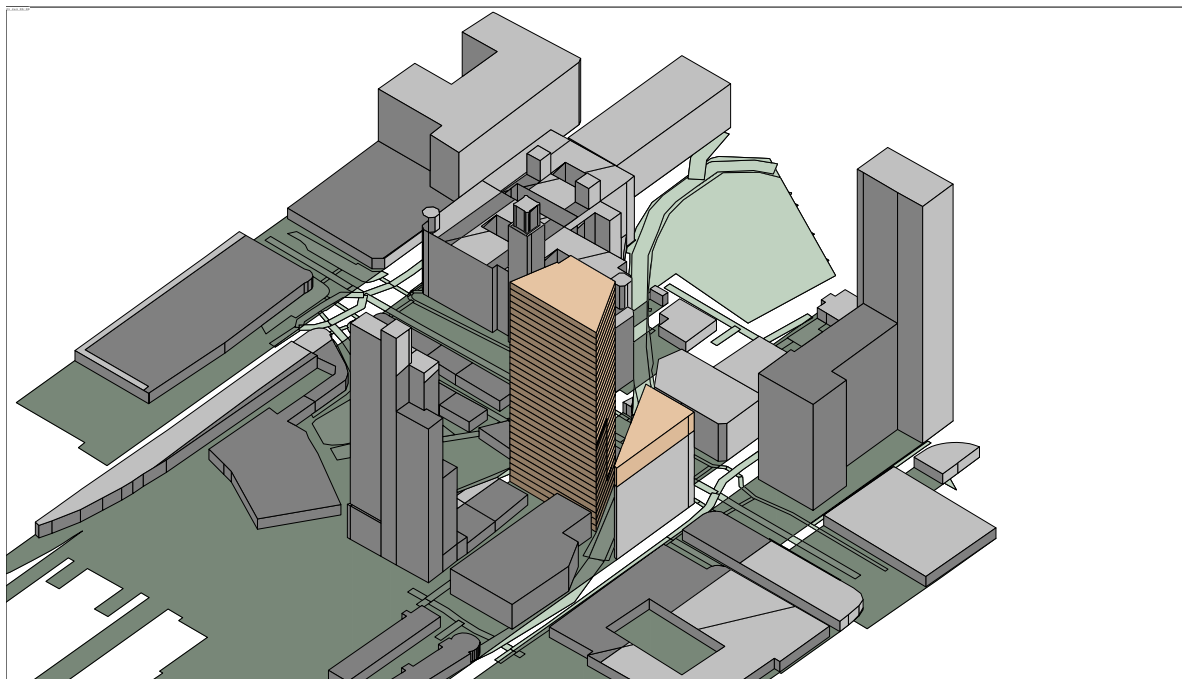
Appendix B – Shadowing Analysis on 21st June



