

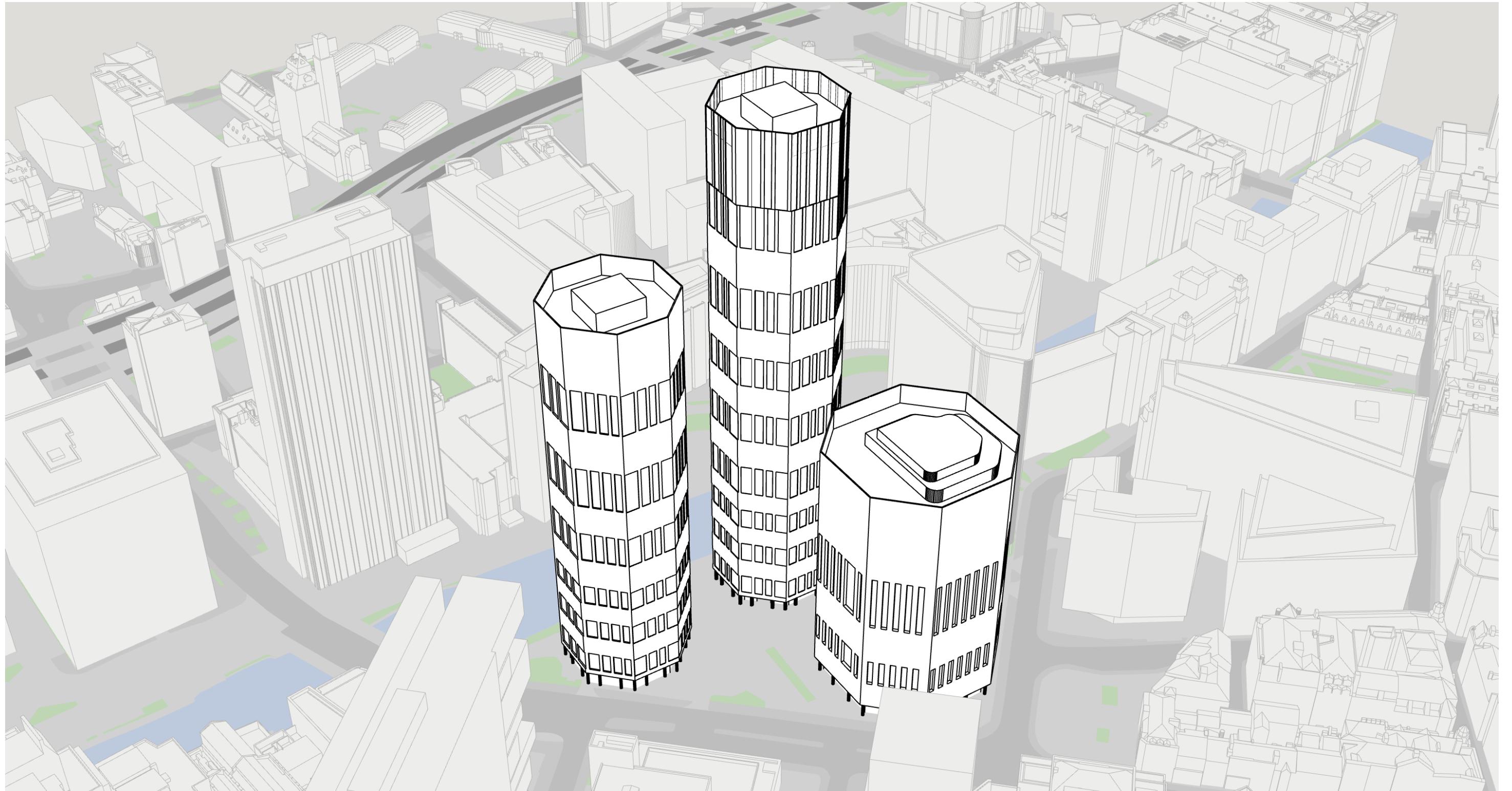
5222

Albert Bridge House

CFD WIND MICROCLIMATE ASSESSMENT

May 2025

akt II
Bioclimatic



Contents

Executive Summary		2.0 Legislative Framework, Policy, and Guidance		4.0 Results		5.0 Conclusions	
page 3		page 7		page 12		page 18	
Scope of work		2.1	Guidance	7	4.1	Ground-Level Comfort - Winter Season	12
Results		2.2	National Planning Policy	7	4.2	Ground-Level Comfort - Summer Season	12
1.0 Introduction		2.3	Regional Planning Policy	7	4.3	Ground-Level Distress - Annual	12
1.1 Location		2.4	Local Planning Policy	7	Appendix A		
1.2 Site Boundary		3.0 Methodology		page 8		- Surrounding Views	
1.3 Surrounding Area		3.1	Meteorological Data	8	4.4	Roof Terraces and Balconies	16
1.4 Existing Site & Proposed Development		3.2	CFD Methodology	8			
1.5 Consented schemes		3.3	Assessment Criteria	9			
		3.4	Scenarios Analysed	11			
		3.5	Level of Detail	11			

rev 2	09-05-2025	Draft for issue
rev 1	07-04-2025	Draft for comment
rev 0	07-04-2025	Draft for internal review
Revision	Date	Status
Prepared		
by:		Cameron Salter
Checked		
by:		Mingzhe He
Approved		
by:		Steven Daniels

Executive summary

AKT II has prepared this wind microclimate report on behalf of Oval Real Estate ("the applicant") in support of the application to Manchester City Council for the redevelopment of Albert Bridge House, 1 Bridge St, Manchester M60 9AF ("the Site") in Manchester City, UK.

This report details an assessment of the pedestrian wind comfort on and around the Site of the Proposed Development using Computational Fluid Dynamics (CFD). This assessment pays particular attention to the impact of the Proposed Development on its surroundings, including pedestrian access routes to the Site, building drop-off and entrances, and proposed on-and-off-Site seating areas. The wind conditions on the proposed public and private terraces are also considered. Overall, the impact of the Proposed Development on local wind conditions will be evaluated on two measures:

- A comparison between the Existing Site ('Baseline') and the Proposed Development.
- Whether the wind conditions for identified 'receptors' for the proposed scheme are suitable for the intended use.

Scope of work

The main body of this report details the wind microclimate assessments for the following Scenarios:

1. 'Baseline' - Existing Site with existing surroundings;
2. Proposed scheme with existing surroundings;
3. Proposed scheme with future consented schemes in the surroundings.

Quantification of the wind conditions within and around the Site is performed using the Lawson London Docklands Development Corporation (LDDC) criteria. For the wind 'comfort' part of this assessment, the criteria sets out pedestrian activities (Sitting, Standing, Strolling, Business Walking, and Uncomfortable/Unsafe) that would be suitable for the local wind conditions, e.g., wind conditions in a seating area need to be calmer than that for a location used as a movement corridor. If the wind conditions exceed the threshold for the intended activity, then they are intolerable for the stated pedestrian activity and the expectation is that there may be complaints of nuisance or people will not use the area for its intended purpose. This part of this assessment is performed on two contrasting seasons:

- winter (windiest season);
- summer (characterised by frequent pedestrian activity).

An annual 'distress' assessment (from the same criteria) also forms part of this assessment. If exceeded (i.e., unacceptable distress), vulnerable pedestrians and cyclists may find it difficult to traverse through this area - potentially leading to stumbling or falling.

Results

Ground-level

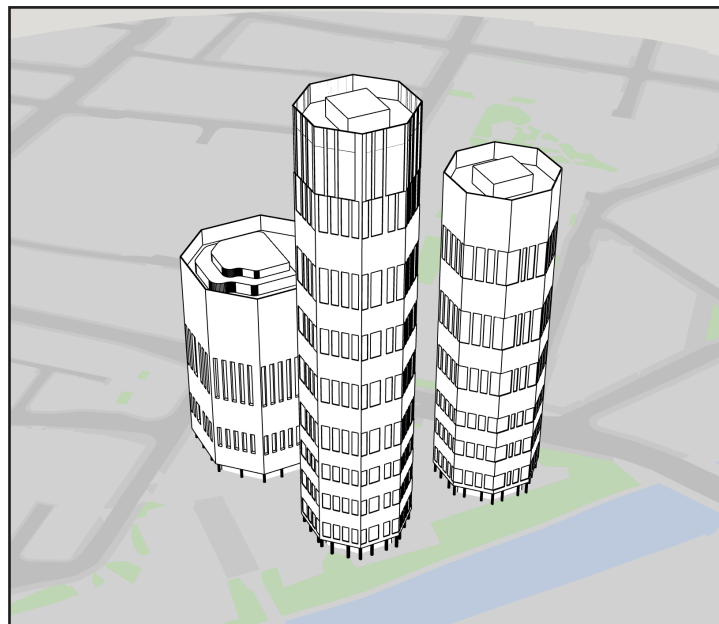
A summary of the wind comfort and distress results for the Baseline and proposed schemes at ground-level around the Site is as follows:

- During winter, the wind conditions for the Baseline are considered acceptable for the intended uses of the surrounding areas. The proposed scheme for Scenarios 2 and 3 has a Negligible impact and are therefore acceptable.
- During summer, the wind conditions for the Baseline are considered acceptable for the intended uses of the surrounding areas. The proposed scheme for Scenarios 2 and 3 has a Negligible impact and are therefore acceptable.
- No areas of (annual) distress observed in all scenarios. The proposed scheme has a Negligible impact.
- Overall, the proposed scheme has a 'Negligible' impact on the wind conditions in its surroundings.

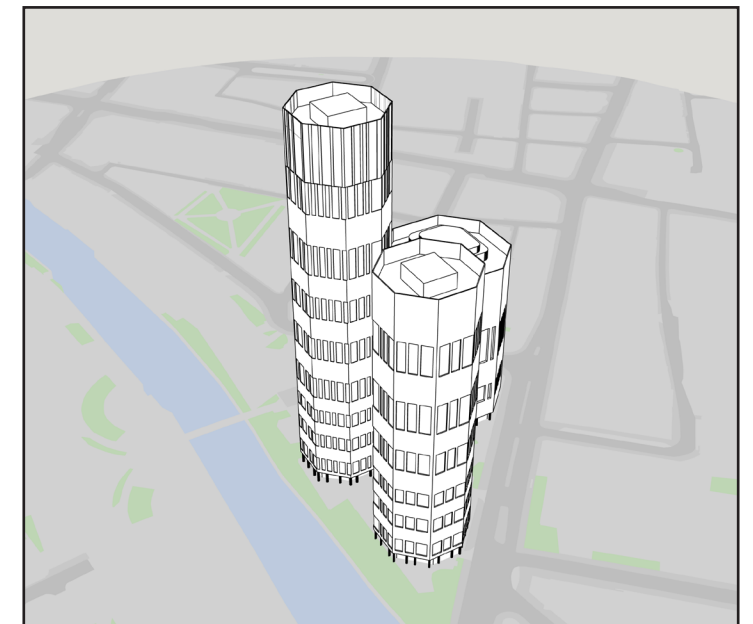
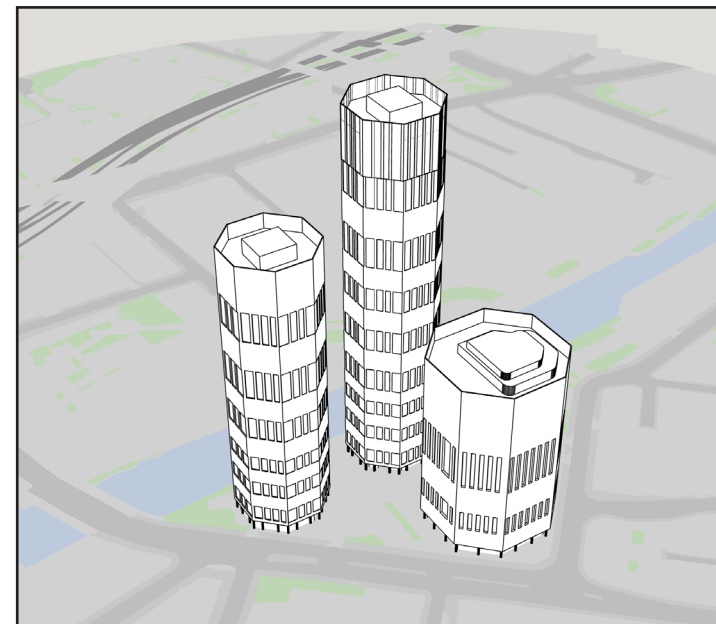
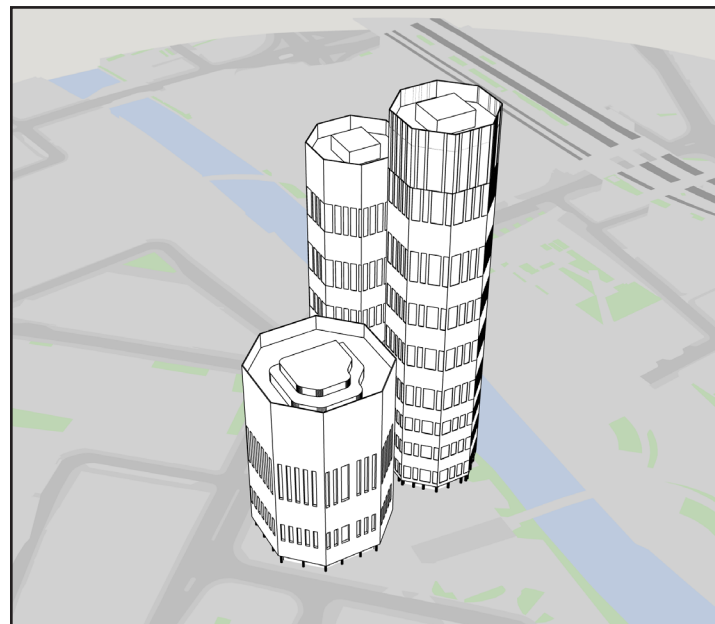
Proposed Development private roof terraces and balconies

The roof terraces experience wind conditions suitable for 'Sitting' and 'Standing' activities and are therefore suitable for the intended use.

No regions of unacceptable wind distress are observed on any of the roof terraces. For these areas, the significance of the wind conditions for the proposed scheme is Negligible.



Design of the proposed development

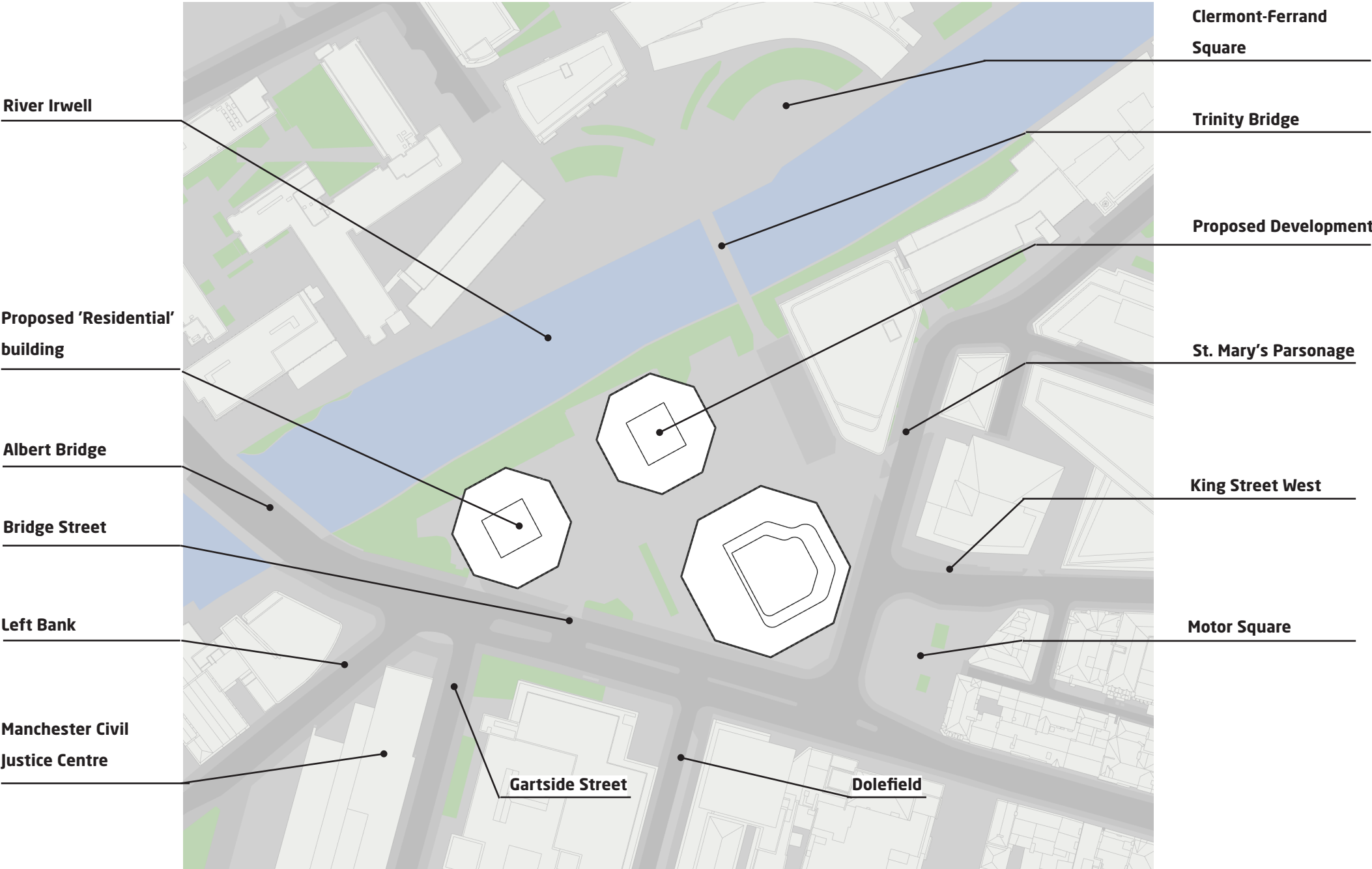


1 Introduction

AKT II has prepared this wind microclimate report on behalf of Oval Real Estate ("the applicant") in support of the application to Manchester City Council for the redevelopment of Albert Bridge House, 1 Bridge St, Manchester M60 9AF ("the Site") in Manchester City, UK.