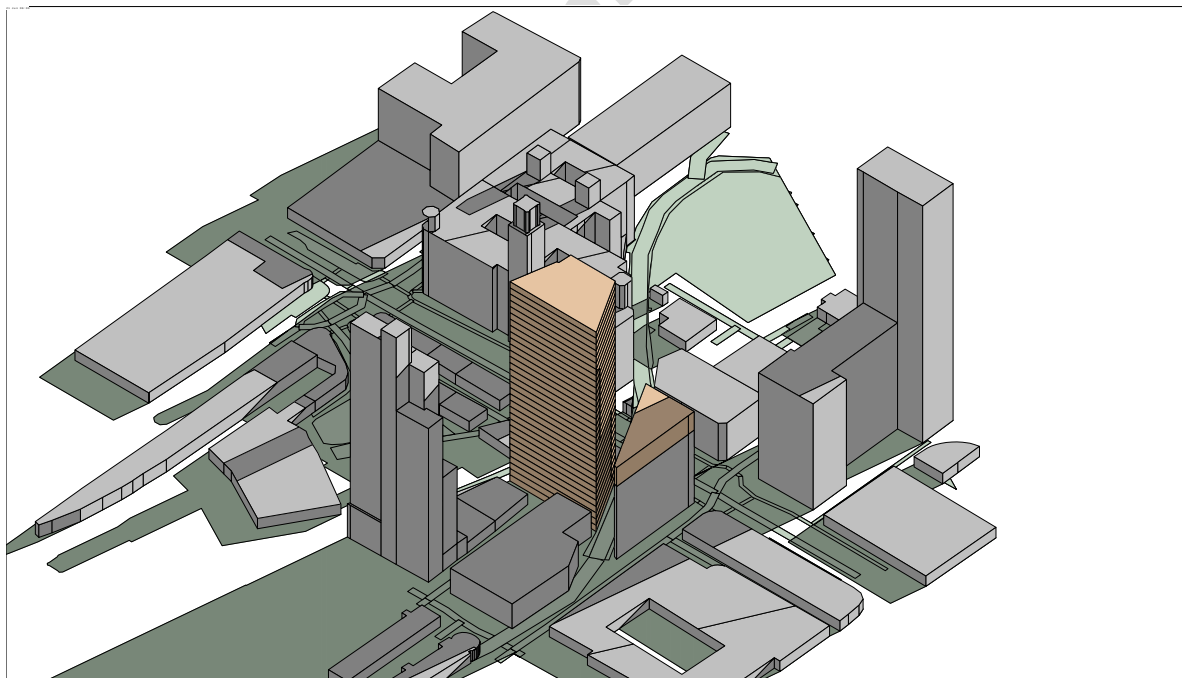
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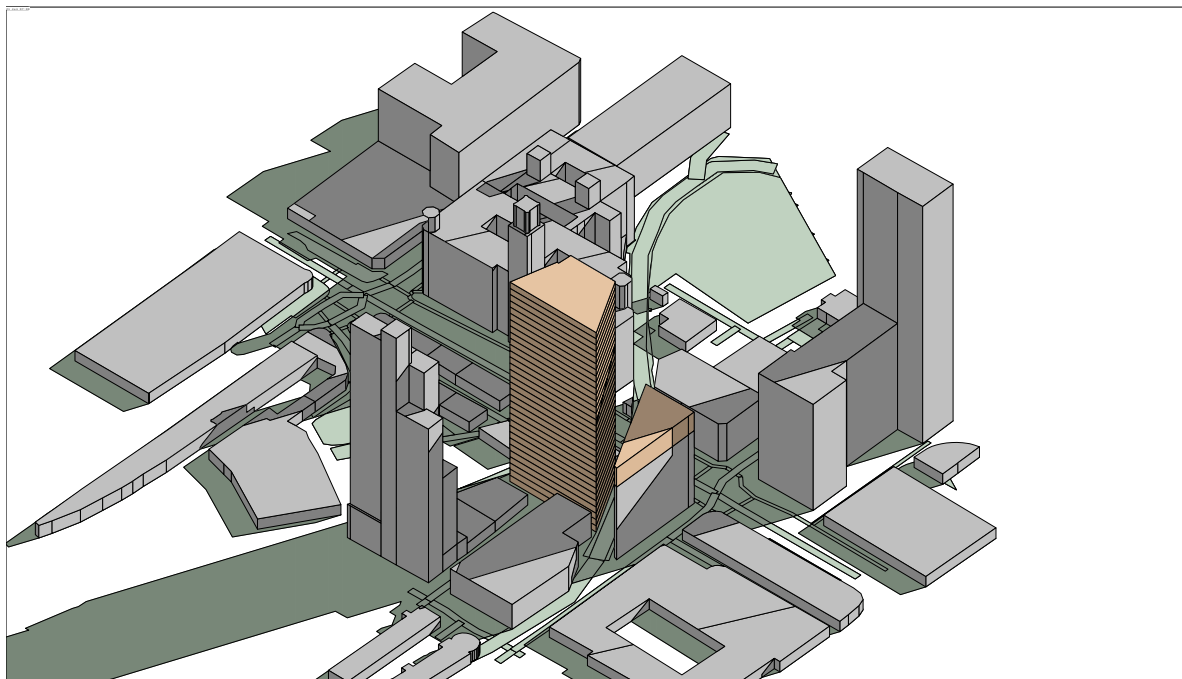
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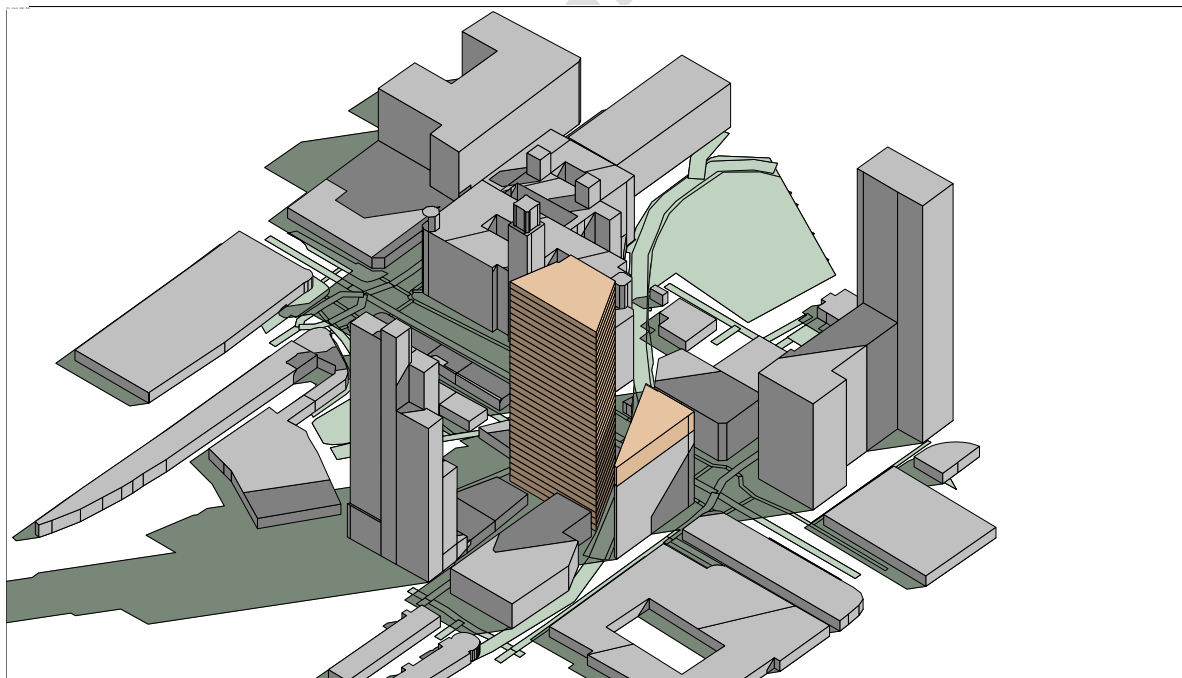
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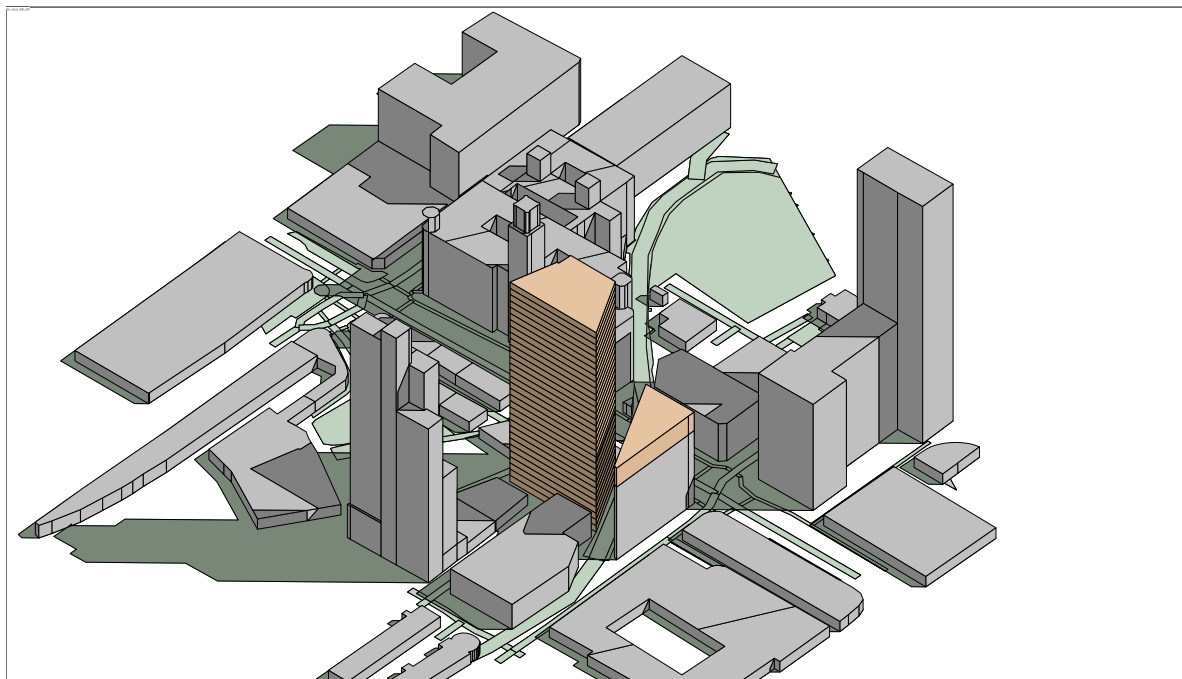
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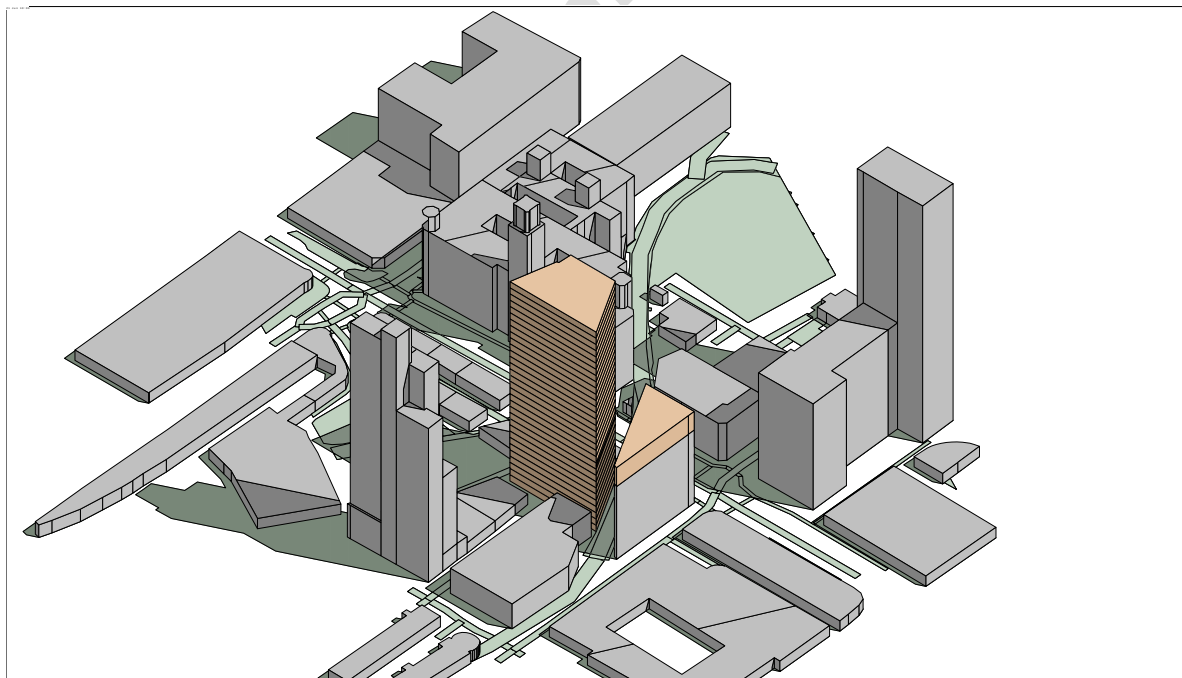
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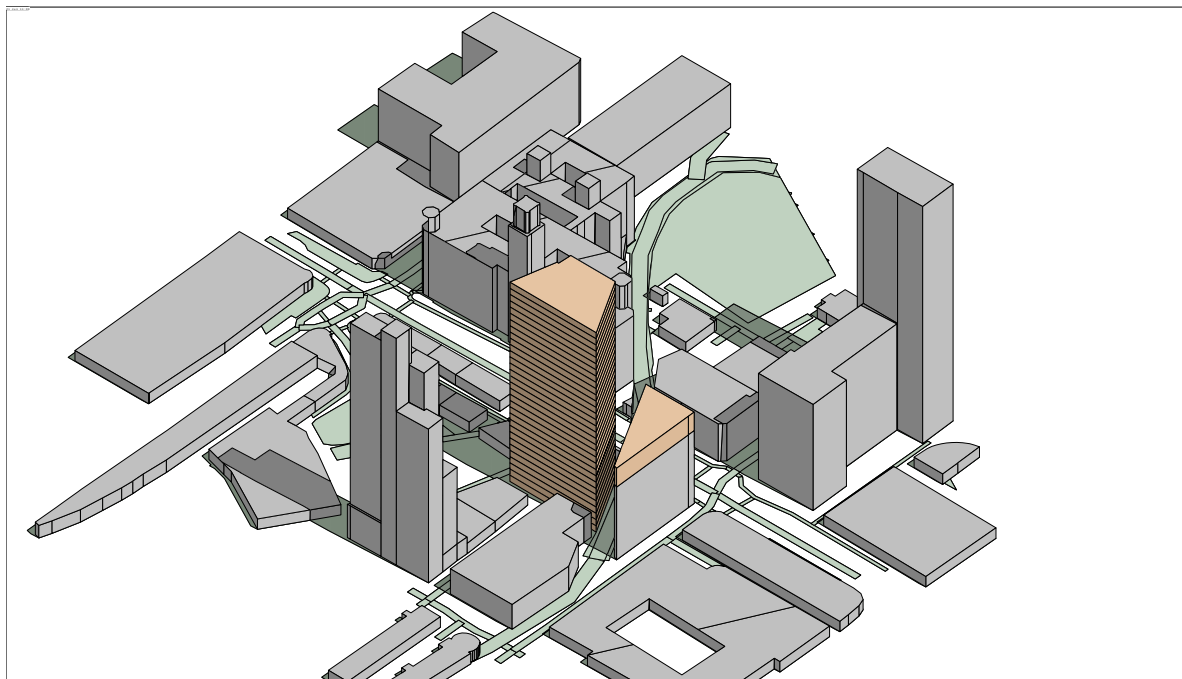
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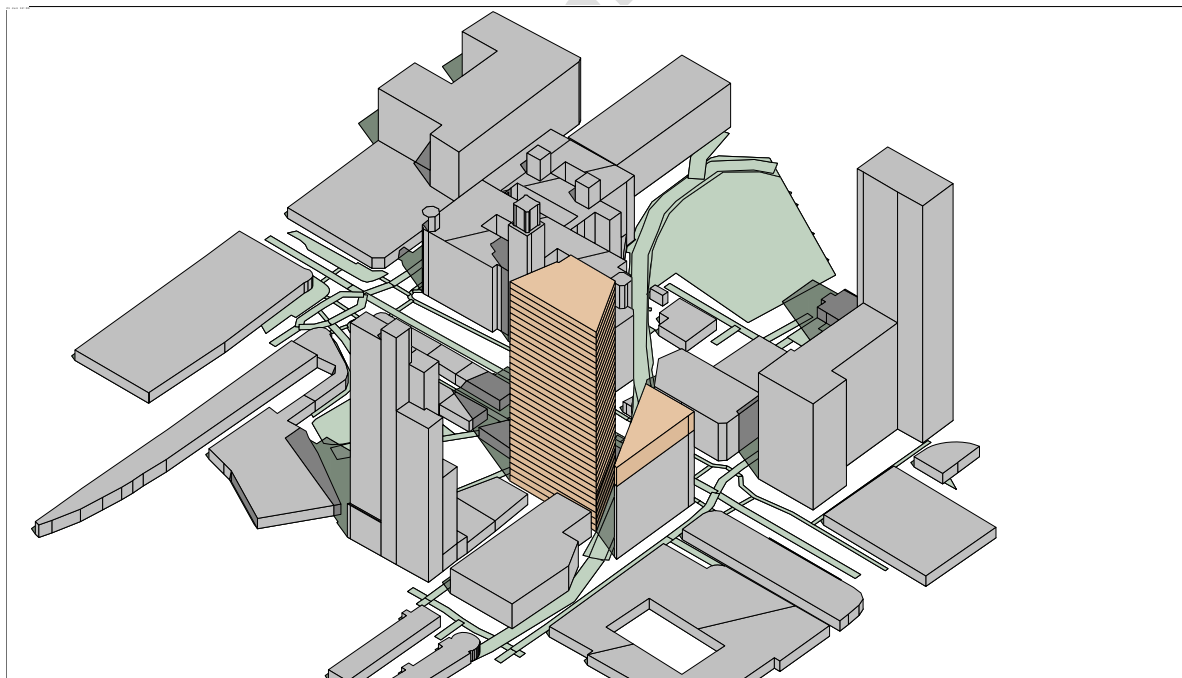
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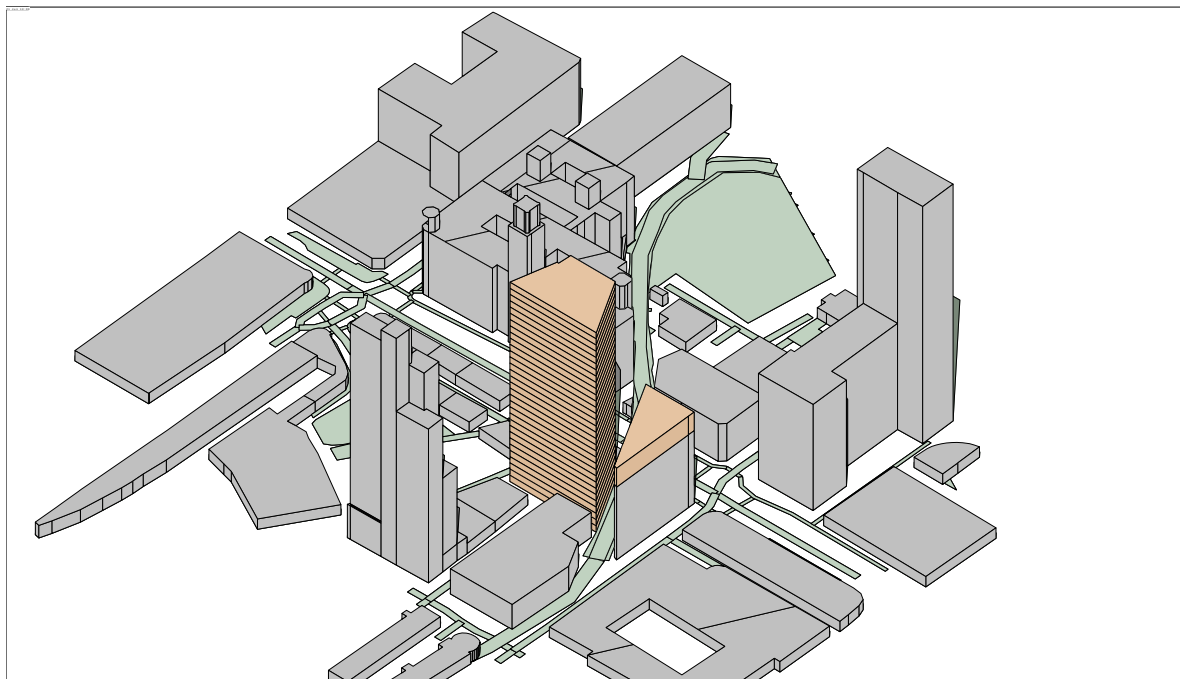
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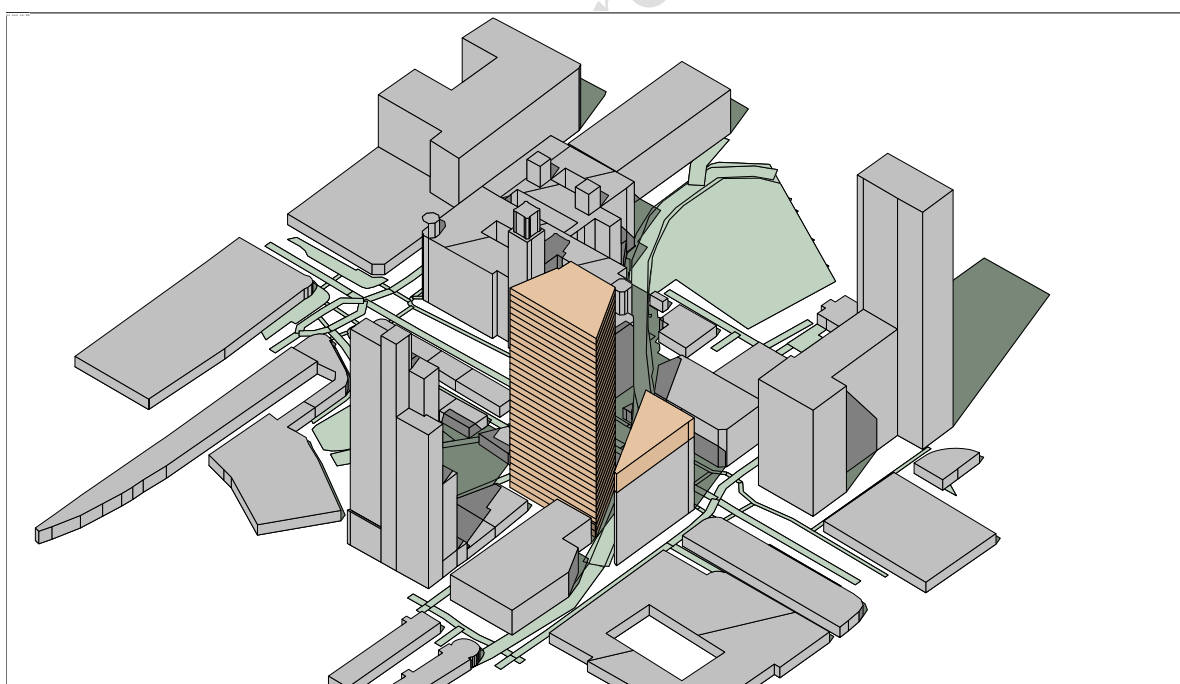
11:00 BST