This report details an assessment of the pedestrian wind comfort on and around the Site using Computational Fluid Dynamics (CFD). This assessment pays particular attention to the impact of the Proposed Development on its surroundings, including pedestrian access routes to the Site, building drop-off and entrances, and proposed on-and-off-Site seating areas. The wind conditions on the proposed public and private terraces are also considered. Overall, the impact of the Proposed Development on local wind conditions will be evaluated on two measures:

1. a comparison between the Existing Site ('Baseline') and the Proposed Development.
2. whether the wind conditions for identified 'receptors' for the Proposed scheme are suitable for the intended use.



Plan view of the Proposed Development (Future consented surroundings) with labelled key public regions for discussion.

1.1 Location

The Site is located to the north of Manchester, UK. The National Grid Reference for the Site is 534819, 22508.

1.2 Site Boundary

Please refer to the image below indicating the site boundary.

1.3 Surrounding Area

The area around the Site is characterised by medium-rise (5-8 storeys) industrial, office, commercial, and residential buildings. The Site is located on the south bank of the River Irwell, with a Grade-II listed Albert (road) Bridge immediately west, and Trinity (foot) Bridge immediately east of the Site.

Immediately south-west of the Site is a public seating area 'Trinity Square'. For this area, the St Marys Parsonage Strategic Regeneration Framework (SRF) seeks to reimagine and revitalise this space to *"encourage adjoining businesses to expand into the square at key locations, enhancing the vibrancy and activity"* which would include introducing seating/additional amenity uses as opposed to its current lack of function/predominant use as a movement corridor.

North of the Site, on the other side of the River Irwell, is another public seating area 'Clermont-Ferrand Square'.

The CAD geometry for the surrounding context was received from Studio Egret West (SEW) on the 22/02/22 and the 10/08/22 who obtained this from VU.City.

1.4 Existing Site & Proposed Development

The Site is currently occupied by Albert Bridge House with associated ground level car parking - the Bridge Street Car Park, and Albert Bridge Gardens. The current building comprises four parts, an 18-storey office building, flanked by a six and a three-storey office building plus a single storey building fronting the River Irwell as well as associated plant and substation.

Part of the Site comprises a Manchester City Council-operated public car park. This is accessed and egressed via Bridge Street and contains approximately 65 spaces. Further private car parking can be accessed from St Mary's Parsonage, providing c.72 spaces.

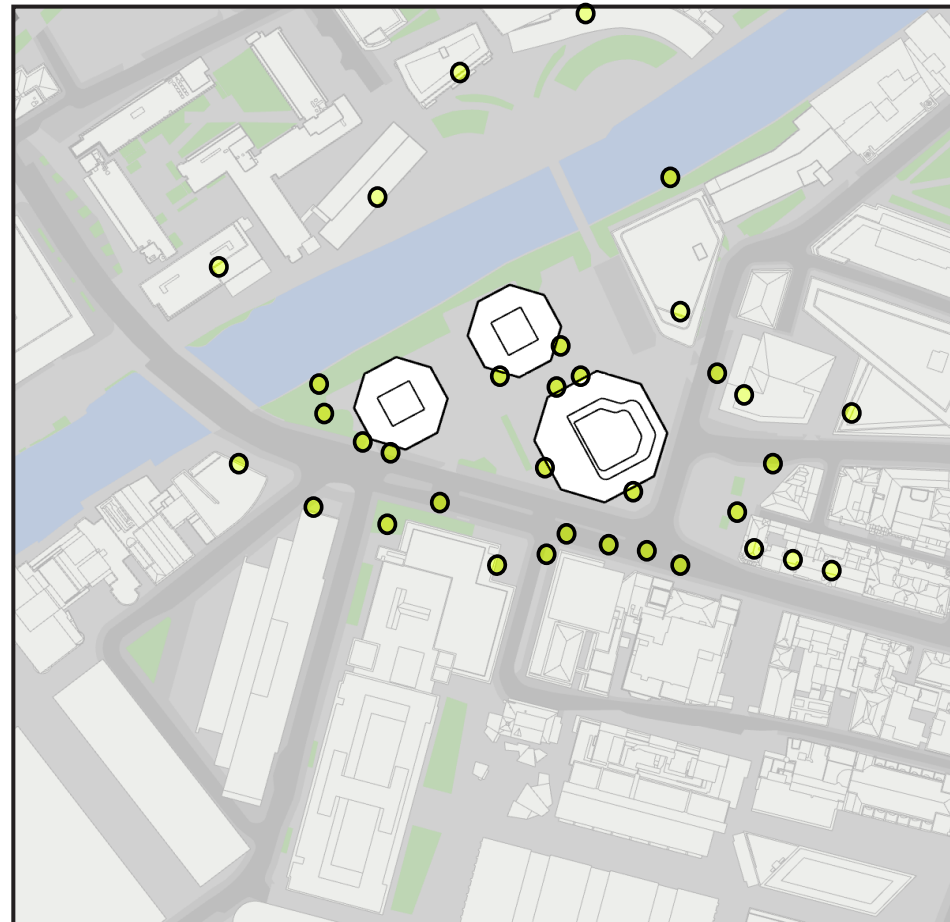
The main pedestrian entrance to the office buildings is located off Bridge Street, although there is also a further pedestrian entrance off St Mary's Parsonage. Immediately adjacent, east of the Site, and accessed from St Marys Parsonage, is a public pedestrian access route through to the pedestrian footbridge (Trinity Bridge). This provides a key connection between Central Salford and Manchester City Centre.

Albert Bridge Gardens is located in the north-western corner of the Site.

The Proposed Development was modelled based on the CAD geometry received from the SEW (0476-SEW-ZZ-ZZ-M3-A-000000 - 3D View - 3D Detailed model view.dwg, 02/04/25).



Plan view of the Proposed Site (Future consented surroundings) and its location. The Site boundary is highlighted in yellow.



Proposed Development with future consented surroundings with entrances, public passageways, and bus stops highlighted



Proposed Development with future consented surroundings with public seatings areas (on-Site and off-Site) highlighted

1.5 Consented schemes

The assessment considers developments that have received planning consent within 300m of the Site. These include schemes in Manchester City and Salford:

- 134287/F0/2022 - Alberton House.
- 135028/F0/2022 - 27-33 King Street West
- 131314/F0/2021 - Speakers House
- 129251/F0/2021 - Kendals & Fraser

The locations of these schemes are indicated in the figure on this page.

The cumulative effect of the approved designs of these buildings is considered in this report for the 'Proposed Development with future consented schemes' (scenario 3).

It is to be noted that 21/78277/FUL - Ralli Quays is deep in construction and therefore is included in all scenarios.



Context surroundings with highlighted positions of consented schemes

2 Legislative Framework, Policy and Guidance

In support of the application for the Proposed Development, this wind microclimate assessment has been undertaken within the context of relevant planning policies, guidance documents and legislative instruments. These are summarised below.

2.1 Guidance

National Planning Practice Guidance (2021)

The NPPG was published in November 2016 to support the NPPF and was updated in August 2021. There is no guidance within the NPPG related to wind microclimate issues.

National Design Guidance (2021)

The Ministry of Housing, Communities & Local Government, paragraph 71 states that

“Proposals for tall buildings (and other buildings with a significantly larger scale or bulk than their surroundings) require special consideration. This includes their location and siting; relationship to context; impact on local character, views and sight lines; composition - how they meet the ground and the sky; and environmental impacts, such as sunlight, daylight, overshadowing and wind. These need to be resolved satisfactorily in relation to the context and local character”.

Historic England Advice Note 4, Tall Buildings (2022)

The revised Guidance on Tall Buildings updates previous guidance by English Heritage and the Commission for Architecture and Built Environment (CABE), produced in 2007. It seeks to guide people involved in planning for and designing tall buildings so that they may be delivered in a sustainable and successful way through the development plan and development management process. The relevant passages:

Page 8:

“3.3 The following factors need to be considered to determine the impacts a tall building could have upon the historic environment:

...

Environmental: *the influence on local micro-climates such as creation of wind tunnels, canyon effect, over-shadowing, glare, and air quality and effect on heritage assets in terms of the impact these micro-climatic changes could have upon their fabric, and how they are experienced; and*

Cumulative: *the combined impacts on heritage assets from existing, consented and proposed tall buildings.”*

Page 14:

“4.5 Using an understanding of the historic environment to inform the approach to tall building design can be achieved by:

...

2. The impact on the local environment: people’s experience of local character and the historic environment can be affected by factors such as wind and other microclimatic changes, overshadowing, and light pollution from the development of a tall building. In some cases, this has the potential to impact the physical fabric of heritage assets. It is important to test impacts on the local environment at design stage and present these through the application process to reduce the incidence of interventions being required to mitigate impacts post construction (which may in turn harm character and quality of a site, street or area).”

2.2 Legislative Framework

For Manchester, there is no specific national legislation or planning policy guidance dealing with wind microclimate in terms of pedestrian comfort. However, the Lawson variant of the criteria used in this assessment is recognised by many other local authorities across the UK as a suitable benchmark for wind assessments.

2.3 National Planning Policy

The National Planning Policy Framework (2024)

The National Planning Policy Framework by the Ministry for Housing, Communities and Local Government and Department for Levelling Up, Housing and Communities. The relevant paragraphs are as follows:

Paragraph 135 of this framework states:

“Planning policies and decisions should ensure that developments:

a) will function well and add to the overall quality of the area, not just for the short term but over the lifetime of the development;

b) are visually attractive as a result of good architecture, layout and appropriate and effective landscaping;

c) are sympathetic to local character and history, including the surrounding built environment and landscape setting, while not preventing or discouraging appropriate innovation or change (such as increased densities);

d) establish or maintain a strong sense of place, using the arrangement of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit;

e) optimise the potential of the site to accommodate and sustain an appropriate amount and mix of development (including green and other public space) and support local facilities and transport networks; and

f) create places that are safe, inclusive and accessible and which promote health and wellbeing, with a high standard of amenity for existing and future users; and where crime and disorder, and the fear of crime, do not undermine the quality of life or community cohesion and resilience.”

2.4 Local Planning Policy

The Places for Everyone Joint Development Plan 2024

this plan states:

“The Places for Everyone Joint Development Plan 2024 enables Greater Manchester to reinforce their ambition to meet local housing need, promote new approach to town centres, achieve carbon neutral goals and supports other wider strategies around air quality, microclimate, walking and cycling etc..”

Policy JP-P1, page 189, states:

“Greater Manchester will aim to become one of the most liveable city regions in the world, consisting of a series of beautiful, healthy and varied places, each having the following key attributes that all development, wherever appropriate, should be consistent with:

[...] 15. Comfortable and inviting, with indoor and outdoor environments:

A. Offering a high level of amenity that minimises exposure to pollution; and

B. Addressing microclimate issues such as sunlight, indoor air quality, overheating, shade, wind and shelter”.

Policy JP-C5 Streets For All, page 227, states that:

“Streets will be designed and managed to make a significant positive contribution to the quality of place and support high levels of walking, cycling and public transport... We will seek to ensure::

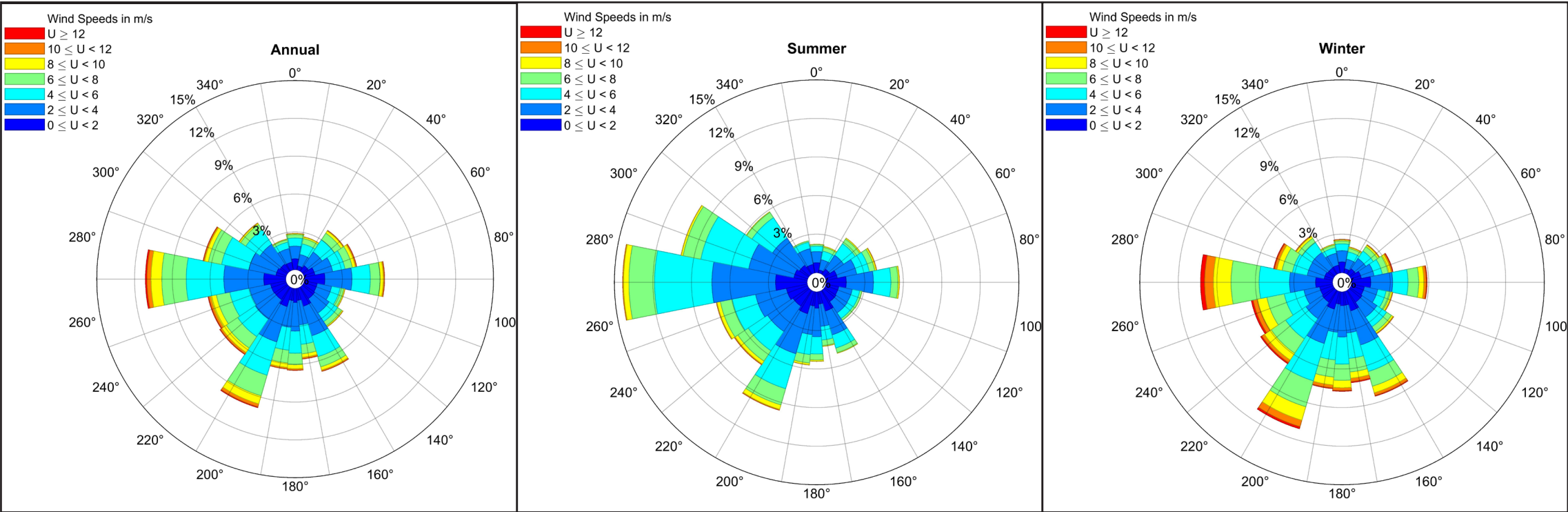
[...] 1. h. Offering shelter from wind and rain, and shade from the sun;”.

3 Methodology

The wind microclimate assessment is a robust and well established approach to quantify the change of wind conditions on or around a proposed scheme and its impact on pedestrians/ occupants. The basic methodology for this assessment is outlined below:

1. Measure the wind speeds at the pedestrian-level (typically 1.5m from the local ground) and normalise to a reference wind speed to obtain 'speedups';
2. transpose the local meteorological data to account for the conditions at the Site;
3. aggregate the above to obtain the expected frequency and magnitude of wind speeds at the pedestrian level;
4. compare the results with the relevant criteria (in this case, Lawson LDDC) to grade the wind conditions.

The methodology for each of these steps are detailed in the proceeding sections.



Annual wind rose	Summer season wind rose																Winter season wind rose	
Wind direction	0°	22°	45°	68°	90°	112°	135°	158°	170°	180°	190°	202°	225°	248°	270°	292°	315°	338°
Terrain factor at 120m	1.37	1.45	1.36	1.34	1.35	1.34	1.35	1.37	1.34	1.36	1.37	1.37	1.37	1.47	1.35	1.36	1.43	1.44

Table A ESDU Terrain Factors at 120m above ground level

3.1 Meteorological Data

Approximately 30 years (1993-2024) of weather data was obtained from Manchester Airport, Manchester, UK for this assessment. The resulting wind roses are shown on this page. The radial axis indicates the percentage hours per season or year that the wind speeds exceeds a particular wind speed range. These diagrams indicate prevailing wind directions from the south throughout the year - as typical for this region of the UK. Due to the dominance of this direction, additional wind directions 170° and 190° were considered, with 22.5° spacing otherwise. The seasons considered in this assessment are summer (June - August), and winter (December - February).

The data has been corrected to standard conditions of 120m above open terrain. The weather station data is subsequently adjusted to the Site conditions using the methodology set out in ESDU 01008¹. To account for the difference in terrain roughness and height between Manchester Airport and the Site, it is necessary to apply adjustment (terrain) factors, obtained from ESDU 01008, to the measured results (speedups). The table on this page presents the terrain factors for the Site.

¹ ESDU International, (2010) Computational program for wind speeds and turbulence properties: flat or hilly sites in terrain with roughness changes, ESDU 01008

3.2 CFD methodology

CFD was used to assist in the design process of the proposed scheme, and the final CFD results are included in the main body of this report in support of this application.

The CFD assessments consisted of:

- approximately 32mil hexahedral cells for the proposed scheme scenarios;
- surrounding (Context) buildings within at least 400m from the edge of the Site;
- future consented schemes in the surroundings within 300m from the Site boundary;
- a detailed 3D representation of the proposed and existing buildings (included in Appendix2 of this report);
- 18 wind directions to ensure less than 10% probability/ duration contribution to the aggregated results (170° and 190° additionally considered, with 22.5° spacing otherwise);
- steady-state simulation using k-omega SST turbulence model and high-Re wall models.
- 2nd order discretisation of momentum equation.
- a maximum cell size near critical locations of 0.3m or lower;
- a minimum 10 cells across street canyon;

- a minimum of 3 prism layers below 1.5m height (Pedestrian Wind Comfort sample plane);
- a surface edge length ranging between 0.2-0.45 on the Proposed Development, and 0.3-1m for the surrounding context.

The dimensions of the CFD domain follow the established guidelines for urban environments². These are outlined below.