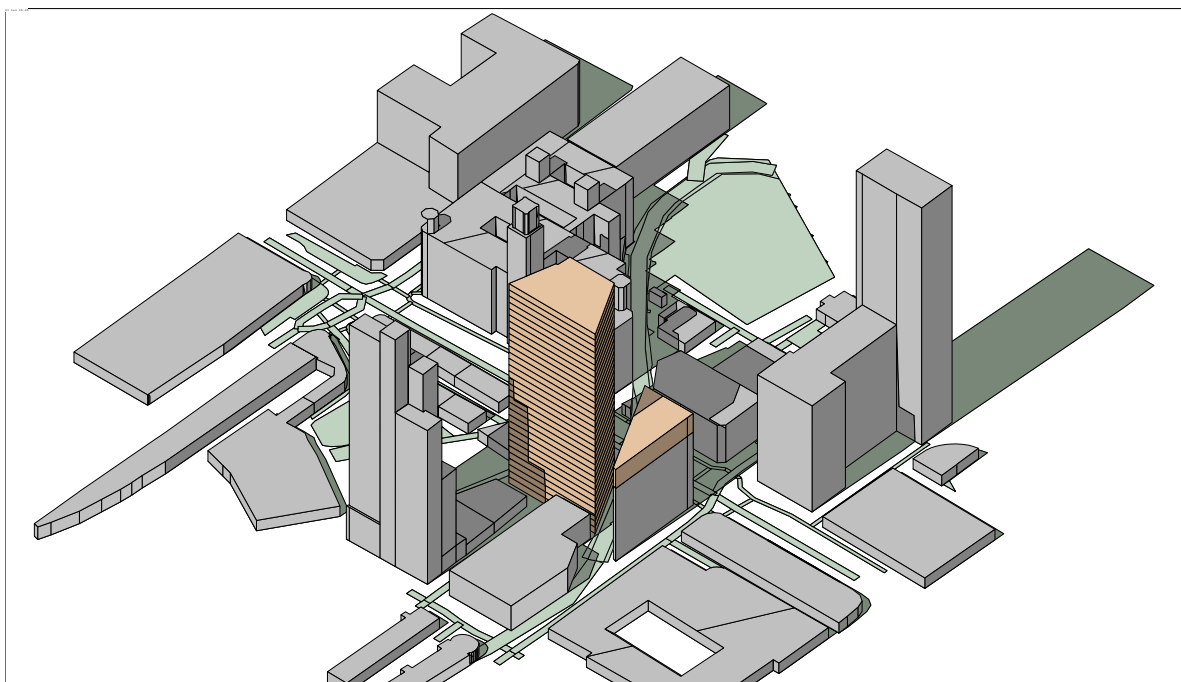
12:00 BST



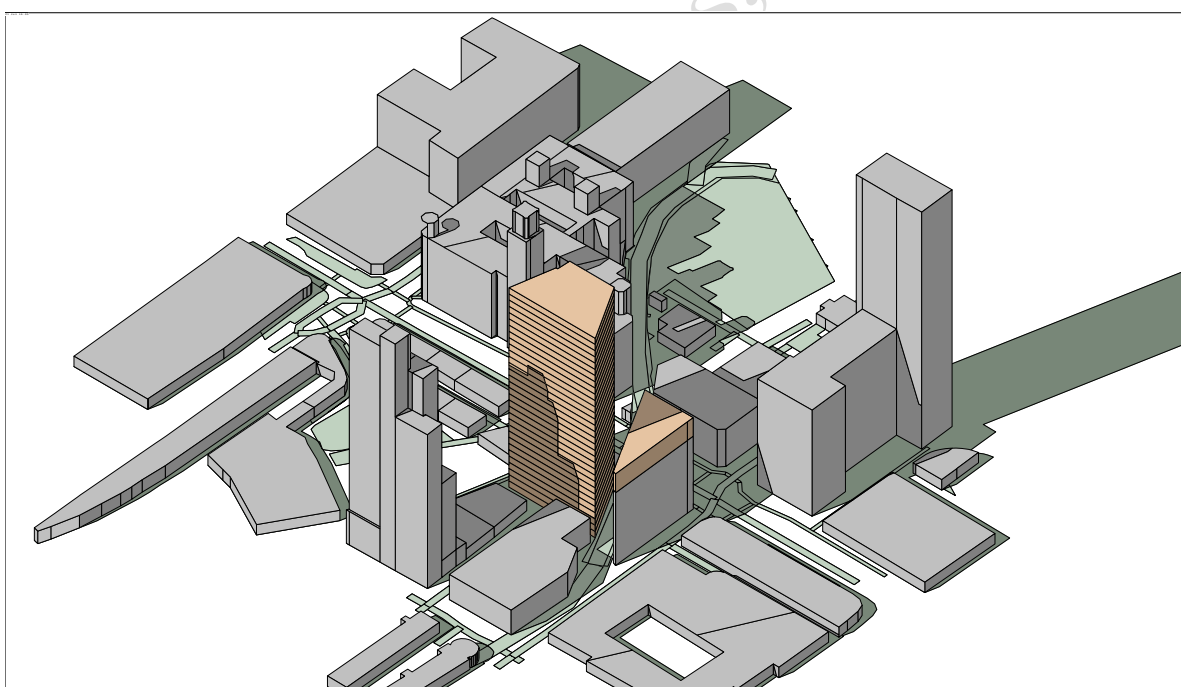
13:00 BST



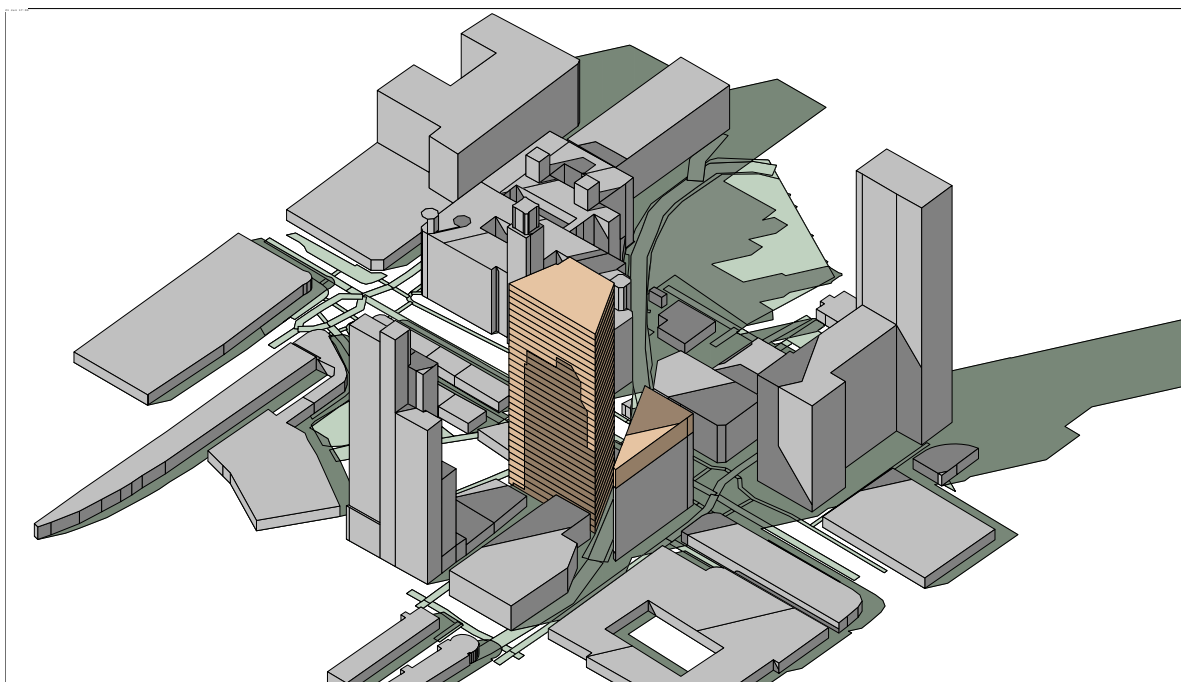
14:00



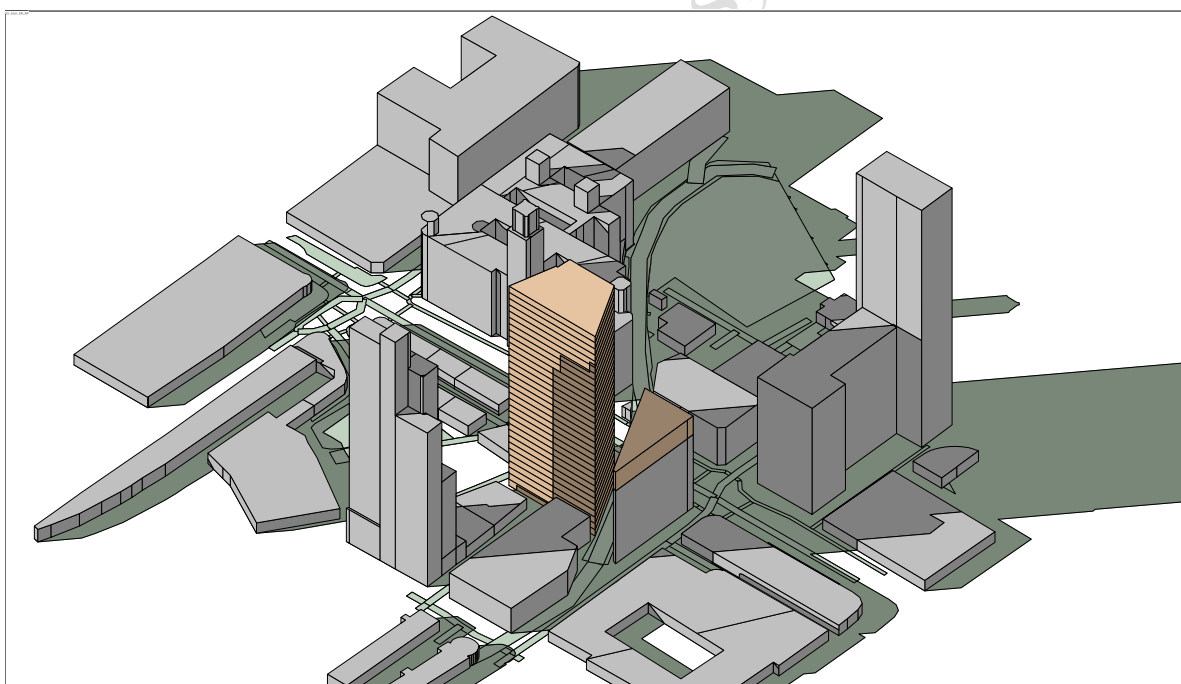
15:00 BST



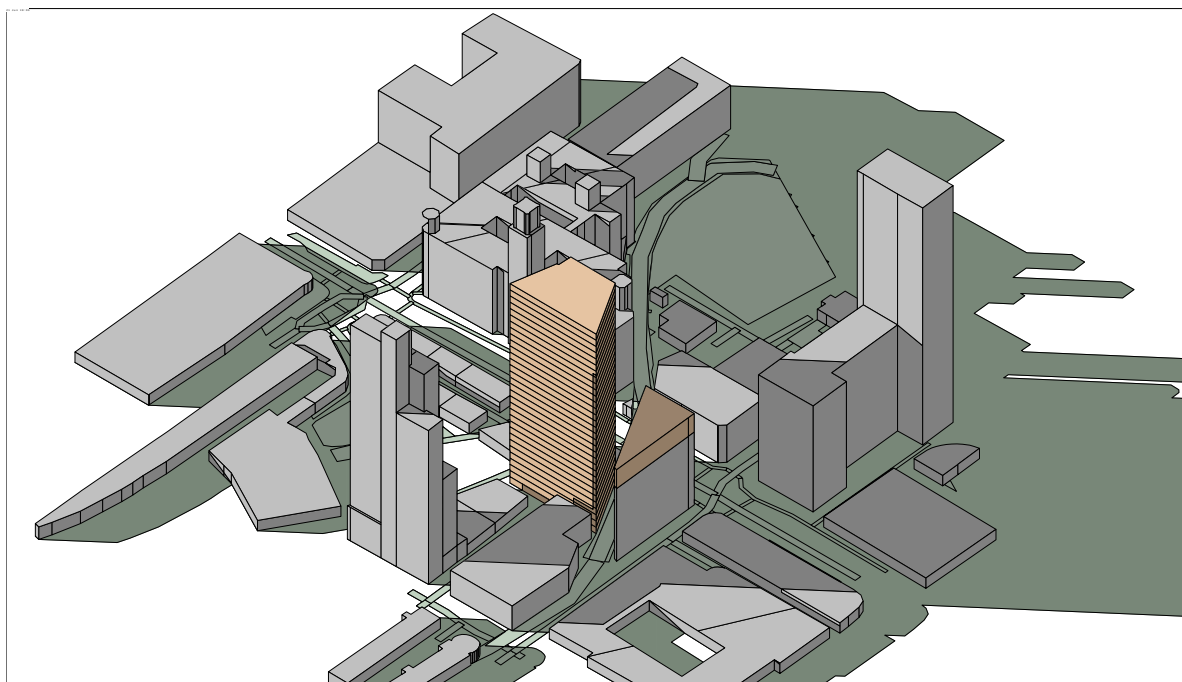
16:00 BST



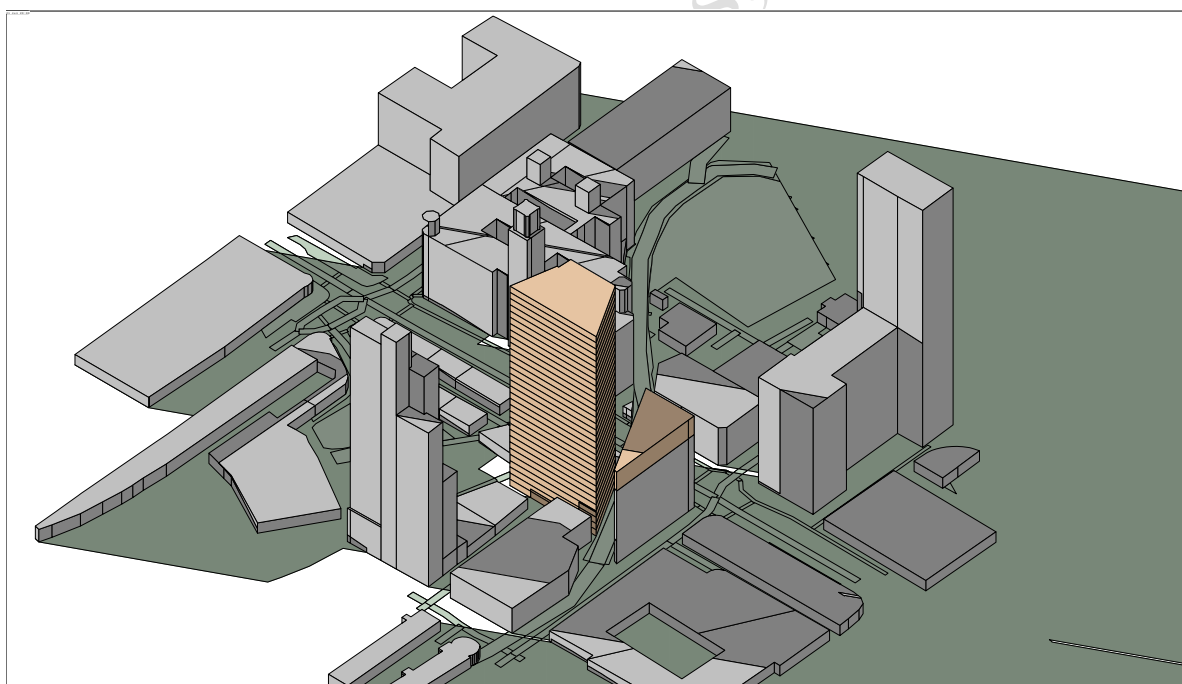
17:00 BST



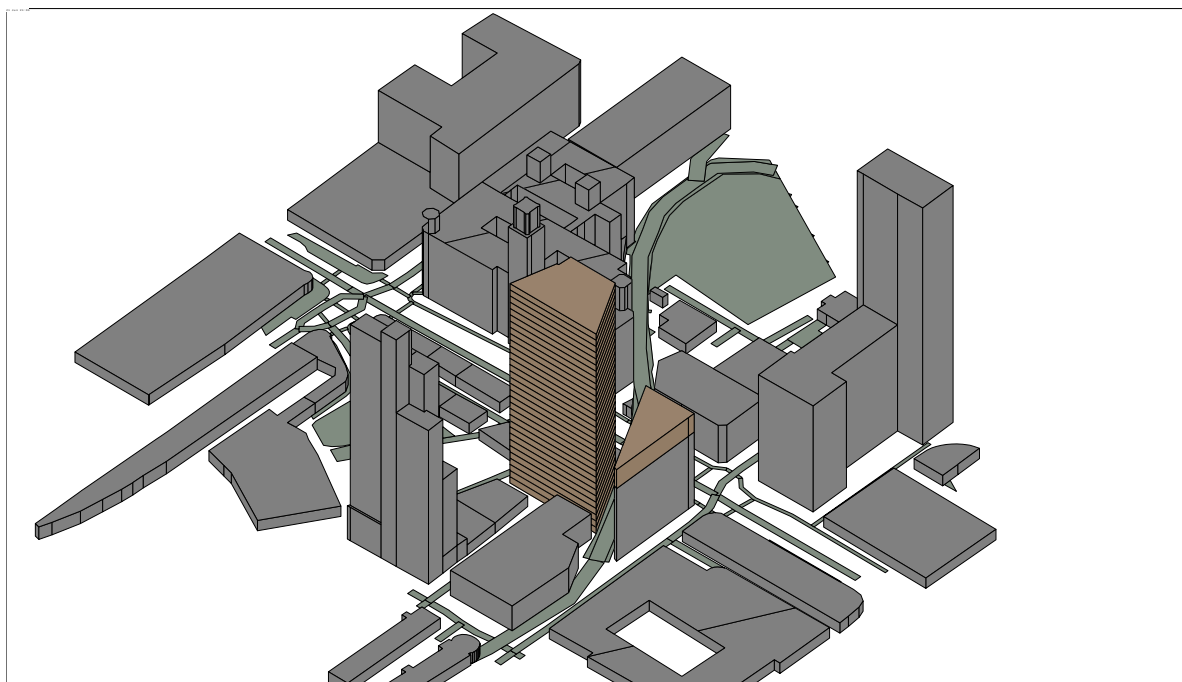
18:00 BST



19:00 BST

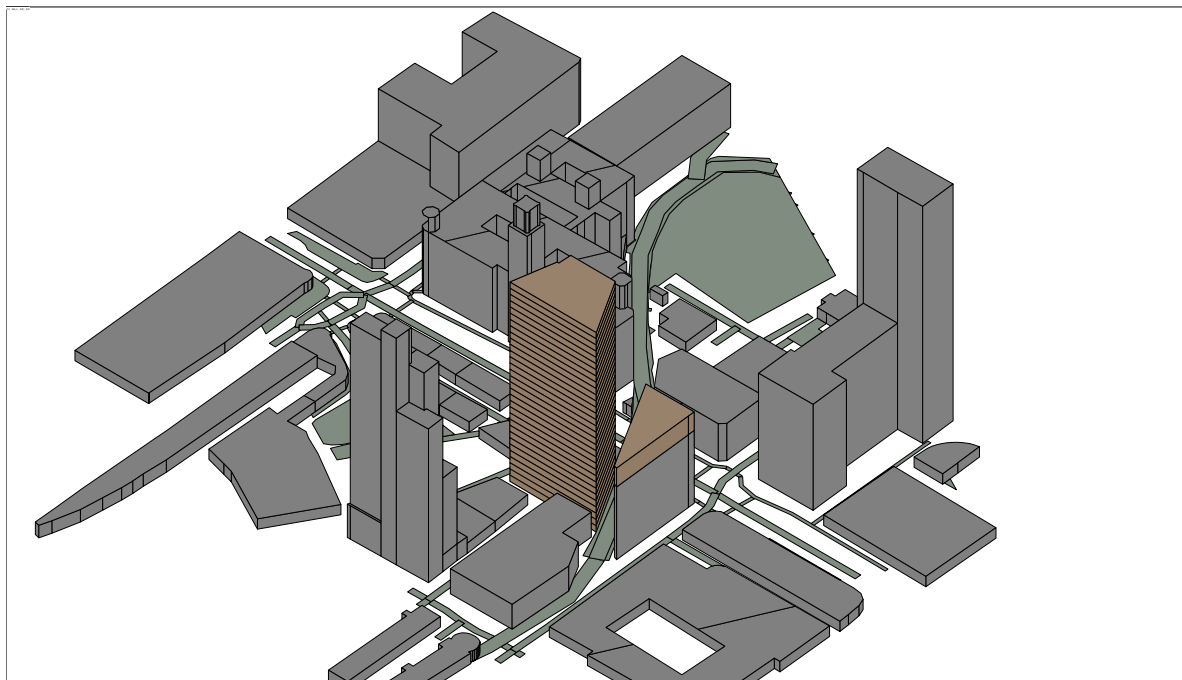


20:00 BST

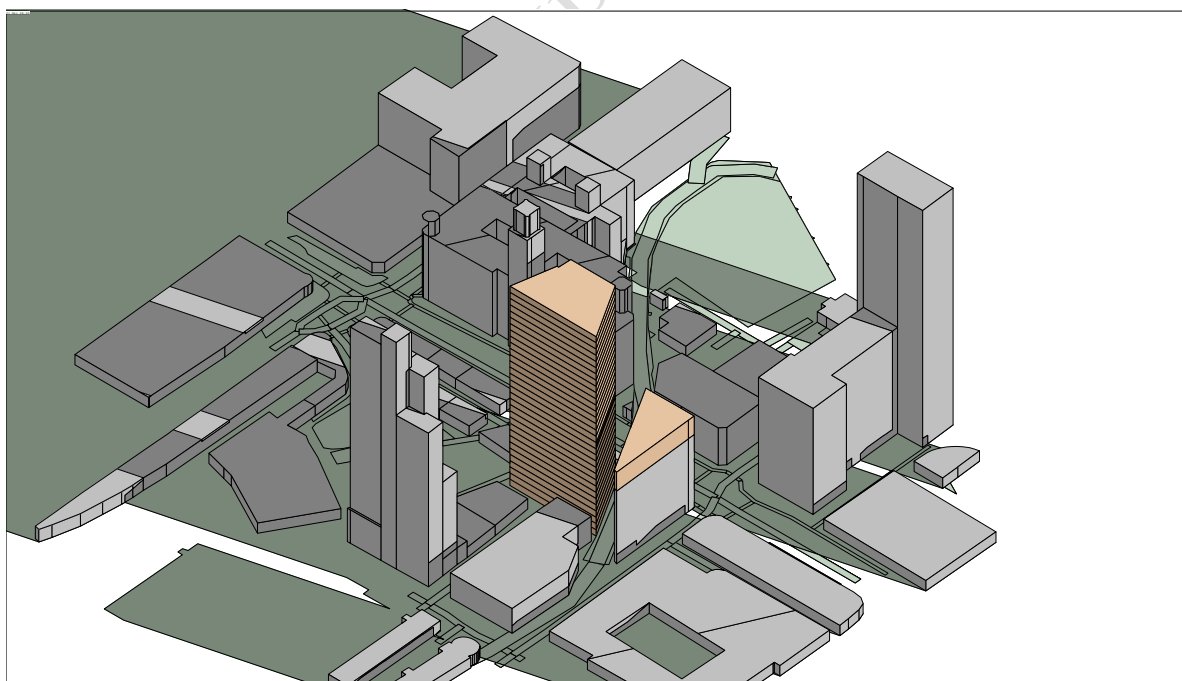


21:00 BST

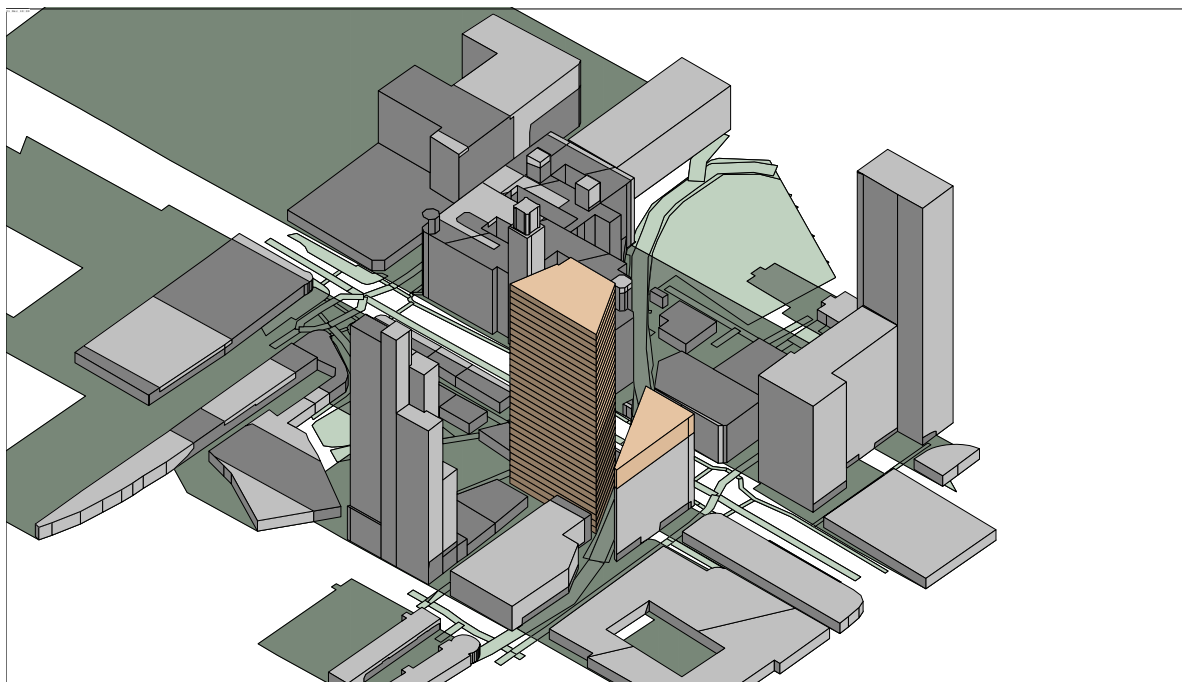
Appendix C – Shadowing Analysis on 21st December