Input parameter	Value
proposed scheme height (<i>H</i>)	155 m.
Height of domain	825 m.
Length of upstream	1225 m.
Length of downstream	1450 m.
Width domain	2250 m.

² Franke, Jörg & Hellsten, A & Schlünzen, Heinke & Carissimo, Bertrand. (2007) Best Practice Guidelines for the CFD simulation of Flows in the Urban Environment. COST action. 732. 51.

The CFD calculations have been carried out using AKT II's proprietary Bioclimatic CFD Tool, which has been developed in-house and embedded within the McNeel Rhinoceros and Grasshopper platforms, utilising OpenFOAM 7.0 as the CFD analysis engine by means of local Clusters and Cloud Computing Technology.

In order to perform the CFD simulation, three main steps are followed: pre-processing, computing and post-processing. Each phase contributes to the final outcome of the simulation:

1. pre-processing: McNeel Rhinoceros was used to model the urban geometry and Grasshopper platform to transform meshes into CFD ready file;
2. computing: OpenFOAM 7.0 was then employed to carry out the CFD analysis due to its flexibility and reliability alongside strong validation in the Industry. Local Clusters and Cloud Computing Technology was embedded within the workflow to multi-thread the analysis and increase the efficiency of the overall workflow;
3. post-processing: MATLAB was used to process the raw data from OpenFOAM, processing them with the long-term wind data to be then visualised in McNeel Rhinoceros / Grasshopper.

3.3 Assessment Criteria

The pedestrian wind ‘comfort’ assessment in this report focuses primarily on the seasons:

- winter (windiest);
- summer (characterised by frequent pedestiran activity).

This assessment LDDC variant of the Lawson Comfort Criteria. The Lawson Criteria are well-established in the UK for quantifying wind conditions in relation to built developments. The comfort results are discussed relating the wind conditions in an area to the intended pedestrian use, notably:

- thoroughfares – requiring, at worst, wind conditions suitable for ‘Strolling’ activities;
- Car parks – requiring, at worst, wind conditions suitable for ‘Business Walking’ activities;
- entrances – requiring, at worst, wind conditions suitable for ‘Standing’ activities;
- covered passageways – requiring, at worst, wind conditions suitable for ‘Standing’ activities;
- seating areas – requiring wind conditions suitable for ‘Sitting’ activities during summer;
- mixed-use amenity spaces – requiring wind conditions suitable for ‘Sitting’ and ‘Standing’ activities during summer;
- public terraces/balconies – typically requiring, at worst, wind conditions suitable for ‘Standing’ activities during summer.

An annual pedestrian ‘distress’ assessment is also performed to highlight any potential safety risks to vulnerable members of the public or cyclists due to strong winds.

Please refer to the tables below for the colour-coding of the comfort and distress plots.

This chapter specifies the wind comfort and distress criteria used in this assessment.

The established Lawson London Docklands Development Corporation (LDDC) criterion was adopted. Developed by Tom Lawson, this criterion is considered best practice guidance and is widely used in the established field of wind research within the United Kingdom. Lawson devised a scale for assessing the suitability of wind conditions in the urban environment based upon threshold values of wind speed and frequency of occurrence.

This criterion¹ defines a range of pedestrian activities from sitting through to more transient activities such as crossing the road, and for each activity defines a wind speed and frequency of occurrence. If the wind conditions exceed the threshold, then the conditions are considered unacceptable for the stated activity. If the wind conditions are below the threshold, they are described as tolerable (or suitable) for the stated activity.

¹ *Building Aerodynamics, Lawson, T., 2001, London, Imperial College Press*

Grade	Criteria for acceptability wind speed exceeded for x% of the time	Activity				
		Main Roads	Business Walking	Strolling	Standing and Entrance	Sitting
1	5% and < 4 m/s	✓	✓	✓	✓	✓
2	5% and > 4m/s	✓	✓	✓	✓	
3	5% and > 6m/s	✓	✓	✓		
4	5% and > 8m/s	✓	✓			
5	5% and > 10m/s	✓				

Table A.1 Criteria for wind acceptability according to Lawson criteria'

Table A.1 describes these criteria, which can be visualised easily using a colour gradient from green to red representing the different grades from 1 to 5 and in turn, their associated activities.

In addition, the criterion stipulates two strong wind thresholds (15 and 20m/s) to represent the levels of *distress* where someone could find walking difficult - potentially leading to stumbling or falling. In this report, the more conservative (and inclusive) threshold of 15 m/s was used to design for vulnerable and young people. The methodology is similar to assessing pedestrian wind comfort, but this time with much stricter criterion.

However, even if we design to ensure that high wind speeds will not exceed a period over the year of 0.025% (i.e., 2 hours), we cannot quantify the frequency of this high wind speed because 2 hours (or more) can represent a sum of a 2-hour storm or 2400 gust-events of 3 seconds each. We quantify these 2-hours based on probability and statistics over a long period (30-years), but we can't predict these events' frequency to sum up to the 2 hours.

Criteria for distress, wind speed exceeded for 0.025% of the year		
Unacceptable	> 15m/s	
Acceptable	< 15m/s	

Table A.2 Criteria for wind distress according to Lawson criteria'

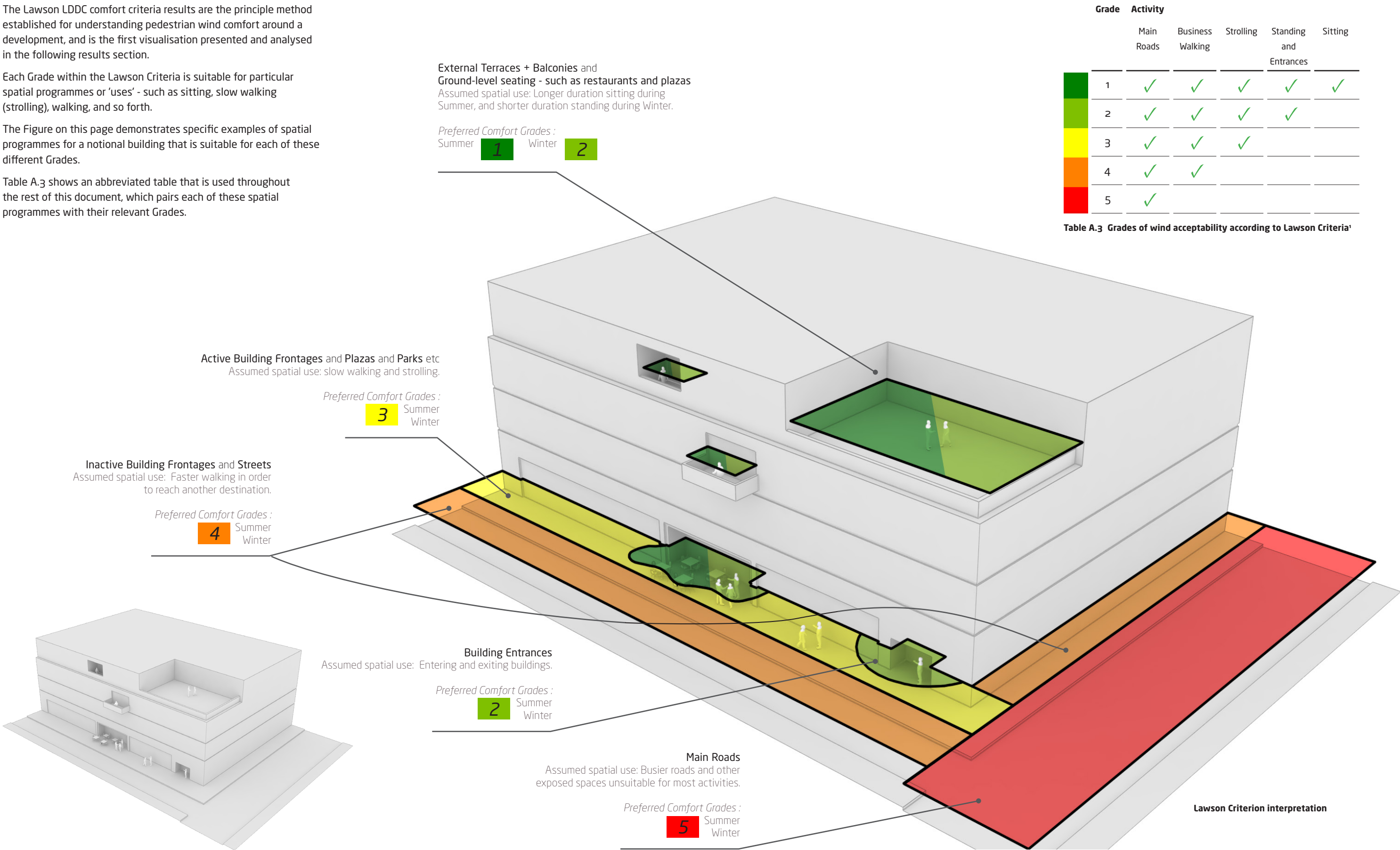
Interpreting Comfort Results

The Lawson LDDC comfort criteria results are the principle method established for understanding pedestrian wind comfort around a development, and is the first visualisation presented and analysed in the following results section.

Each Grade within the Lawson Criteria is suitable for particular spatial programmes or 'uses' - such as sitting, slow walking (strolling), walking, and so forth.

The Figure on this page demonstrates specific examples of spatial programmes for a notional building that is suitable for each of these different Grades.

Table A.3 shows an abbreviated table that is used throughout the rest of this document, which pairs each of these spatial programmes with their relevant Grades.



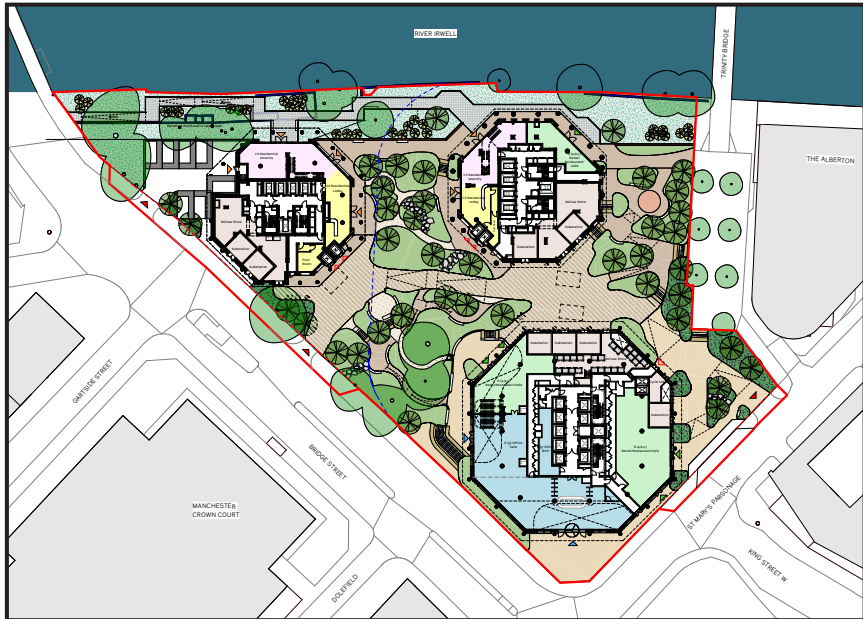
3.4 Scenarios Analysed

The main body of this report outlines the wind comfort and distress results of the Proposed Development for the following schemes:

1. Baseline: Existing Site with existing surroundings;
2. Proposed Development with existing surroundings;
3. Proposed Development with future planning consented schemes in the surroundings

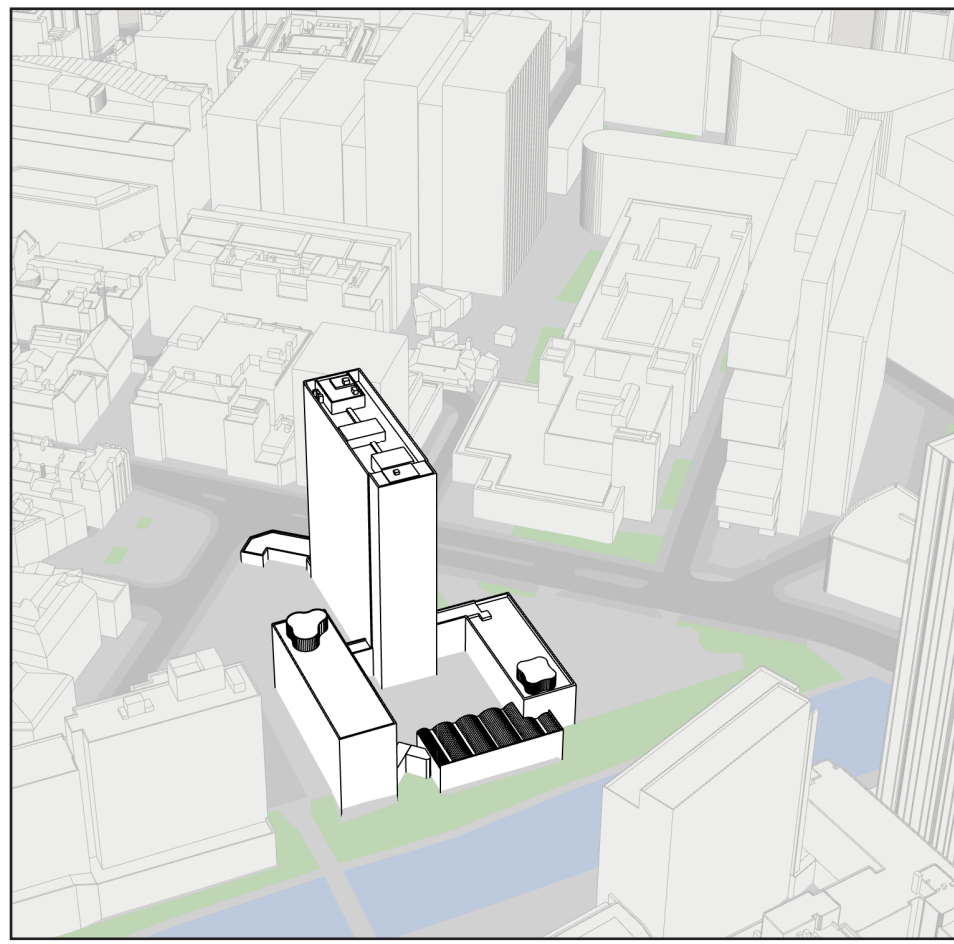
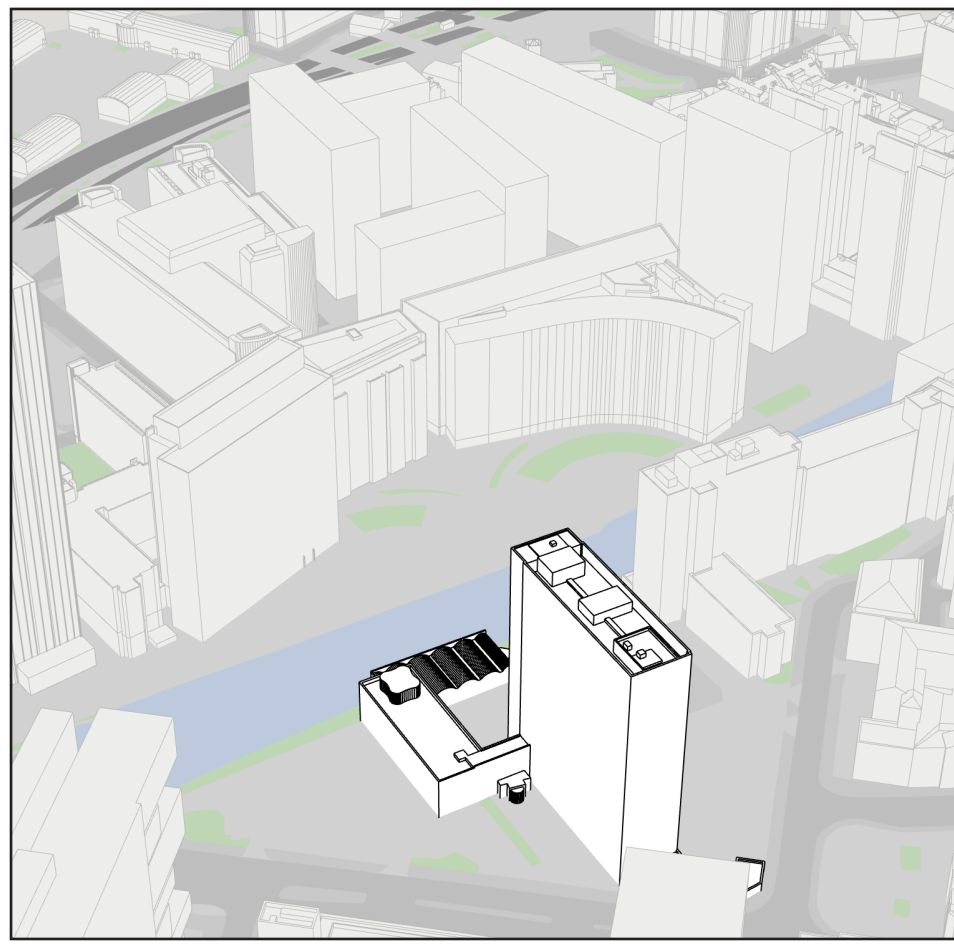
3.5 Level of Detail

Building features down to 0.5m on the Site and surrounding buildings are included in this analysis. Of particular note, the facade detail that characterises the Proposed Development have been omitted from this analysis. Therefore, this report consists of a conservative assessment of the wind conditions, especially on the ground-level.

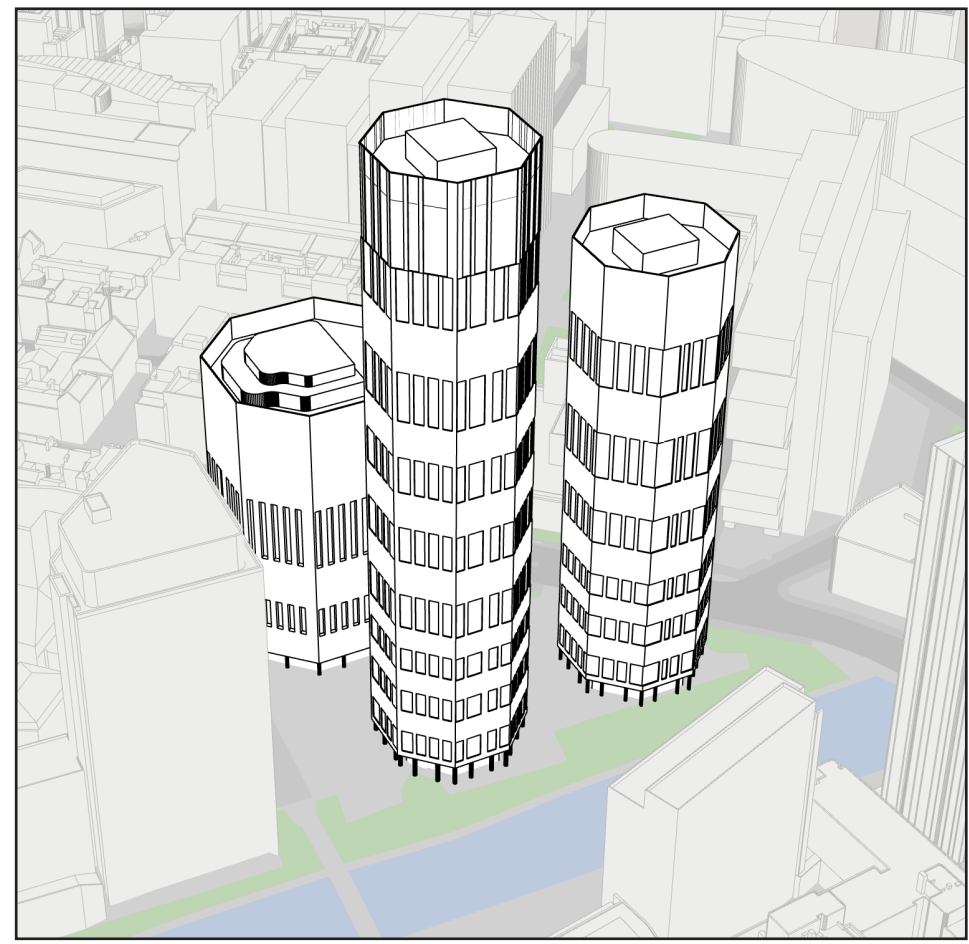
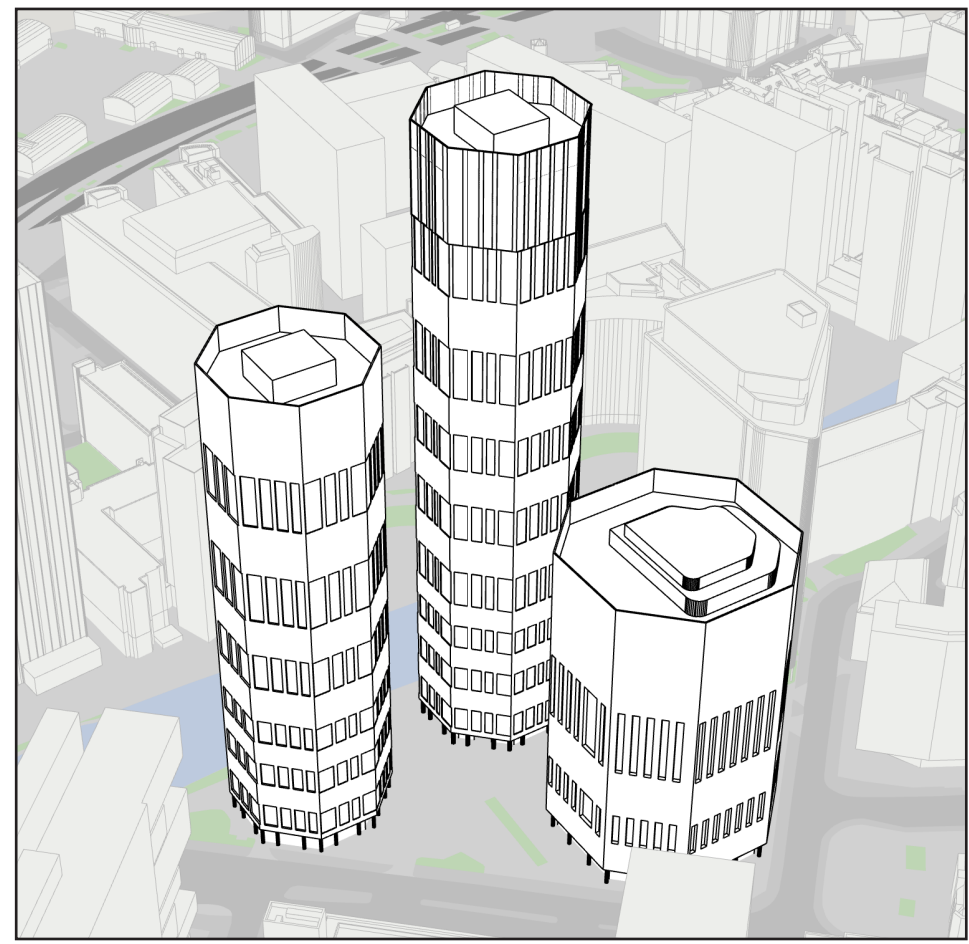


On-Site landscaping markup (received 29-05-2025, from SEW Architects, '0476-SEW-ZZ-00-DR-A-PL1000.pdf')

On-Site vegetation and planting was not included in this assessment. All results presented herein can be considered conservative as any vegetation in this central courtyard would provide some beneficial mitigation.



Existing Site



Proposed Development

4 Results

The results of this assessment are discussed for off-Site and on-Site areas for pedestrian access/activities - denoted as ‘Receptors’. Off-site receptors focus on the ground-level wind conditions with the following assessments::

1. wind comfort results on the ground-level for winter and summer seasons respectively.
2. the annual wind distress results on the ground-level

For the above results, the Baseline and Proposed scheme results are shown side-by-side to represent the impact of the Proposed scheme on the surrounding terrain. The impact of the Proposed scheme on the off-site surroundings are categorised by the following significance criteria:

Off-site Receptors	
Significance	Trigger
Major Adverse	Unacceptable wind distress in the Proposed scheme that was not present in the Baseline or Conditions (in terms of comfort) that were suitable for the intended use in the Baseline become unsuitable by the Proposed scheme
Moderate Adverse	Conditions (in terms of comfort) are made windier (by one comfort grade) by the Proposed scheme but are still suitable for the intended use
Negligible	Conditions between the Baseline and Proposed scheme remain the same
Minor Beneficial	Conditions (in terms of comfort) that were unsuitable for the intended use in the Baseline are made suitable in the Proposed scheme
Major Beneficial	Unacceptable distress in the Baseline become acceptable in the Proposed scheme

This criteria being applied to off-site areas with pedestrian access:

- entrances
- bus stops
- seating areas
- thoroughfares.

It should be noted that the entrance to the (off-Site) Manchester Civil Justice Centre is off-set from the walkway, as shown in the figure on this page. additional images of the comfort results for this region are included in this chapter.

Subsequently, various on-site Receptors are discussed for the Proposed scheme:

- entrances
- seating areas
- thoroughfares
- public terraces (commercial building)
- private terraces (residential building)

The following criteria area used for these:

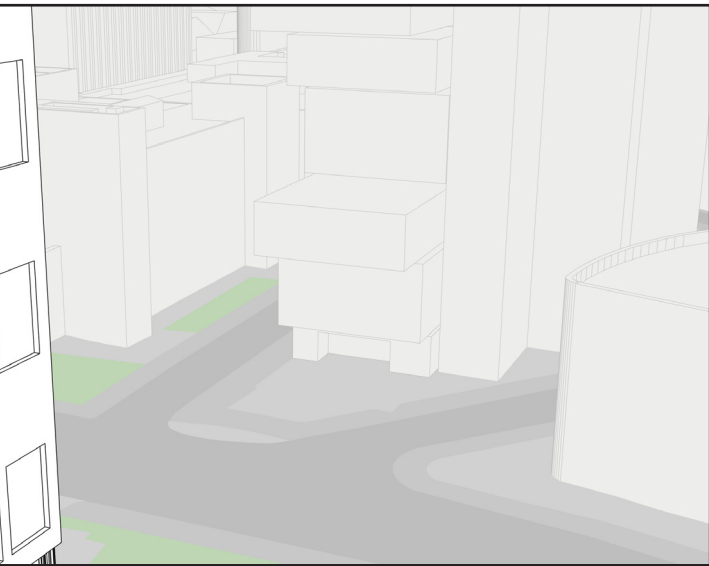
On-site Receptors	
Significance	Trigger
Major Adverse	Unacceptable wind distress conditions
Moderate Adverse	Wind comfort conditions are unsuitable for the intended use
Negligible	Wind comfort conditions are suitable for the intended use
Moderate Beneficial	Conditions are calmer than required for the intended pedestrian use

4.1 Ground-level comfort – winter

Baseline:

The surrounding streets generally experience wind conditions suitable for ‘Sitting’ and ‘Standing’ activities with localised areas suitable for Strolling’ activities, and are therefore suitable for the intended use as thoroughfares.

All bus stops, and entrances for off-site buildings experience ‘Sitting’ and ‘Standing’ conditions, therefore are suitable for the intended use.



Entrance to Manchester Civil Justice Centre

Proposed Development with existing surroundings:

Off-Site

The surrounding streets generally experience wind conditions suitable for ‘Sitting’ and ‘Standing’ activities, with an increase in ‘Strolling’ conditions between the collection of buildings that make up Trinity Riverside. For areas used as thoroughfares this is acceptable.

All bus stops, and entrances for off-site buildings experience wind conditions suitable for ‘Sitting’ and ‘Standing’ activities, therefore are suitable for the intended use.

The Proposed Development therefore has a **Negligible impact on the surrounding (off-Site) area.**

On-Site

On-Site entrances to the Proposed Development experience wind conditions suitable for ‘Sitting’ and ‘Standing’ activities and therefore acceptable for the intended use.

The significance of the wind conditions for the **on-Site area is therefore Negligible.**

Proposed Development with consented surroundings:

The significance of the wind conditions remain unchanged with the future-consented schemes in the surroundings.

4.2 Ground-level comfort – summer

Baseline:

The surrounding streets generally experience wind conditions suitable for ‘Sitting’ and ‘Standing’ activities, and are therefore suitable for the intended use as thoroughfares.

All bus stops, and entrances for off-site buildings experience ‘Sitting’ and ‘Standing’ conditions, therefore are suitable for the intended use.

Off-site seating areas, Trinity Square and Clermont-Ferrand Square, experience ‘Sitting’ conditiions. The wind conditions for these areas are suitable for the intended use.

Proposed Development with existing surroundings:

Off-Site

The surrounding streets generally experience wind conditions suitable for ‘Sitting’ and ‘Standing’ activities. For areas used as thoroughfares this is acceptable.

All bus stops, and entrances for off-site buildings experience wind conditions suitable for ‘Sitting’ and ‘Standing’ activities, and therefore are suitable for the intended use.

Off-site seating areas, Trinity Square and Clermont-Ferrand Square, experience wind conditions suitable for ‘Sitting’ activities. The wind conditions for these areas are suitable for the intended use.

The Proposed Development therefore has a **Negligible impact on the surrounding (off-Site) area.**

On-Site

On-Site entrances to the Proposed Development experience wind conditions for ‘Sitting’ activities. This is acceptable for the intended use.

On-Site seating areas experience wind conditions suitable for ‘Sitting’ and ‘Standing’ activities. The wind conditions for these areas are therefore suitable for intended use.

The significance of the wind conditions for the **on-Site area is therefore Negligible.**

Proposed Development with consented surroundings:

The significance of the wind conditions remain unchanged with the future-consented schemes in the surroundings.

4.3 Ground-level distress – annual

Baseline:

No unacceptable distress areas observed on-or-off-Site.

Proposed Development with existing surroundings:

No unacceptable distress areas observed on-or-off-Site. The Proposed scheme has a Negligible impact on this region.

Proposed Development with consented surroundings:

No unacceptable distress areas observed on-or-off-Site. The Proposed scheme has a Negligible impact on this region.

Please refer to the following pages for the Ground-level comfort and distress results described above.

Ground-level comfort - Winter season

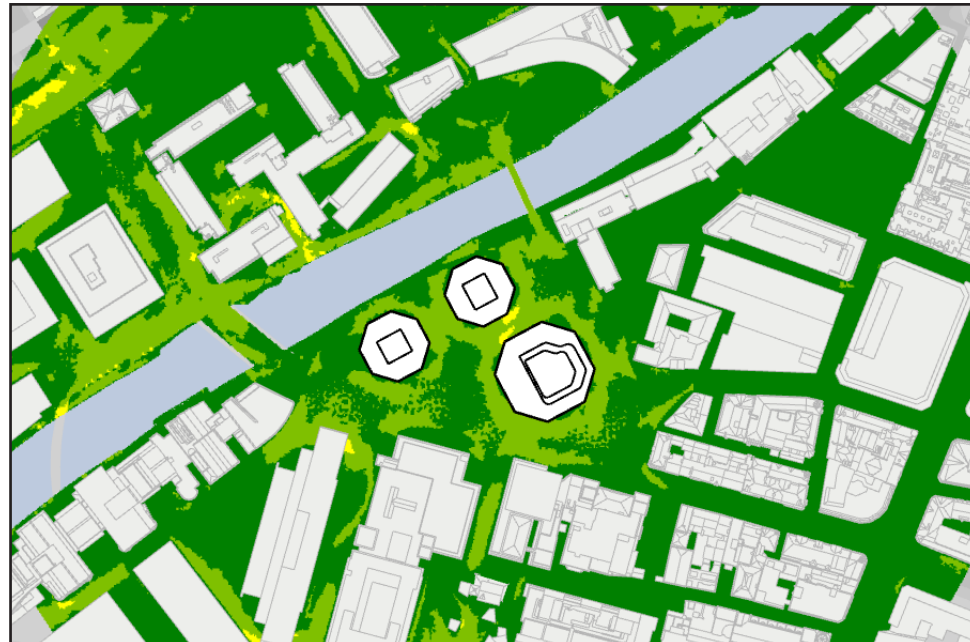
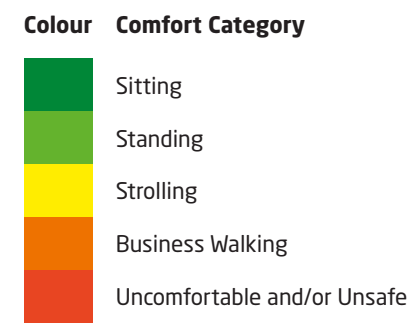