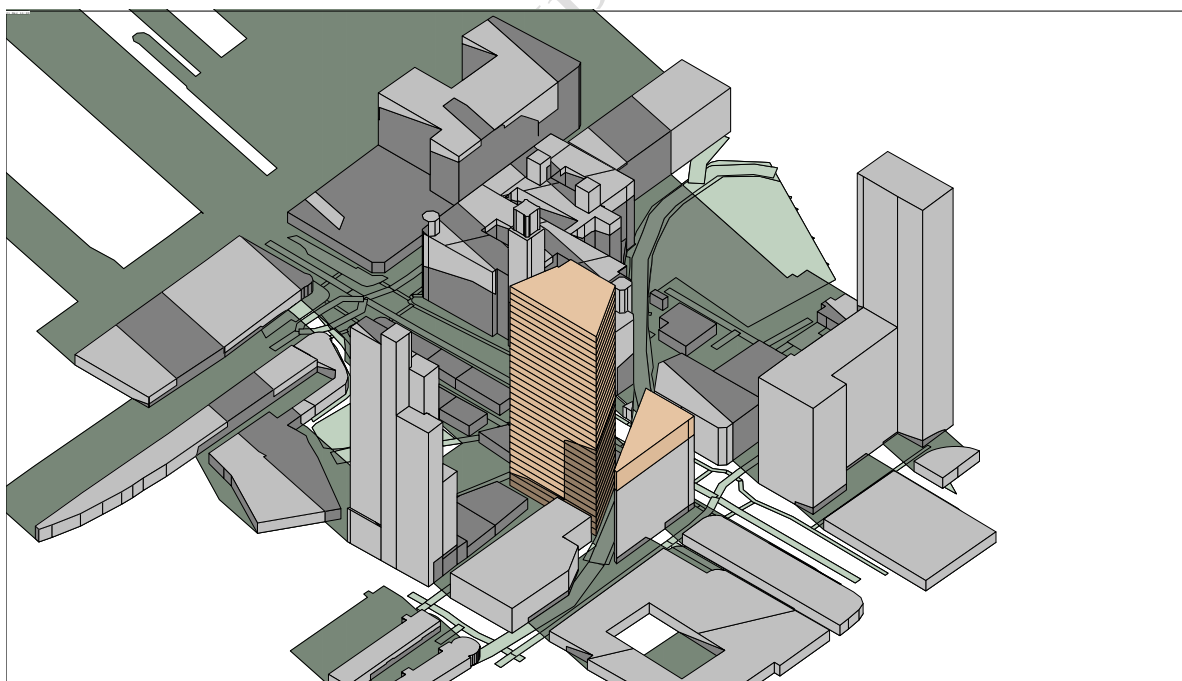
08:00 GMT



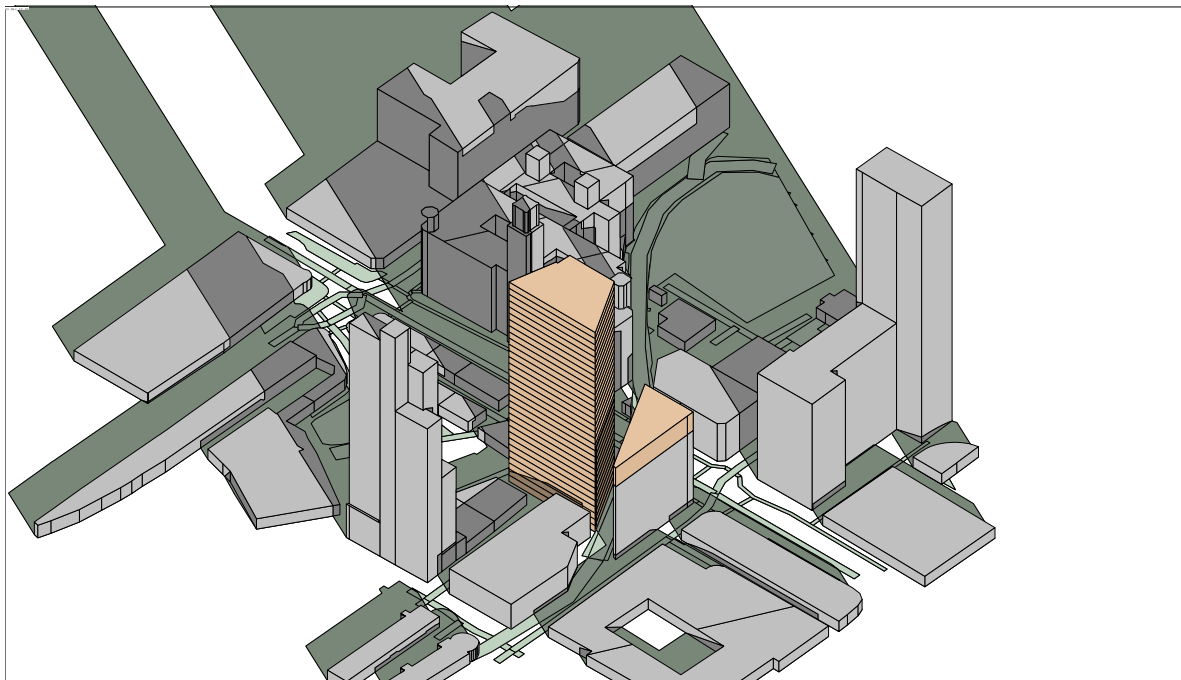
09:00 GMT



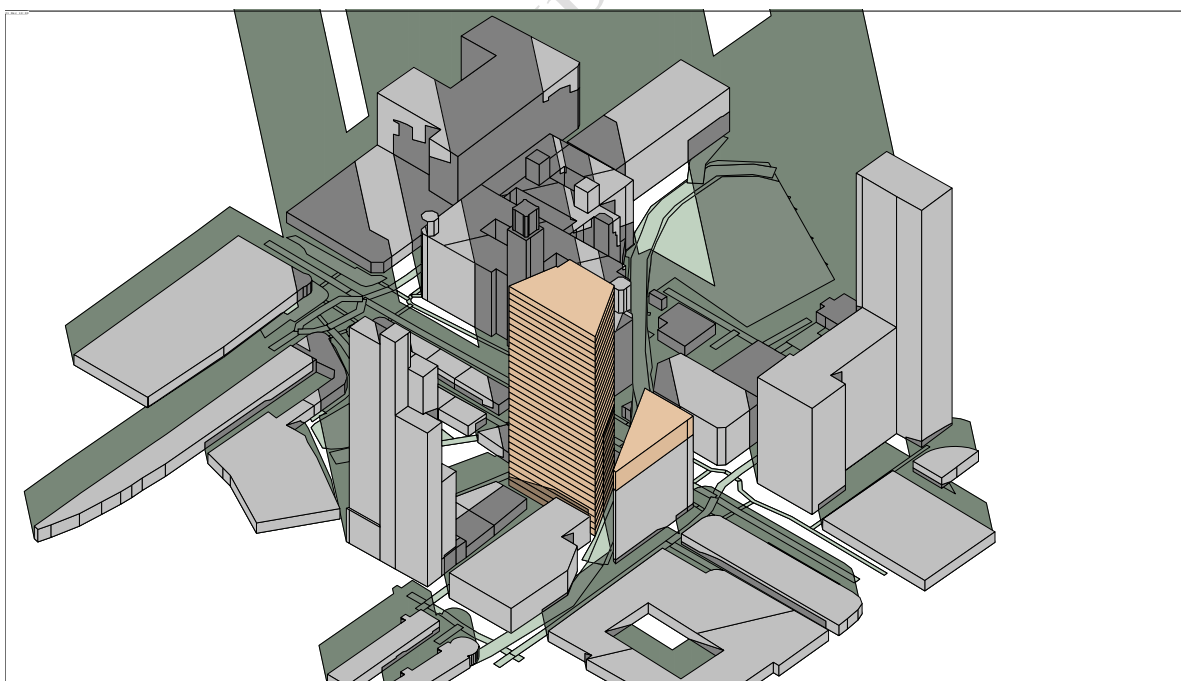
10:00 GMT



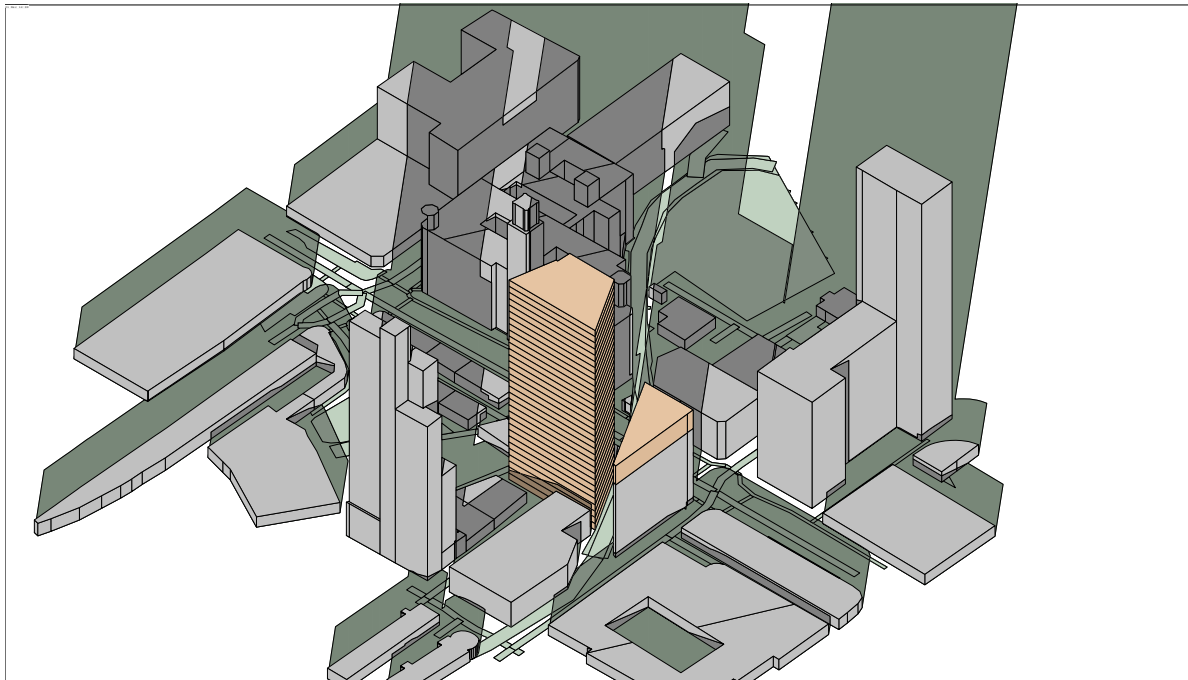
11:00 GMT



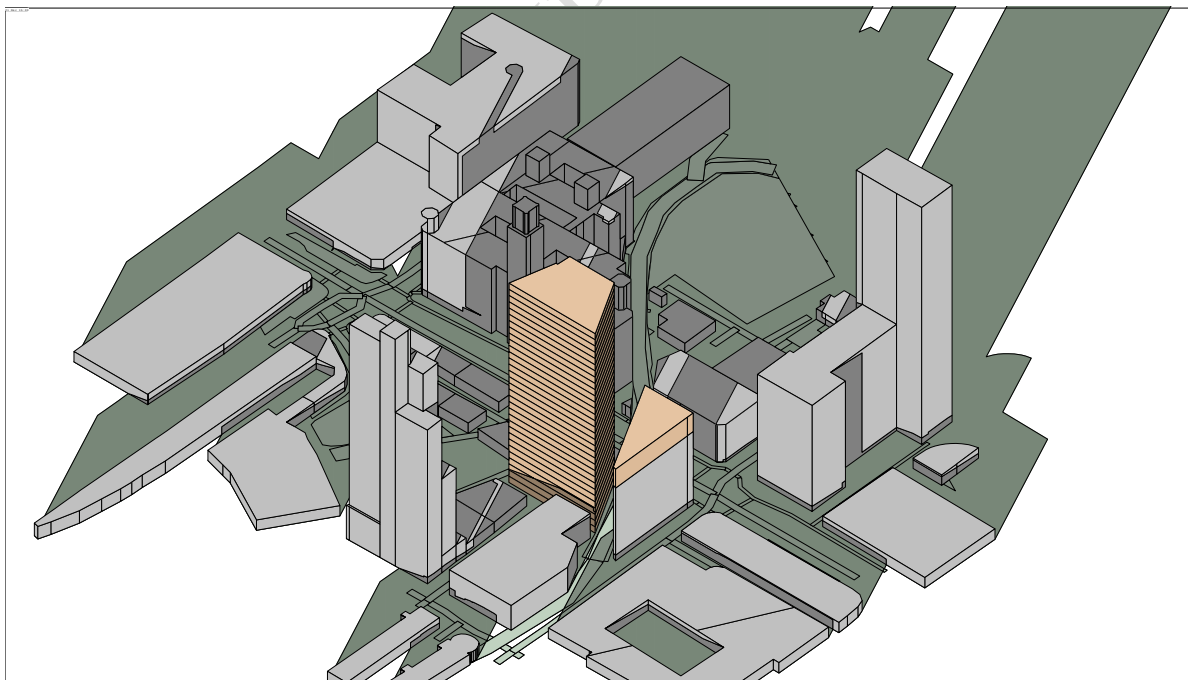
12:00 GMT



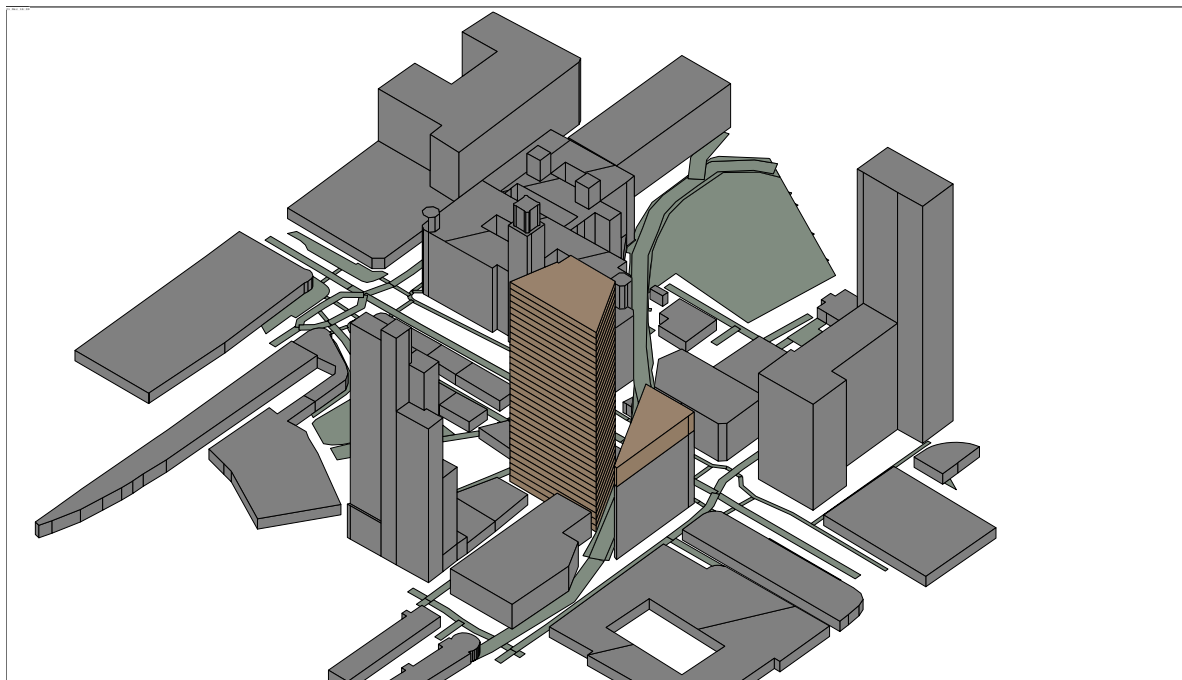
13:00 GMT



14:00 GMT



15:00 GMT



16:00 GMT

Appendix D – VSC Assessment Results

Window	V.S.C. without Extension	VSC with Extension	Status
1	8.58	7.08	PASS
2	7.67	6.83	PASS
3	7.31	6.18	PASS
4	5.73	4.48	FAIL
5	4.98	4.16	PASS
6	4.46	4.43	PASS
7	3.82	3.93	PASS
8	5.14	3.95	FAIL
9	5.26	3.89	FAIL
10	5.67	4.87	PASS
11	6.4	4.46	FAIL
12	6.38	5.5	PASS
13	5.98	4.59	FAIL
14	6.36	5.45	PASS
15	5.67	5.1	PASS
16	6.32	5.37	PASS
17	8.08	5.67	FAIL
18	8.44	6.88	PASS
19	8.85	8.29	PASS
20	7.46	5.16	FAIL
21	6.28	5.83	PASS
22	5.78	4.61	FAIL
23	7.15	5.85	PASS
24	7.49	6.73	PASS
25	8.52	7.38	PASS
26	7.54	5.67	FAIL
27	6.88	5.47	FAIL
28	6.48	5.81	PASS
29	6.94	5.37	FAIL
30	7.06	5.4	FAIL
31	7.83	5.59	FAIL
32	8.55	5.8	FAIL
33	9.68	7.09	FAIL
34	8.4	7.49	PASS
35	8.03	6.36	FAIL
36	8.54	5.2	FAIL
37	9.54	6.19	FAIL

38	8.55	5.94	FAIL
39	9.29	6.47	FAIL
40	9.34	6.85	FAIL
41	10.53	8.33	FAIL
42	8.81	7.4	PASS
43	8.93	6.59	FAIL
44	9.45	5.68	FAIL
45	10.92	6.02	FAIL
46	9.92	6.22	FAIL
47	10.08	6.79	FAIL
48	11.65	8.82	FAIL
49	10.86	7.5	FAIL
50	10.26	7.44	FAIL
51	11.81	6.62	FAIL
52	11.73	6.37	FAIL
53	11.39	6.89	FAIL
54	11.67	7.25	FAIL
55	12.84	9.14	FAIL
56	12.58	8.78	FAIL
57	12.66	8.28	FAIL
58	14.52	7.99	FAIL
59	13.89	7.9	FAIL
60	14.28	7.53	FAIL
61	14.55	7.99	FAIL
62	15.94	10.03	FAIL
63	15.18	8.67	FAIL
64	14.7	9.1	FAIL
65	17.74	8.06	FAIL
66	17.7	9.06	FAIL
67	18.1	8.51	FAIL
68	18	9.35	FAIL
69	18.33	10.69	FAIL
70	19.02	10.75	FAIL
71	18.52	10.53	FAIL
72	22.26	9.61	FAIL
73	22.11	10.14	FAIL
74	22.11	10.55	FAIL
75	22.46	10.41	FAIL
76	22.45	12.45	FAIL
77	22.61	11.84	FAIL
78	22.59	11.14	FAIL

79	28.16	11.65	FAIL
80	28.22	11.89	FAIL
81	27.85	12.35	FAIL
82	27.44	12.31	FAIL
83	28.44	14.08	PASS
84	28.59	13.58	PASS
85	28.09	12.98	FAIL
86	33.15	14.67	PASS
87	33.75	14.99	PASS
88	33.79	15.17	PASS
89	33.66	15.43	PASS
90	32.93	15.78	PASS
91	33.46	16.08	PASS
92	33.51	16.23	PASS
93	36.12	18.55	PASS
94	36.27	19.13	PASS
95	35.43	19.95	PASS