Figure 4.1 Scenario 1: Baseline - Existing site with existing surroundings



Figure 4.2 Scenario 2: Proposed Development with existing surroundings



Figure 4.3 Scenario 3: Proposed Development with future consented surrounding

Ground-level comfort - Summer season

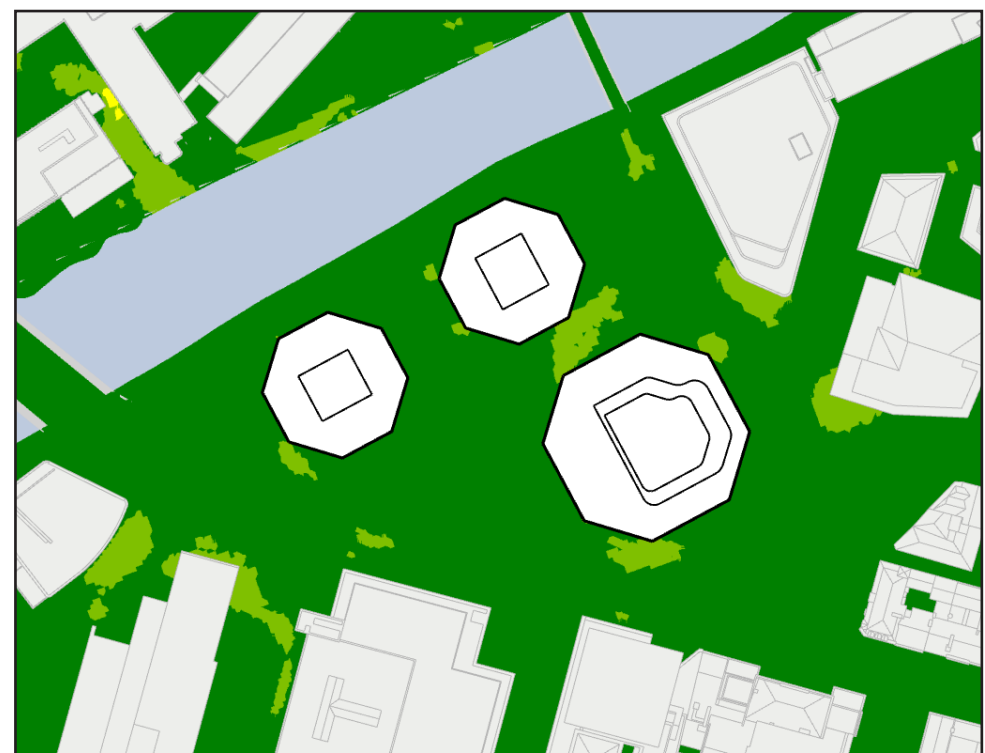
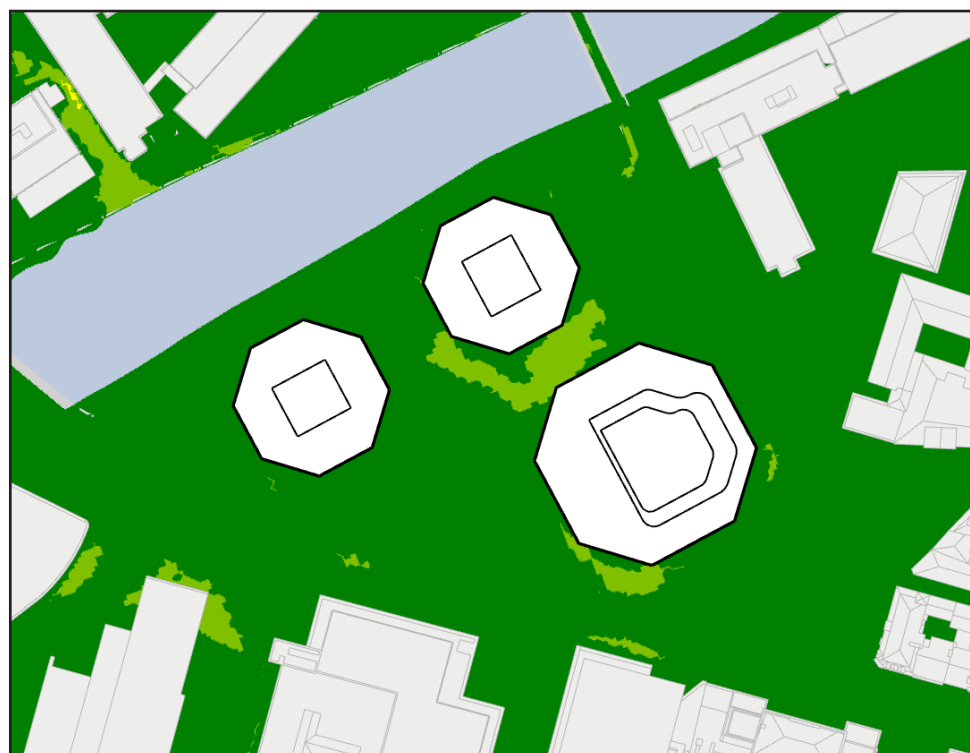
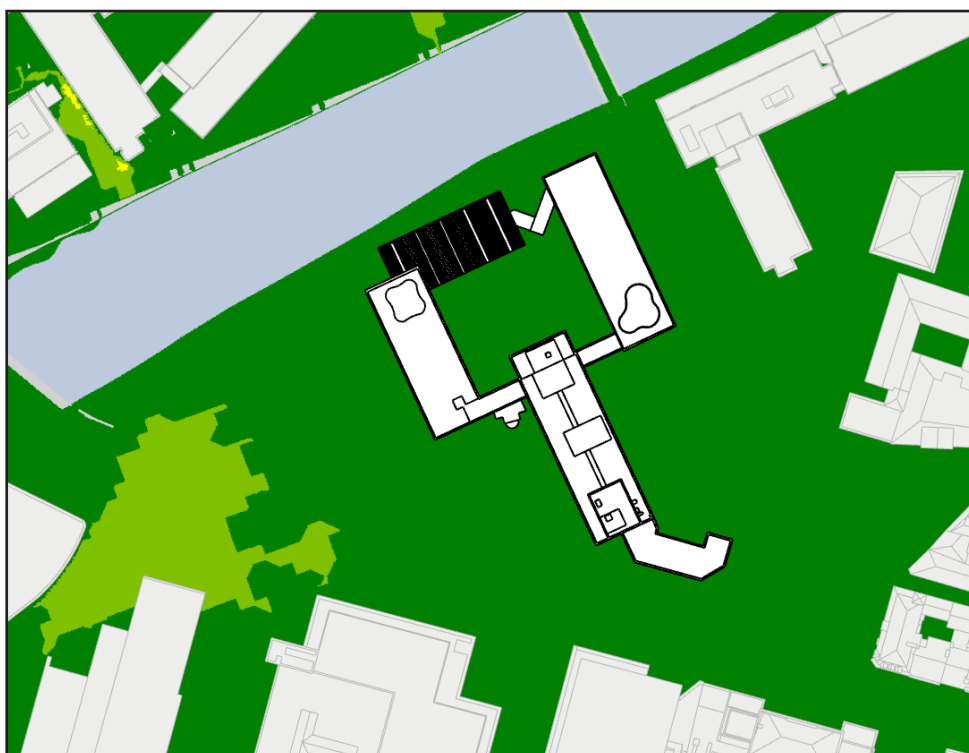
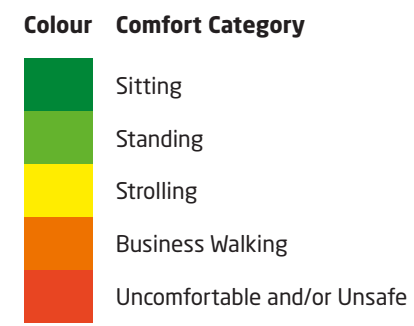


Figure 4.4 Scenario 1: Baseline - Existing site with existing surroundings

Figure 4.5 Scenario 2: Proposed Development with existing surroundings

Figure 4.6 Scenario 3: Proposed Development with future consented surrounding

Colour	Distress Category
■	Unacceptable
■	Acceptable

Ground-level distress - annual

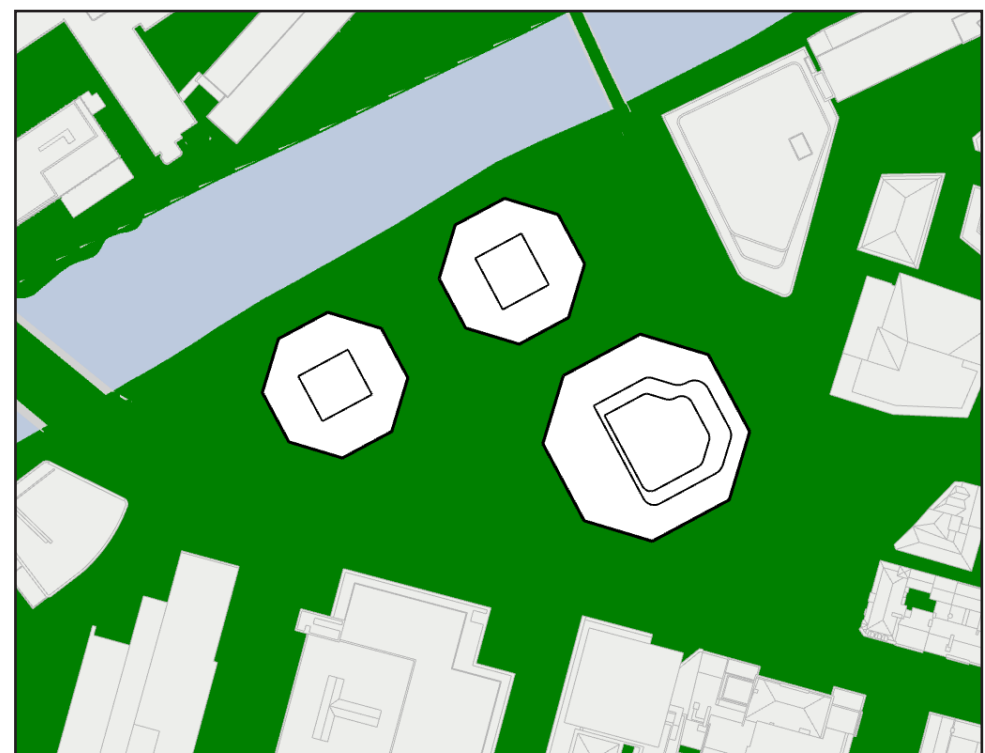
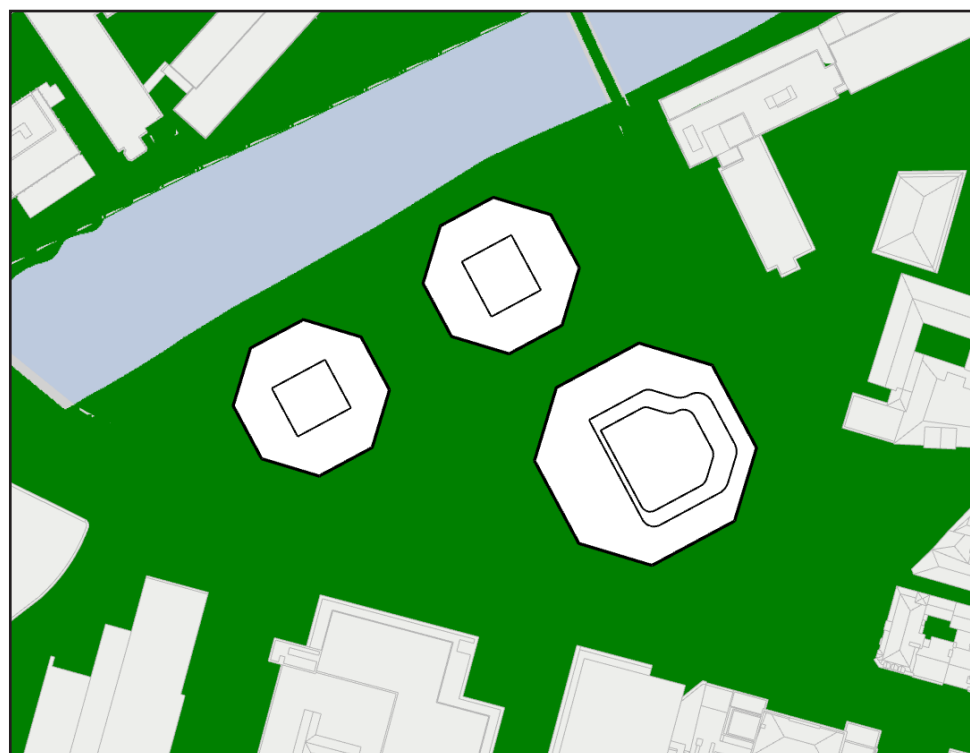
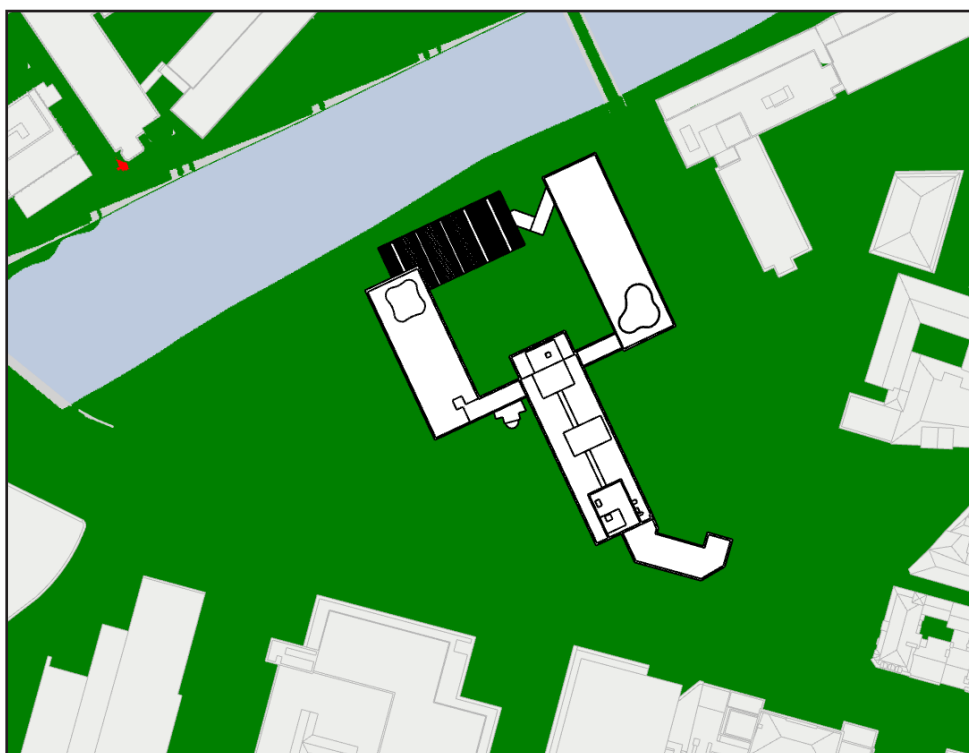


Figure 4.7 Scenario 1: Baseline - Existing site with existing surroundings

Figure 4.8 Scenario 2: Proposed Development with existing surroundings

Figure 4.9 Scenario 3: Proposed Development with future consented surrounding

4.4 Terraces and Balconies

Scenario 2: Proposed Development with existing surroundings - private terraces and balconies

Roof terraces

Summer (comfort)

The wind conditions on the terraces are largely suitable for 'Sitting' and 'Standing' activities. The wind conditions for these terraces are therefore acceptable for the intended use.

Annual (distress):

No unacceptable distress areas observed for the roof terraces

The significance of the wind conditions for the **roof terraces** is therefore **Negligible**.

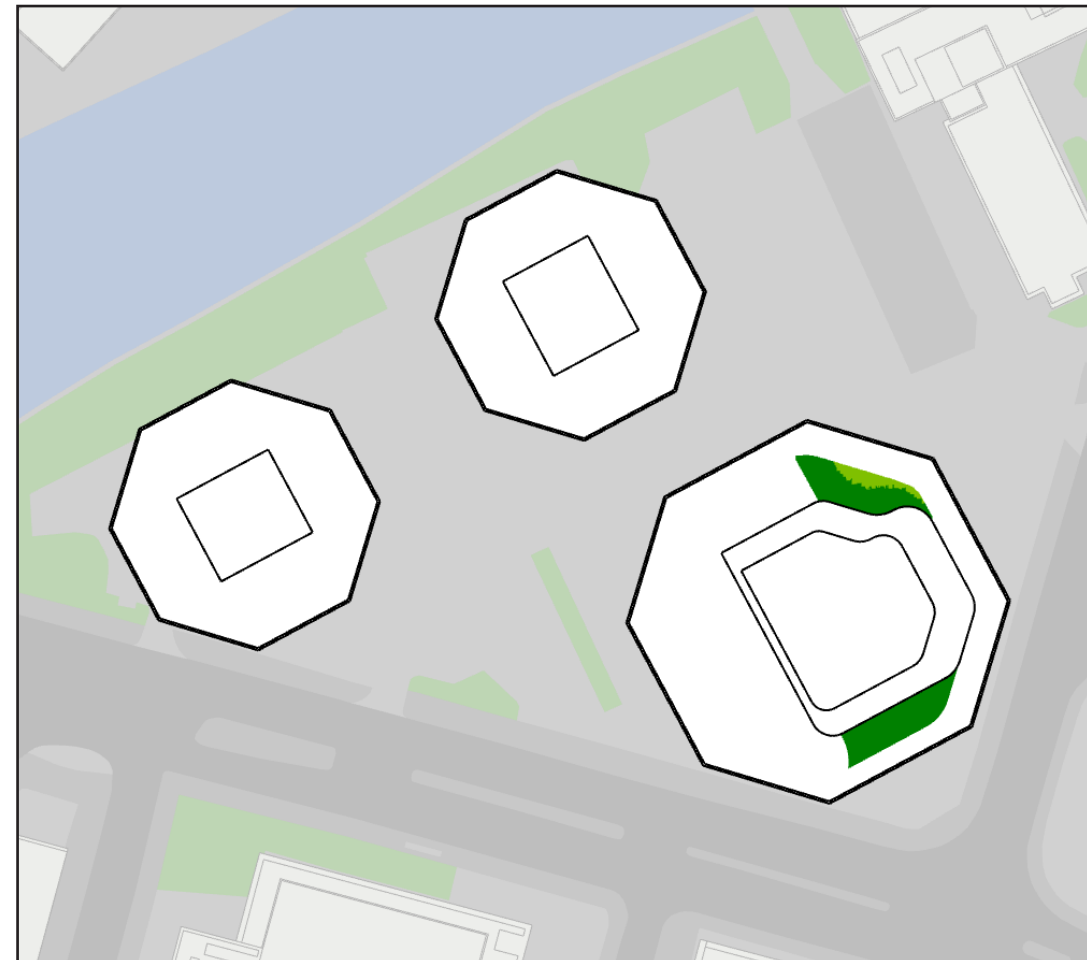


Figure 4.10 Scenario 2 - terrace-level comfort - summer season

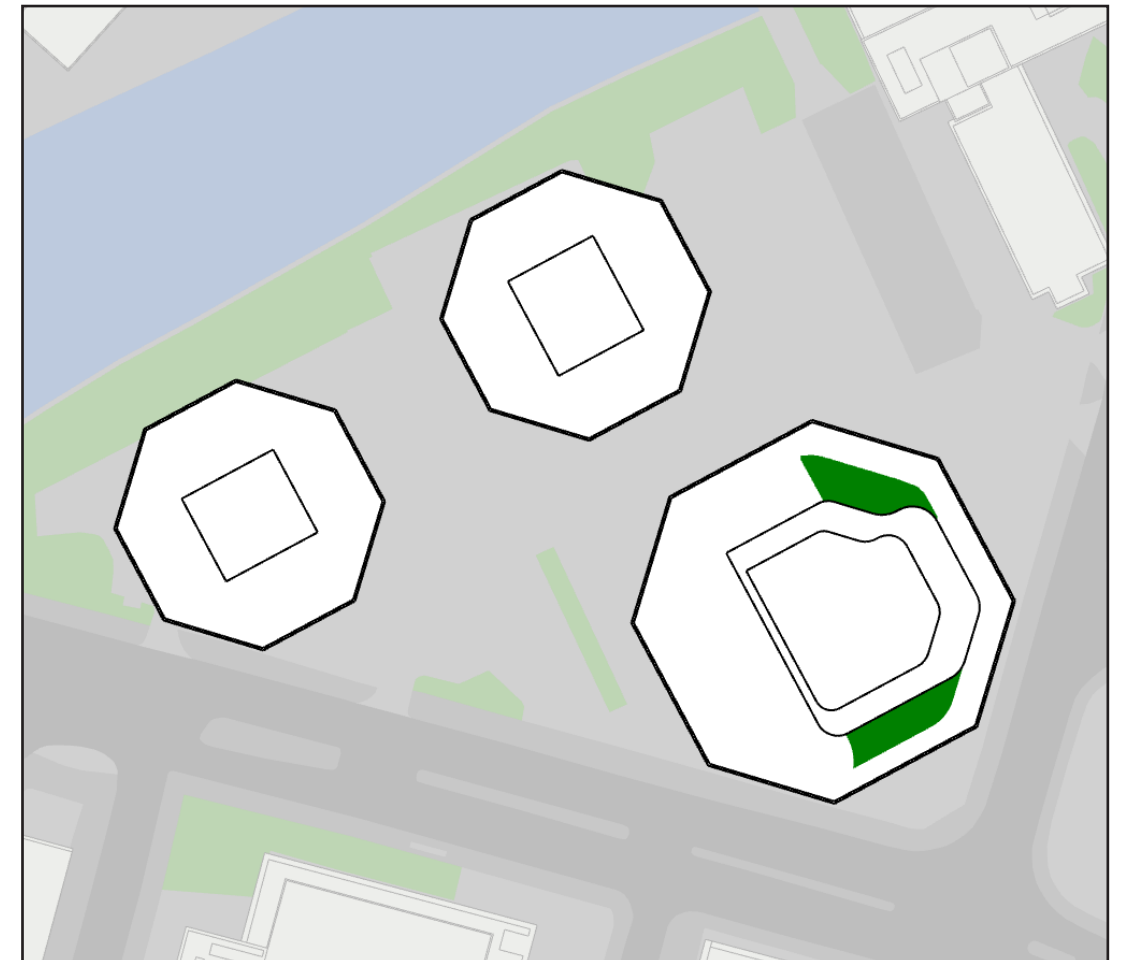


Figure 4.11 Scenario 2 - terrace-level distress - annual

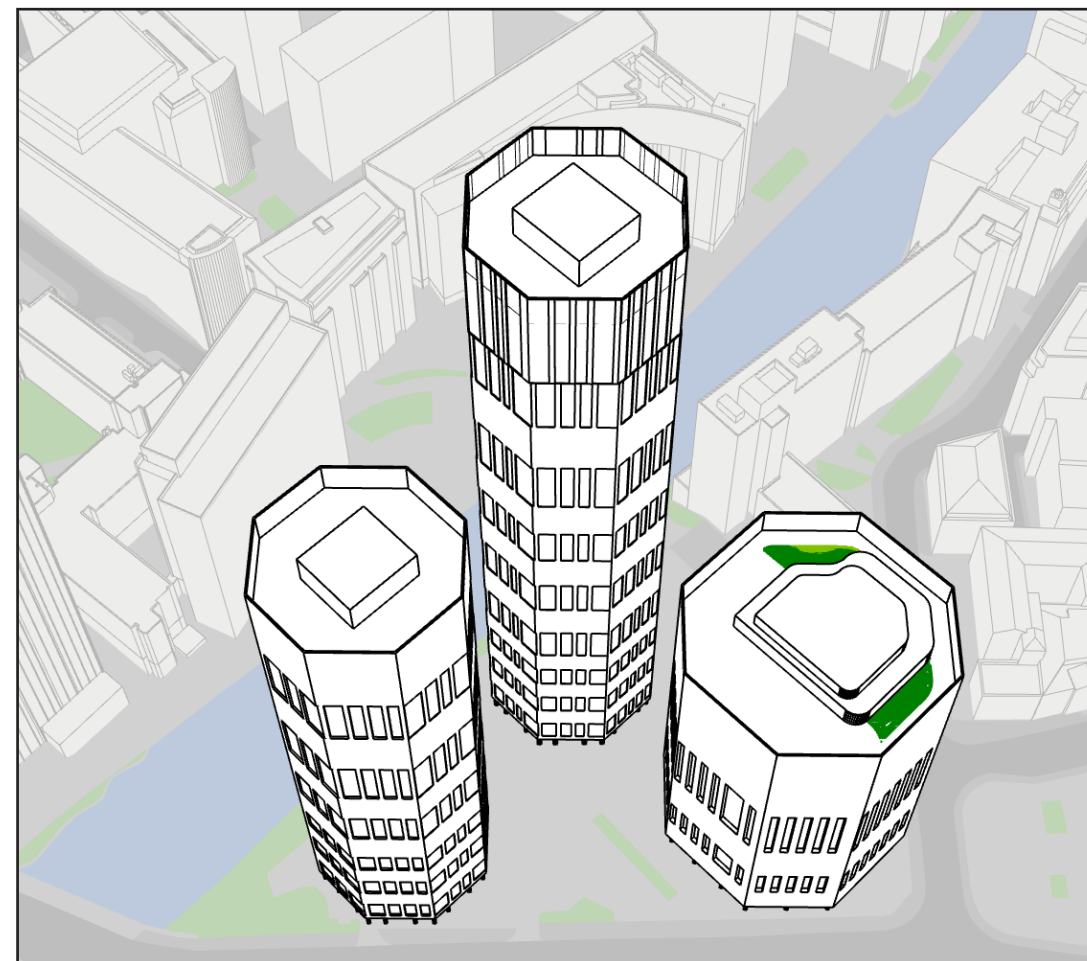


Figure 4.12 Scenario 2 - terrace-level comfort - summer season

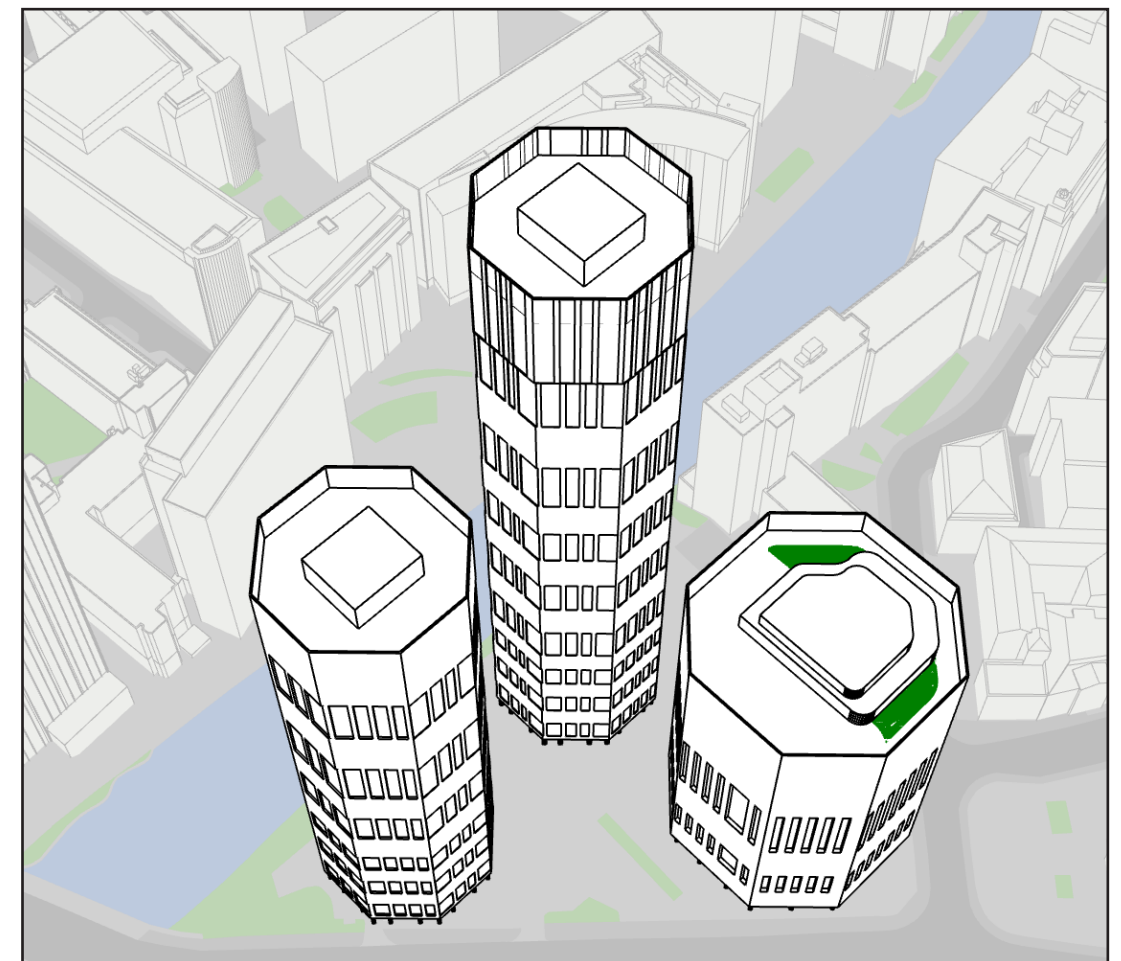


Figure 4.13 Scenario 2 - terrace-level distress - annual

Colour Comfort Category

Dark Green	Sitting
Light Green	Standing
Yellow	Strolling
Orange	Business Walking
Red	Uncomfortable and/or Unsafe

Colour Distress Category

Red	Unacceptable
Dark Green	Acceptable

Scenario 3: Proposed Development with future consented surroundings - terraces and balconies

Roof terraces

Summer (comfort)

The wind conditions on the terraces are largely suitable for 'Sitting' and 'Standing' activities. The wind conditions for these terraces are therefore acceptable for the intended use.

Annual (distress):

No unacceptable distress areas observed for the roof terraces
The significance of the wind conditions for the **roof terraces** is therefore **Negligible**.