96	35.42	19.81	PASS
97	36.39	18.84	PASS
98	35.53	19.07	PASS
99	36.44	23.64	PASS
100	36.32	23.77	PASS
101	35.94	24.4	PASS
102	35.76	24.17	PASS
103	35.94	23.54	PASS
104	36.06	24.01	PASS
105	36.77	29.89	PASS
106	36.96	30.14	PASS
107	36.18	30.41	PASS
108	36.51	30.09	PASS
109	36.58	30.11	PASS
110	36.43	29.9	PASS
111	37.01	35.89	PASS
112	37.32	35.65	PASS
113	36.23	35.39	PASS
114	36.86	35.3	PASS
115	36.77	35.54	PASS
116	36.49	35.17	PASS
117	37.16	37.11	PASS
118	37.47	37.24	PASS
119	36.72	36.55	PASS

120	37.05	36.68	PASS
121	37.13	36.98	PASS
122	37.07	36.73	PASS
123	37.68	37.25	PASS
124	37.52	37.26	PASS
125	36.93	36.81	PASS
126	37.3	37.22	PASS
127	37.23	37.23	PASS
128	37.43	37.09	PASS
129	37.6	37.63	PASS
130	37.68	37.45	PASS
131	37.44	37.4	PASS
132	37.27	37.26	PASS
133	36.98	37.03	PASS
134	37.13	37.15	PASS
135	37.51	37.28	PASS
136	37.76	37.94	PASS
137	37.75	37.87	PASS
138	37.8	37.77	PASS
139	37.69	37.6	PASS
140	37.46	37.38	PASS
141	37.54	37.23	PASS
142	37.69	37.68	PASS
143	37.73	37.74	PASS
144	38.1	37.64	PASS
145	38.07	37.47	PASS
146	37.64	37.77	PASS
147	37.52	37.64	PASS
148	37.63	37.61	PASS
149	37.58	37.51	PASS
150	38.01	38.08	PASS
151	38.06	38.01	PASS
152	37.96	37.78	PASS
153	37.8	37.89	PASS
154	37.35	37.63	PASS
155	37.41	37.65	PASS
156	37.99	37.86	PASS
157	38.14	38.25	PASS
158	38.04	38.03	PASS
159	38.09	37.94	PASS
160	37.81	37.84	PASS

161	37.5	37.43	PASS
162	37.79	37.45	PASS
163	37.83	37.79	PASS
164	38.1	38.16	PASS
165	38.15	38.18	PASS
166	38.03	38.05	PASS
167	38.1	37.96	PASS
168	37.61	37.62	PASS
169	37.66	37.88	PASS
170	38.32	37.95	PASS
171	38.09	38.17	PASS
172	38.13	38.22	PASS
173	38.32	38.12	PASS
174	38.24	38.1	PASS
175	37.76	38.03	PASS
176	37.79	37.82	PASS
177	38.45	37.85	PASS
178	38.36	38.48	PASS
179	38.45	38.51	PASS
180	38.28	38.43	PASS
181	38.3	38.33	PASS
182	38	38.11	PASS
183	38.22	37.98	PASS
184	38.23	38.27	PASS
185	38.57	38.61	PASS
186	38.41	38.7	PASS
187	38.36	37.9	PASS
188	38.42	38.45	PASS
189	38.49	38.57	PASS
190	38.45	38.48	PASS
191	38.54	38.7	PASS
192	38.69	38.67	PASS
193	38.32	38.33	PASS
194	38.43	38.56	PASS
195	38.44	38.46	PASS
196	38.4	38.49	PASS
197	38.79	38.67	PASS
198	38.82	38.7	PASS
199	38.42	38.49	PASS
200	38.42	38.47	PASS
201	38.76	38.64	PASS

202	38.66	38.73	PASS
203	38.74	38.93	PASS
204	38.87	38.86	PASS
205	38.57	38.66	PASS
206	38.71	38.68	PASS
207	38.84	38.55	PASS
208	38.79	38.85	PASS
209	38.86	38.95	PASS
210	38.82	38.91	PASS
211	38.51	38.78	PASS
212	38.52	38.75	PASS
213	38.71	38.84	PASS
214	38.68	38.77	PASS
215	38.89	39.08	PASS
216	38.88	38.99	PASS
217	38.64	38.9	PASS
218	38.78	38.95	PASS
219	38.84	38.87	PASS
220	38.82	38.87	PASS

Appendix E – APSH Assessment Results

Room Name	Annual			Winter			Overall
	Existing	Proposed		Existing	Proposed		
Ground Plant	14.97	14.97	PASS	8.72	8.72	PASS	PASS
L01 Amenity	14.06	13.89	PASS	7.64	7.64	PASS	PASS
L02 Double 1	11.11	9.03	PASS	4.86	4.86	PASS	PASS
L02 Double 1	12.26	11.55	PASS	5.33	5.33	PASS	PASS
L02 Kitchen Room 1	15.89	15.12	PASS	8.87	8.87	PASS	PASS
L02 Kitchen Room 2	12.21	10.13	PASS	4.98	4.98	PASS	PASS
L03 Double 1	14.28	12.3	PASS	5.91	5.91	PASS	PASS
L03 Double 2	13.09	10.29	FAIL	5.52	5.52	PASS	FAIL
L03 Kitchen Room 1	17.35	15.31	PASS	9.06	9.06	PASS	PASS
L03 Kitchen Room 2	14.4	11.62	PASS	5.56	5.56	PASS	PASS
L04 Double 1	15.06	12.95	PASS	6.03	6.03	PASS	PASS
L04 Double 2	14.64	11.17	FAIL	5.56	5.56	PASS	FAIL
L04 Kitchen Room 1	17.9	15.82	PASS	9.57	9.57	PASS	PASS
L04 Kitchen Room 2	16.14	12.67	FAIL	5.56	5.56	PASS	FAIL
L05 Double 1	17.61	14.72	PASS	8.05	8.05	PASS	PASS
L05 Double 2	17.58	14.45	PASS	6.42	6.42	PASS	PASS
L05 Kitchen Room	18.48	15.62	PASS	6.13	6.13	PASS	PASS
L06 Double 1	18.62	16.5	PASS	8.66	8.53	PASS	PASS
L06 Double 2	20.35	15.99	FAIL	7.12	6.75	PASS	FAIL
L06 Kitchen Room	21.87	17.85	PASS	6.6	6.25	PASS	PASS
L07 Double 1	19.57	17.57	PASS	8.75	8.53	PASS	PASS
L07 Double 2	23.47	18.73	FAIL	7.64	6.75	PASS	FAIL
L07 Kitchen Room	24.44	20.46	PASS	7.63	6.25	PASS	PASS
L08 Double 1	25.03	18.28	FAIL	9.61	8.53	PASS	FAIL
L08 Double 2	27.85	18.54	FAIL	8.45	6.75	PASS	FAIL
L08 Kitchen Room	27.61	21.88	FAIL	8.41	6.25	PASS	FAIL
L09 Double 1	32.2	19.21	FAIL	11.9	8.53	PASS	FAIL
L09 Double 2	30.85	19.48	FAIL	11.32	6.75	PASS	FAIL
L09 Kitchen Room	30.81	21.76	FAIL	11.26	6.25	PASS	FAIL
L10 Double 1	44.36	21.52	FAIL	18.1	8.73	PASS	FAIL
L10 Double 2	47.46	23.24	FAIL	18.02	7.41	PASS	FAIL
L10 Kitchen Room	48.03	26.31	PASS	17.95	7	PASS	PASS
L11 Double 1	56.51	24.52	FAIL	26.39	8.75	PASS	FAIL
L11 Double 2	57.05	25.5	PASS	26.02	7.65	PASS	PASS
L11 Kitchen Room	56.39	28.75	PASS	25.86	7.64	PASS	PASS
L12 Kitchen Room 1	63.19	33.64	PASS	29.86	10.29	PASS	PASS
L12 Kitchen Room 2	61.72	35.76	PASS	28.6	9.1	PASS	PASS
L12 Studio 1	62.06	32.41	PASS	29.78	9.16	PASS	PASS
L12 Studio 2	60.58	32.7	PASS	28.84	9.16	PASS	PASS
L13 Kitchen Room 1	63.19	41.35	PASS	29.86	13.27	PASS	PASS
L13 Kitchen Room 2	63.18	44.26	PASS	29.17	12.77	PASS	PASS

L13 Studio 1	62.5	41.25	PASS	29.86	12.86	PASS	PASS
L13 Studio 2	62.65	42.39	PASS	29.17	12.81	PASS	PASS
L14 Kitchen Room 1	63.89	53.31	PASS	29.86	20.64	PASS	PASS
L14 Kitchen Room 2	63.73	54.82	PASS	29.17	20.48	PASS	PASS
L14 Studio 1	63.71	52.97	PASS	29.86	20.56	PASS	PASS
L14 Studio 2	63.72	53.22	PASS	29.17	20.51	PASS	PASS
L15 Kitchen Room 1	63.89	62.61	PASS	29.86	28.59	PASS	PASS
L15 Kitchen Room 2	63.73	62.75	PASS	29.17	28.2	PASS	PASS
L15 Studio 1	63.89	62.61	PASS	29.86	28.58	PASS	PASS
L15 Studio 2	63.89	62.9	PASS	29.17	28.2	PASS	PASS
L16 Kitchen Room 1	64.12	64.12	PASS	30.09	30.09	PASS	PASS
L16 Kitchen Room 2	63.85	63.85	PASS	29.38	29.38	PASS	PASS
L16 Studio 1	63.97	63.97	PASS	29.94	29.94	PASS	PASS
L16 Studio 2	64.27	64.27	PASS	29.55	29.55	PASS	PASS
L17 Kitchen Room 1	65.16	65.16	PASS	31.13	31.13	PASS	PASS
L17 Kitchen Room 2	64.71	64.71	PASS	30.21	30.21	PASS	PASS
L17 Studio 1	65.04	65.04	PASS	31.02	31.02	PASS	PASS
L17 Studio 2	65.68	65.68	PASS	30.96	30.96	PASS	PASS
L18 Double 1	65.28	65.28	PASS	31.25	31.25	PASS	PASS
L18 Double 2	65.97	65.97	PASS	31.25	31.25	PASS	PASS
L18 Kitchen Room 1	65.81	65.81	PASS	30.56	30.56	PASS	PASS
L19 Double 1	65.28	65.28	PASS	31.25	31.25	PASS	PASS
L19 Double 2	65.97	65.97	PASS	31.25	31.25	PASS	PASS
L19 Kitchen Room	65.97	65.97	PASS	30.56	30.56	PASS	PASS
L20 Double 1	65.84	65.84	PASS	31.25	31.25	PASS	PASS
L20 Double 2	66.1	66.1	PASS	31.25	31.25	PASS	PASS
L20 Kitchen Room	65.97	65.97	PASS	30.56	30.56	PASS	PASS
L21 Double 1	65.97	65.97	PASS	31.25	31.25	PASS	PASS
L21 Double 2	66.67	66.67	PASS	31.25	31.25	PASS	PASS
L21 Kitchen Room	65.97	65.97	PASS	30.56	30.56	PASS	PASS
L22 Double 1	67.02	67.02	PASS	31.25	31.25	PASS	PASS
L22 Double 2	66.67	66.67	PASS	31.25	31.25	PASS	PASS
L22 Kitchen Room	65.97	65.97	PASS	30.56	30.56	PASS	PASS
L23 Double 1	67.36	67.36	PASS	31.25	31.25	PASS	PASS
L23 Double 2	67.55	67.55	PASS	31.25	31.25	PASS	PASS
L23 Kitchen Room	65.98	65.98	PASS	30.56	30.56	PASS	PASS
L24 Double 1	67.36	67.36	PASS	31.25	31.25	PASS	PASS
L24 Double 2	68.06	68.06	PASS	31.25	31.25	PASS	PASS
L24 Kitchen Room	66.66	66.66	PASS	30.56	30.56	PASS	PASS
L25 Double 1	67.36	67.36	PASS	31.25	31.25	PASS	PASS
L25 Double 2	68.05	68.05	PASS	31.25	31.25	PASS	PASS
L25 Kitchen Room	66.67	66.67	PASS	30.56	30.56	PASS	PASS
L26 Kitchen Room 1	67.59	67.59	PASS	31.25	31.25	PASS	PASS
L26 Kitchen Room 2	66.67	66.67	PASS	30.56	30.56	PASS	PASS

L26 Studio 1	67.36	67.36	PASS	31.25	31.25	PASS	PASS
L26 Studio 2	68.06	68.06	PASS	31.25	31.25	PASS	PASS
L27 Kitchen Room 1	68.06	68.06	PASS	31.25	31.25	PASS	PASS
L27 Kitchen Room 2	66.68	66.68	PASS	30.56	30.56	PASS	PASS
L27 Studio 1	67.86	67.86	PASS	31.25	31.25	PASS	PASS
L27 Studio 2	68.3	68.3	PASS	31.25	31.25	PASS	PASS
L28 Double	68.27	68.27	PASS	31.25	31.25	PASS	PASS
L28 Kitchen Room	67.36	67.36	PASS	30.56	30.56	PASS	PASS
L28 Studio 1	68.05	68.05	PASS	31.25	31.25	PASS	PASS
L28 Studio 2	68.75	68.75	PASS	31.25	31.25	PASS	PASS
L29 Kitchen Room 1	68.75	68.75	PASS	31.25	31.25	PASS	PASS
L29 Kitchen Room 2	67.45	67.45	PASS	30.56	30.56	PASS	PASS
L29 Studio 1	68.59	68.59	PASS	31.25	31.25	PASS	PASS
L29 Studio 2	69.06	69.06	PASS	31.25	31.25	PASS	PASS
L30 Kitchen Room 1	68.75	68.75	PASS	31.25	31.25	PASS	PASS
L30 Kitchen Room 2	68.06	68.06	PASS	30.56	30.56	PASS	PASS
L30 Studio 1	68.75	68.75	PASS	31.25	31.25	PASS	PASS
L30 Studio 2	69.44	69.44	PASS	31.25	31.25	PASS	PASS
L31 Kitchen Room 1	68.75	68.75	PASS	31.25	31.25	PASS	PASS
L31 Kitchen Room 2	68.06	68.06	PASS	30.56	30.56	PASS	PASS
L31 Studio 2	69.44	69.44	PASS	31.25	31.25	PASS	PASS