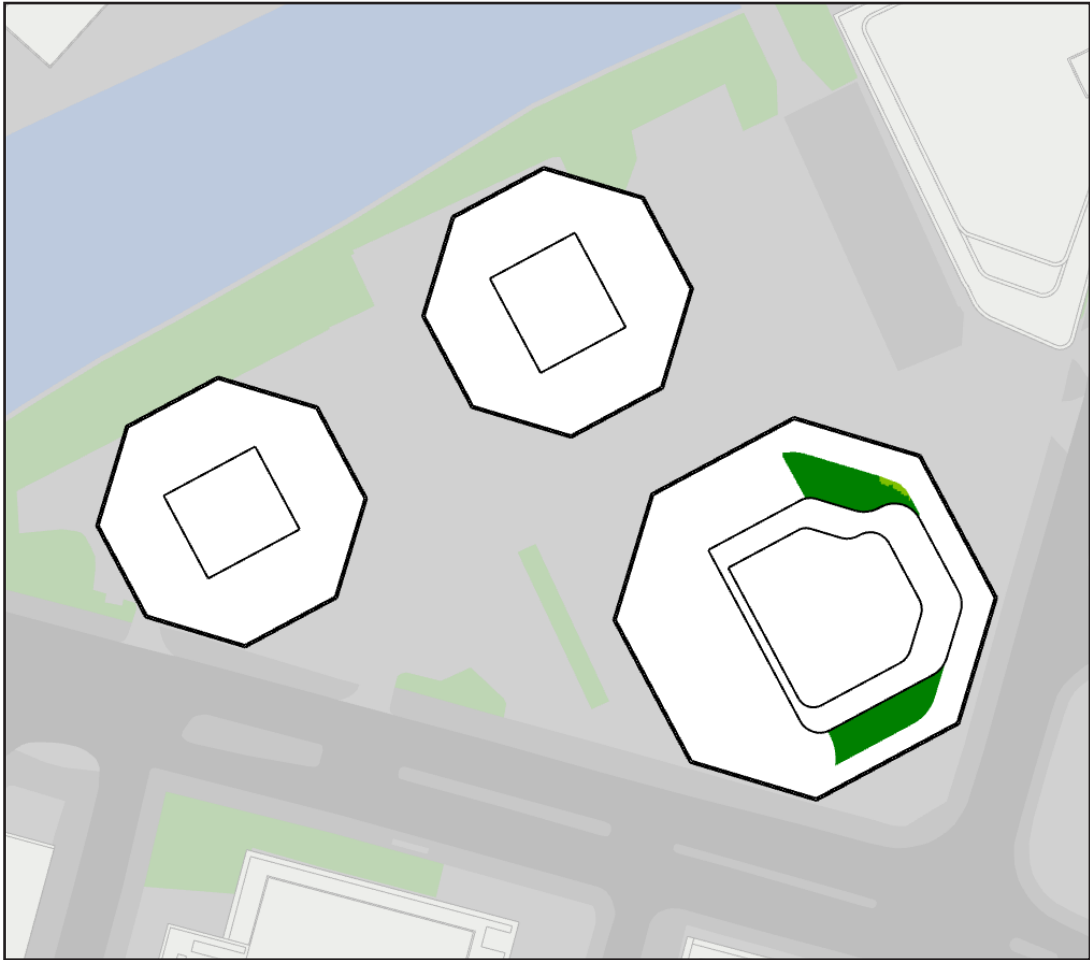


Figure 4.14 Scenario 3 - terrace-level comfort - summer season

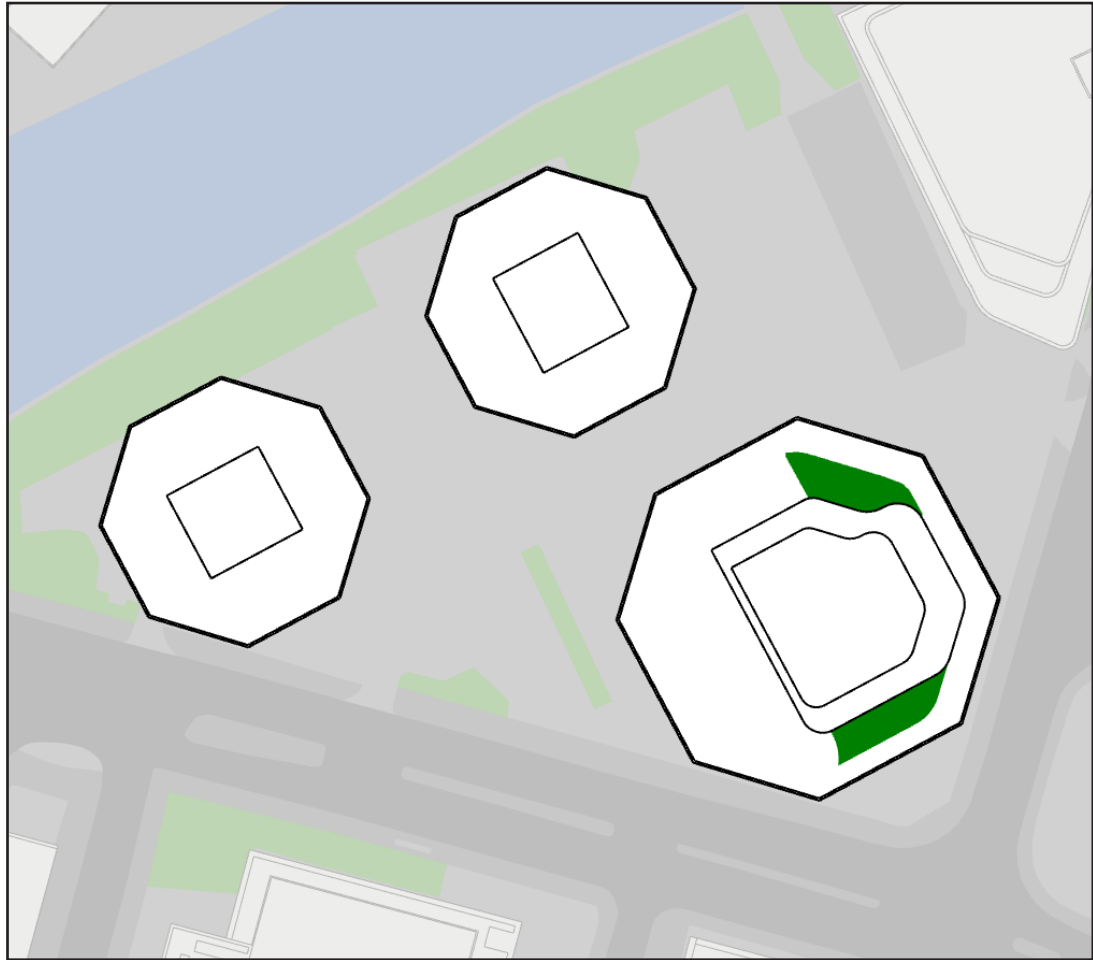


Figure 4.15 Scenario 3 - terrace-level distress - annual

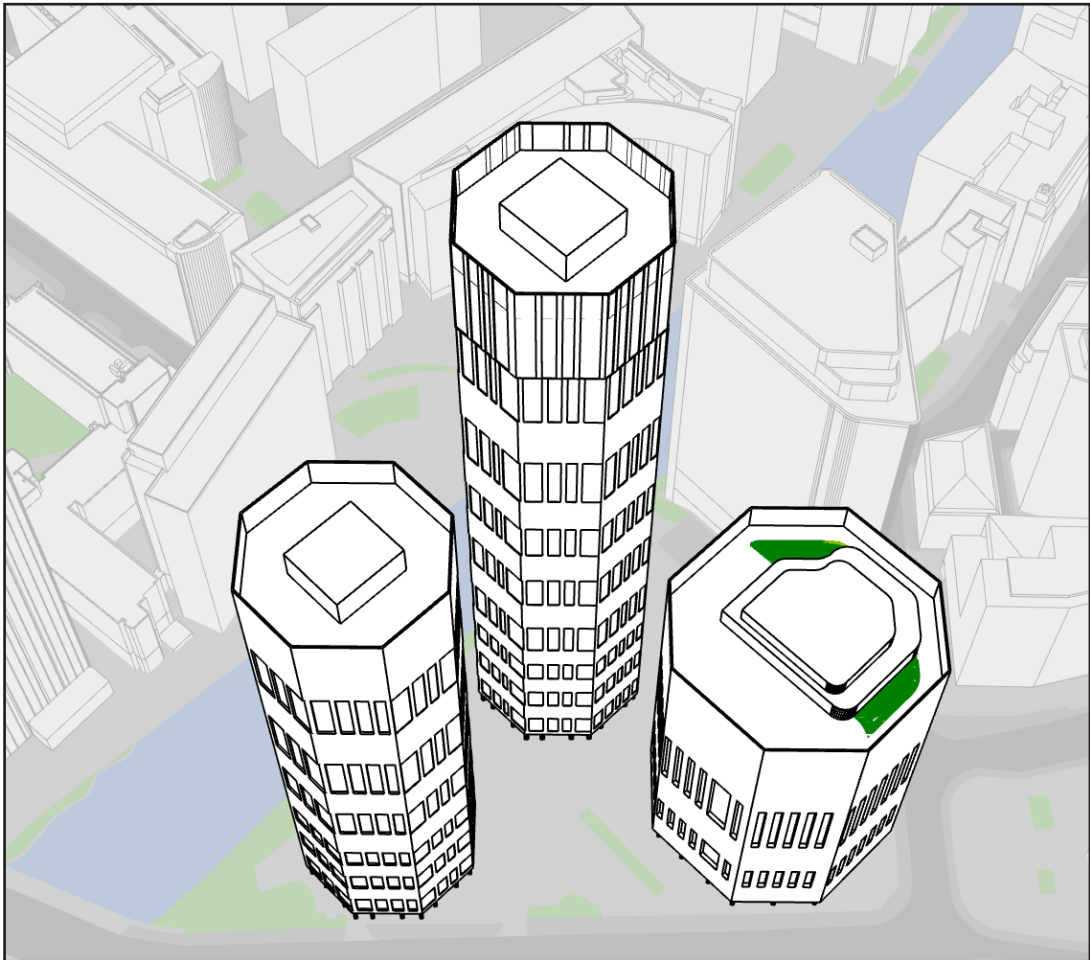


Figure 4.16 Scenario 3 - terrace-level comfort - summer season

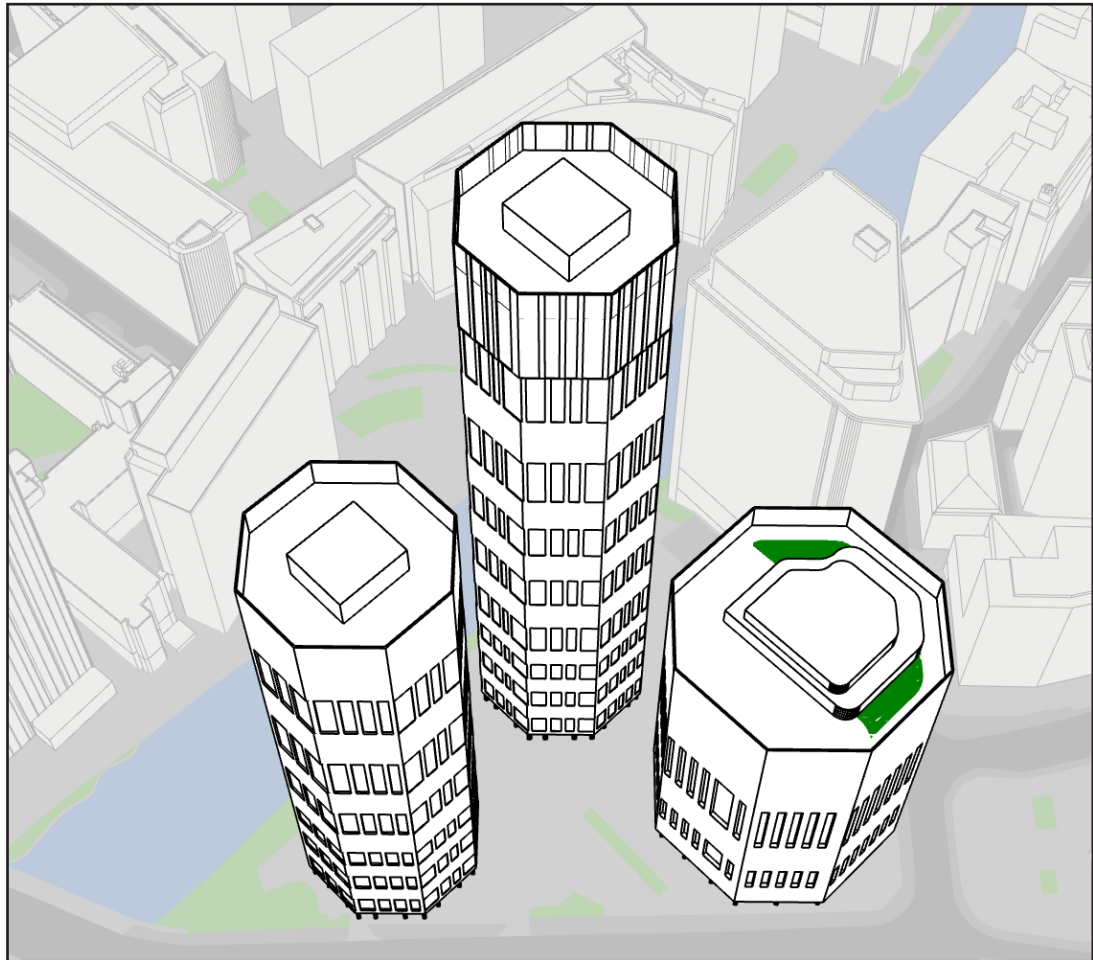


Figure 4.17 Scenario 3 - terrace-level distress - annual

Colour	Comfort Category	Colour	Distress Category
Green	Sitting	Red	Unacceptable
Light Green	Standing	Dark Green	Acceptable
Yellow	Strolling		
Orange	Business Walking		
Dark Orange	Uncomfortable and/or Unsafe		

5 Conclusions

AKT II has prepared this wind microclimate report on behalf of Oval Real Estate (“the applicant”) in support of the application to Manchester City Council for the redevelopment of Albert Bridge House, 1 Bridge St, Manchester M6o 9AF (“the Site”) in Manchester City, UK.

This report details an assessment of the pedestrian wind comfort on and around the Site of the Proposed Development using Computational Fluid Dynamics (CFD).

This report details the following scenarios for the Site:

- Scenario 1: ‘Baseline’ - Existing Site with existing surroundings
- Scenario 2: Proposed Development with existing surroundings
- Scenario 3: Proposed Development with future consented schemes in the surroundings

The pedestrian wind ‘comfort’ assessment in this report focuses primarily on the seasons:

- winter (windiest season)
- summer (characterised by frequent pedestrian activity)

The comfort results are discussed relating the wind conditions in a region to the intended pedestrian use using the Lawson LDDC criteria.

An annual pedestrian ‘distress’ assessment is also performed to highlight any potential safety risks to vulnerable members of the public or cyclists due to strong winds.

The results of these assessments are summarised as follows:

Ground-level

A summary of the wind comfort and distress results for the Baseline and proposed schemes at ground-level around the Site is as follows:

- During winter, the wind conditions for the Baseline are considered acceptable for the intended uses of the surrounding areas. The proposed scheme for Scenarios 2 and 3 has a Negligible impact and are therefore acceptable.
- During summer, the wind conditions for the Baseline are considered acceptable for the intended uses of the surrounding areas. The proposed scheme for Scenarios 2 and 3 has a Negligible impact and are therefore acceptable.
- No areas of (annual) distress observed in all scenarios. The proposed scheme has a Negligible impact.
- Overall, the proposed scheme has a ‘Negligible’ impact on the wind conditions in its surroundings.

Proposed Development private roof terraces and balconies

The roof terraces experience wind conditions suitable for ‘Sitting’ and ‘Standing’ activities and are therefore suitable for the intended use.

No regions of unacceptable wind distress are observed on any of the roof terraces. For these areas, the significance of the wind conditions for the proposed scheme is Negligible.

Phasing

The results presented in this report show that the full development has a Negligible impact on the surroundings. For developments with multiple constructions, phasing plans are sometimes considered in the assessment.

Phasing studies would consider three different scenarios where each development is the first construction and its individual impact assessed. In this report, the downwash effects are shown to be minimal for each of the three developments due to their cross-section and location. The final design with all three scenarios completed is therefore regarded as the ‘worst case’ scenario.

As such, the phased construction of the developments will not have a significant impact on the local area and additional CFD studies are not required.

5.1 Summary

The table on this page summarises whether the wind conditions for a studied area are acceptable for its intended use, and the significance of the wind conditions between the Baseline and the proposed schemes.

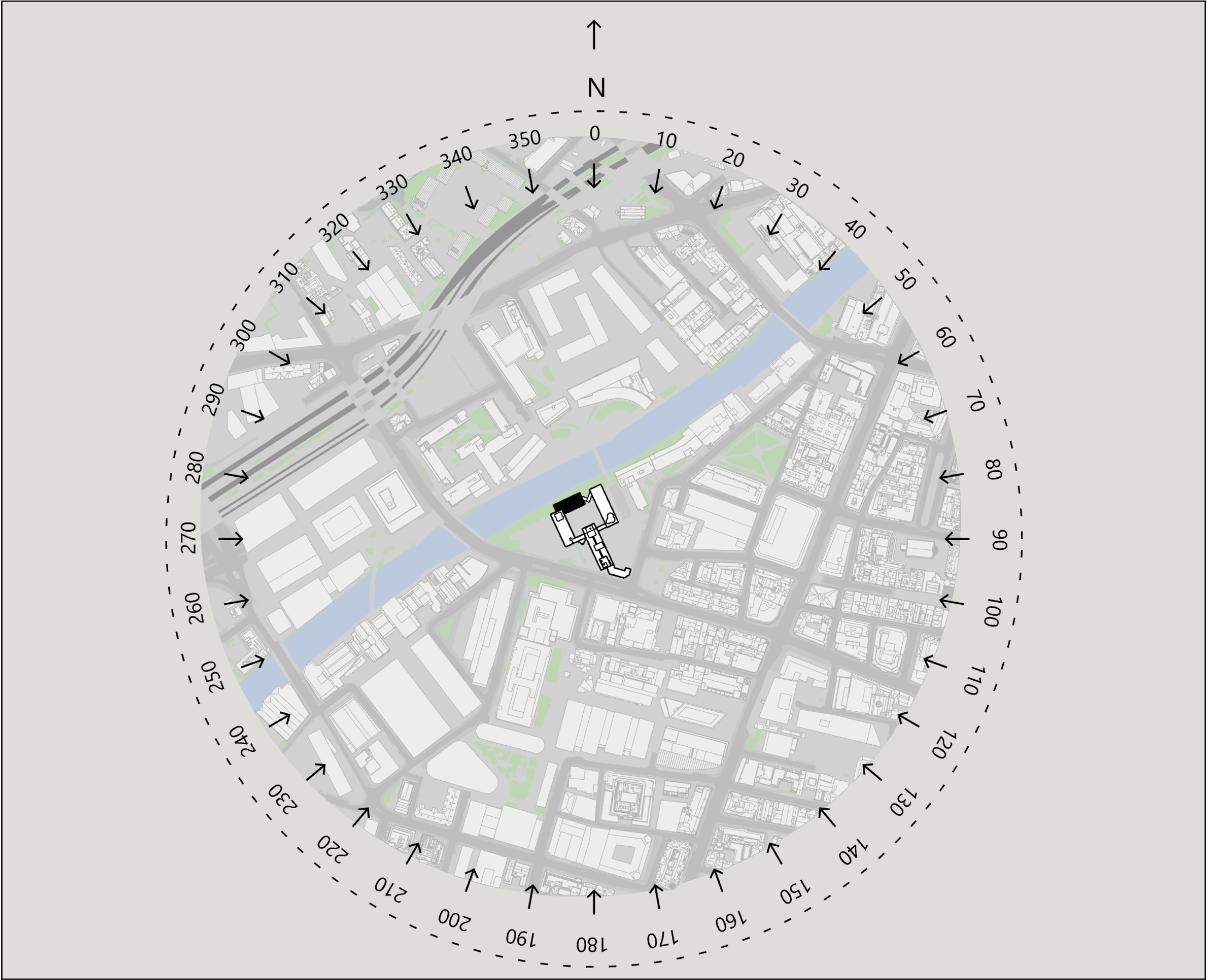
	Location	Season	Conclusion	Interpretation
1	Off-Site – thoroughfares and car parks	Summer	✓	Wind conditions suitable for intended mixed use area. Conditions are largely suitable for ‘Standing’ activities. The proposed scheme has a Negligible impact to these areas.
		Winter	✓	Wind conditions suitable for intended mixed use area. Conditions are largely suitable for ‘Standing’ activities. The proposed scheme has a Negligible impact to these areas.
		Annual (distress)	✓	No unacceptable distress areas observed. The proposed scheme has a Negligible impact to these areas.
2	Off-Site – entrances and bus stops	Summer	✓	Wind conditions suitable for the intended use. The proposed scheme has a Negligible impact to these areas.
		Winter	✓	Wind conditions suitable for the intended use. The proposed scheme has a Negligible impact to these areas.
		Annual (distress)	✓	No unacceptable distress areas observed. The proposed scheme has a Negligible impact to these areas.
3	Off-Site – seating areas	Summer	✓	Wind conditions suitable for intended mixed use area. Conditions are largely suitable for ‘Sitting’ activities. The proposed scheme has a Negligible impact to these areas.
		Annual (distress)	✓	No unacceptable distress areas observed. The proposed scheme has a Negligible impact to these areas.
4	On-Site – thoroughfares and car parks	Summer	✓	Wind conditions are suitable for the intended use. The significance of the wind conditions for this area is Negligible.
		Winter	✓	Wind conditions are suitable for the intended use. The significance of the wind conditions for this area is Negligible.
		Annual (distress)	✓	No unacceptable distress areas observed. The significance of the wind conditions for this area is therefore Negligible.
5	On-site - entrances	Summer	✓	Wind conditions are suitable for the intended use. The significance of the wind conditions for this area is Negligible.
		Winter	✓	Wind conditions are suitable for the intended use. The significance of the wind conditions for this area is Negligible.
		Annual (distress)	✓	No unacceptable distress areas observed. The significance of the wind conditions for this area is therefore Negligible.
6	On-site - mixed-use amenity areas	Summer	✓	Wind conditions are suitable for the intended use (‘Sitting’ and ‘Standing’ activities). The significance of the wind conditions for this area is Negligible.
		Annual (distress)	✓	No unacceptable distress areas observed. The significance of the wind conditions for this area is therefore Negligible.
7	On-site - roof terraces and balconies	Summer	✓	Wind conditions are suitable for the intended use (‘Sitting’ and ‘Standing’ activities). The significance of the wind conditions for this area is Negligible.
		Annual (distress)	✓	No unacceptable distress areas observed. The significance of the wind conditions for this area is therefore Negligible.

Appendix A

Surrounding Views

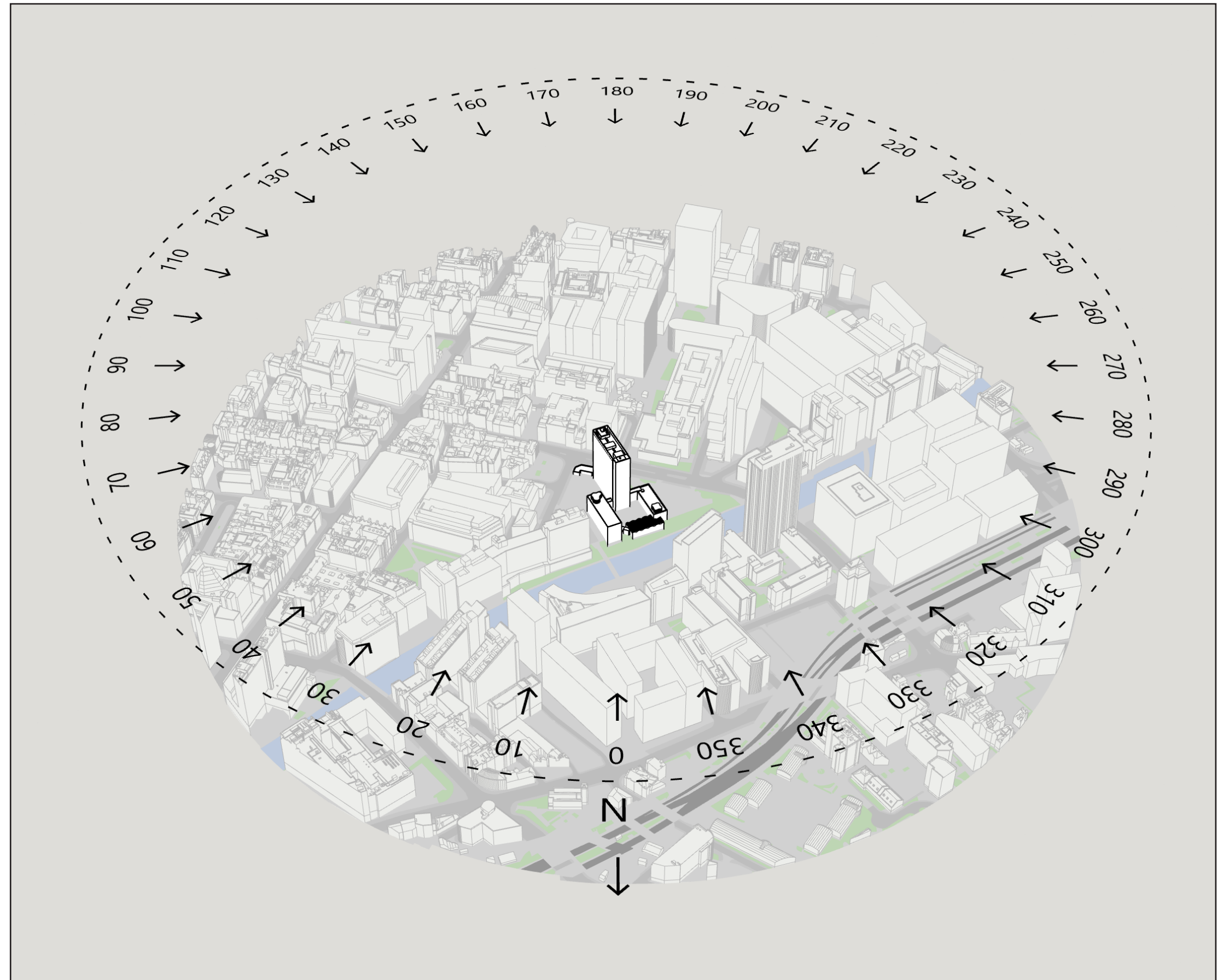
A.1 Existing site with existing surroundings

Plan view of the entire model



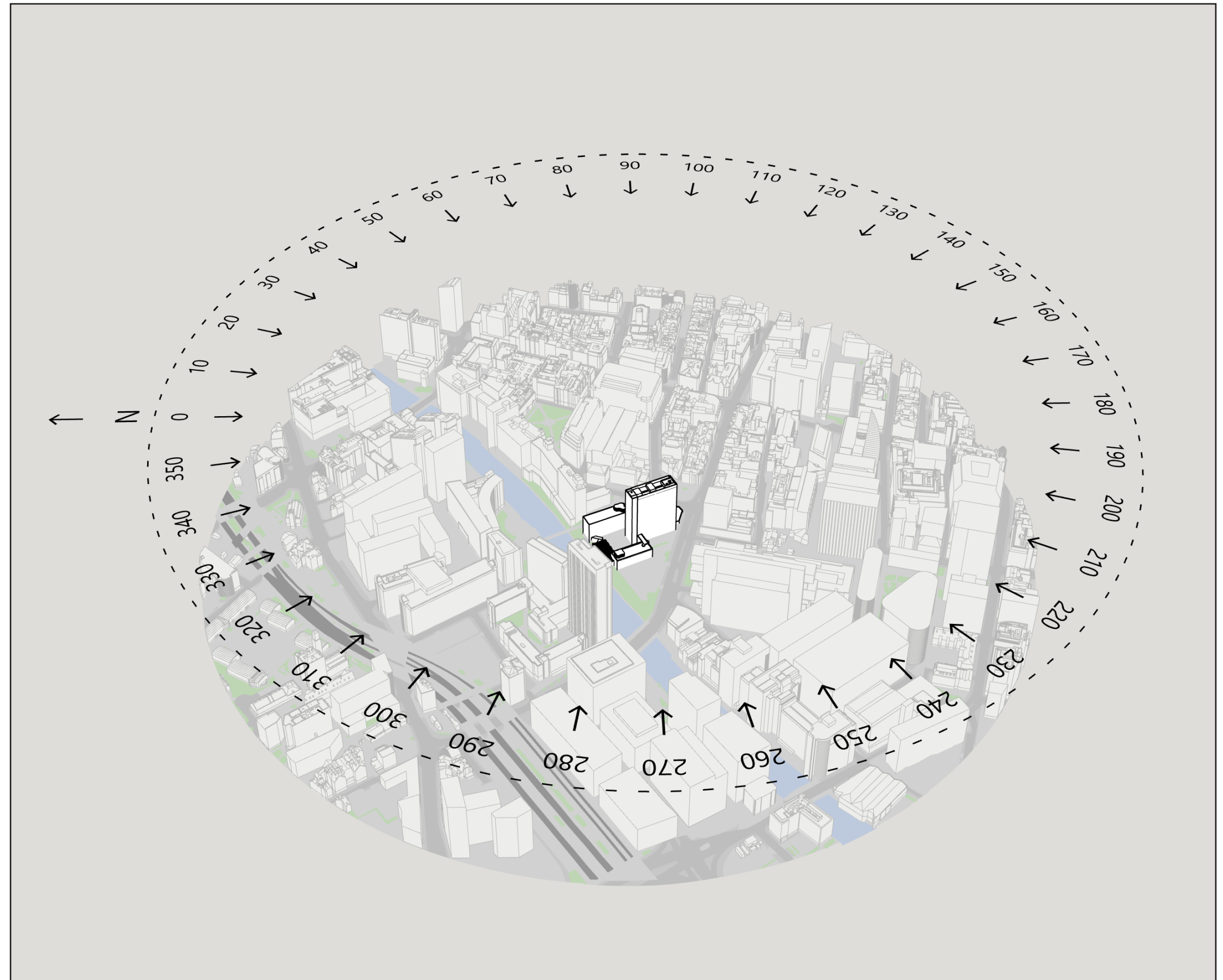
A.1 Existing site with existing surroundings

Far-field view of the entire model: north



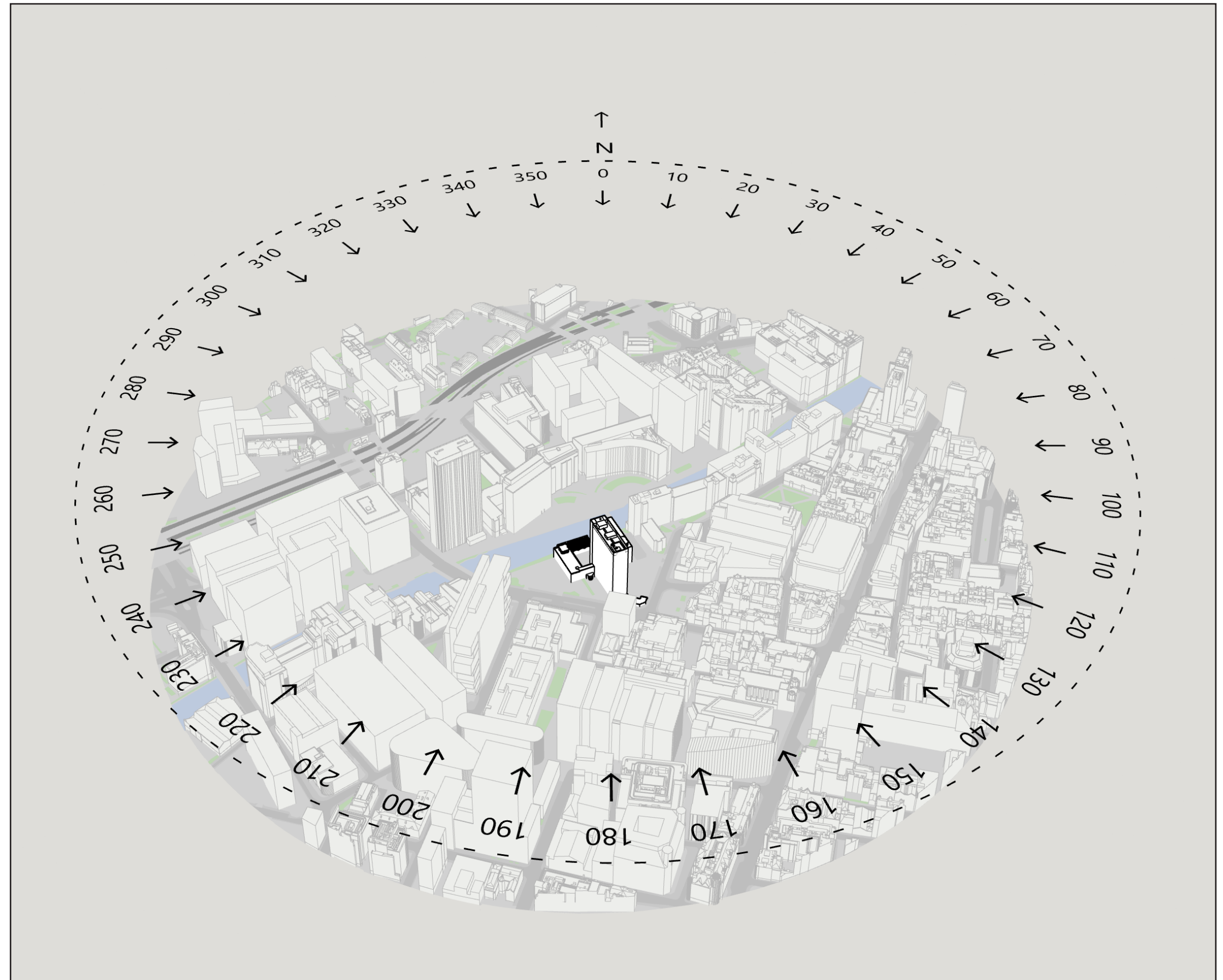
A.1 Existing site with existing surroundings

Far-field view of the entire model: west



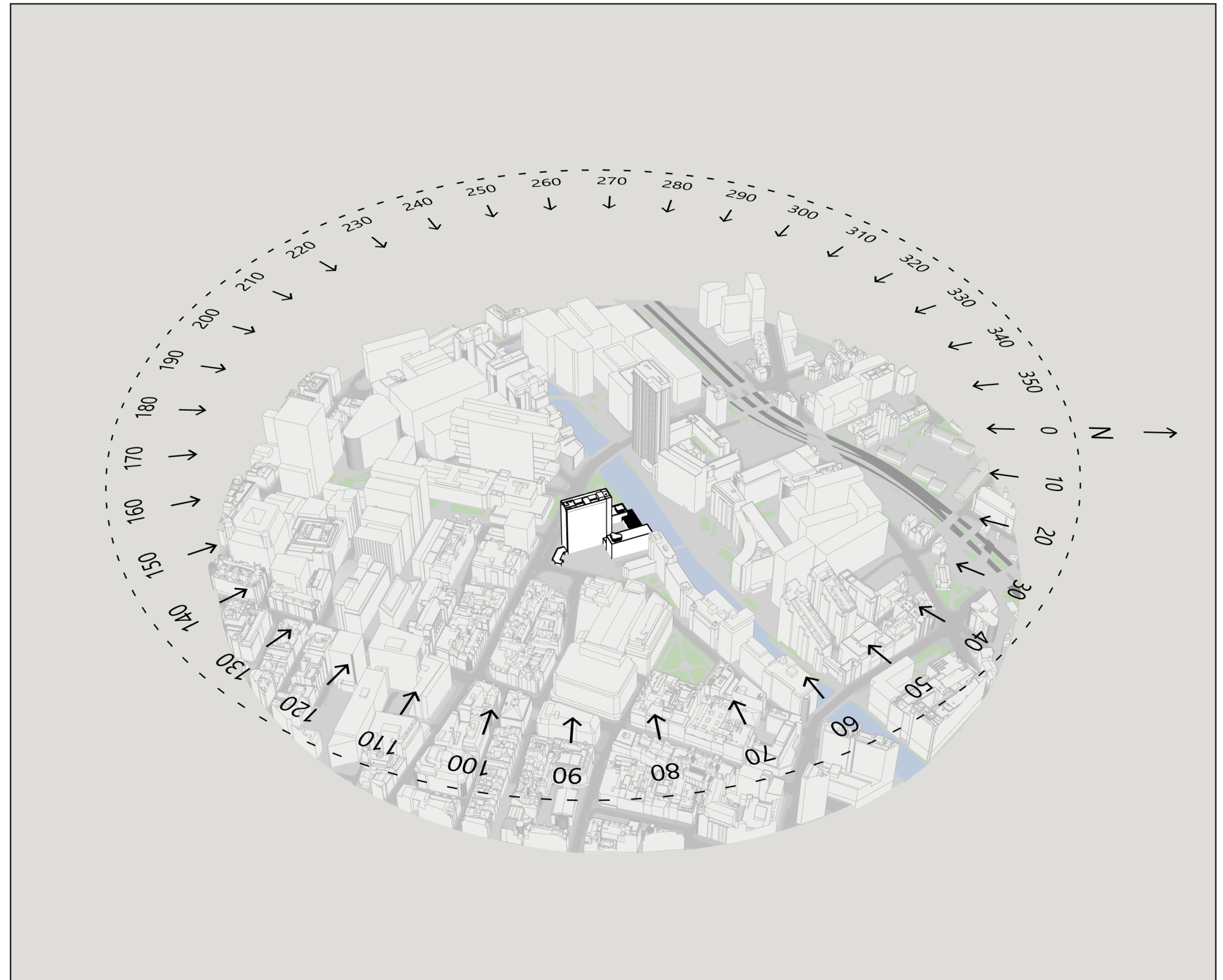
A.1 Existing site with existing surroundings

Far-field view of the entire model: south



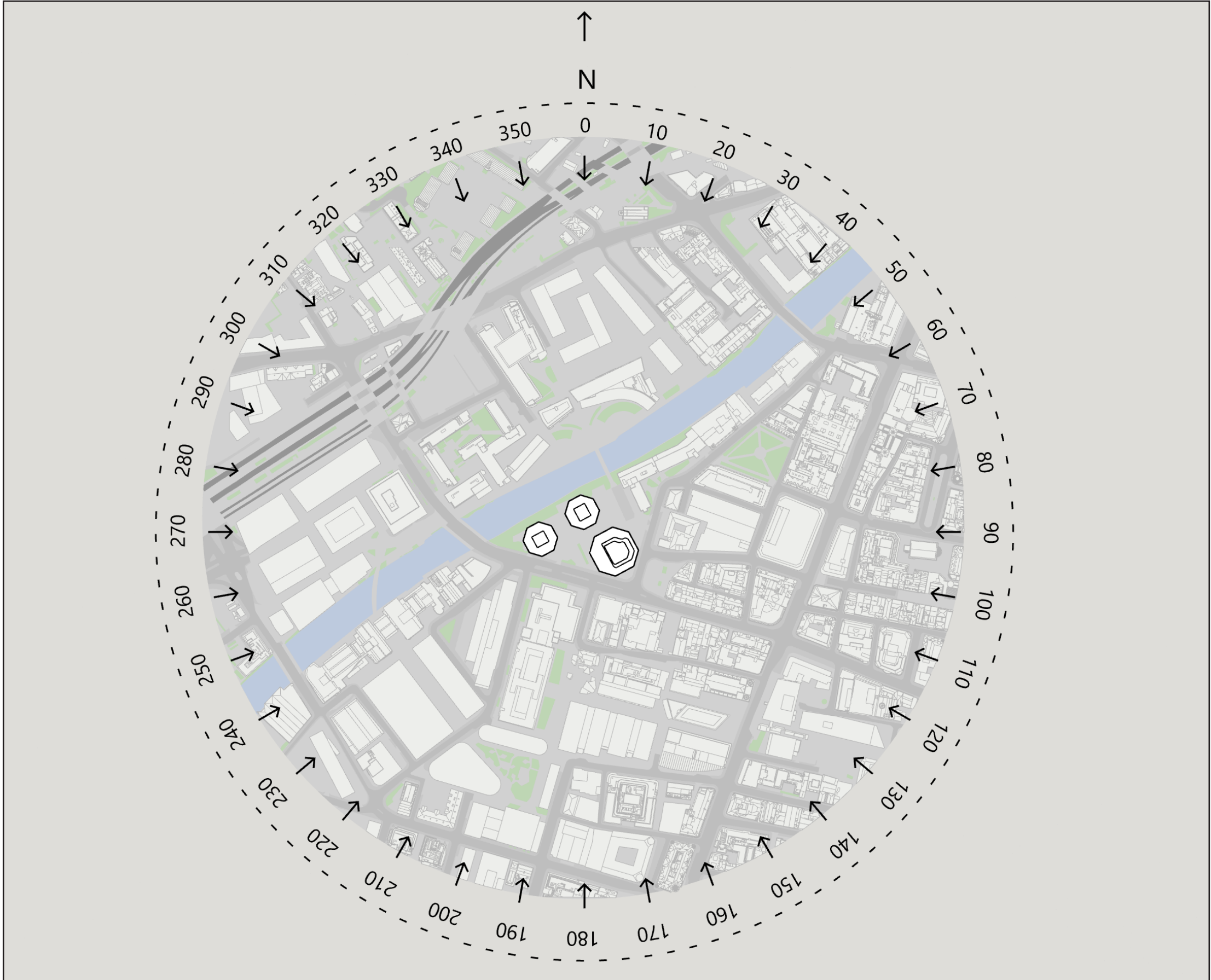
A.1 Existing site with existing surroundings

Far-field view of the entire model: east



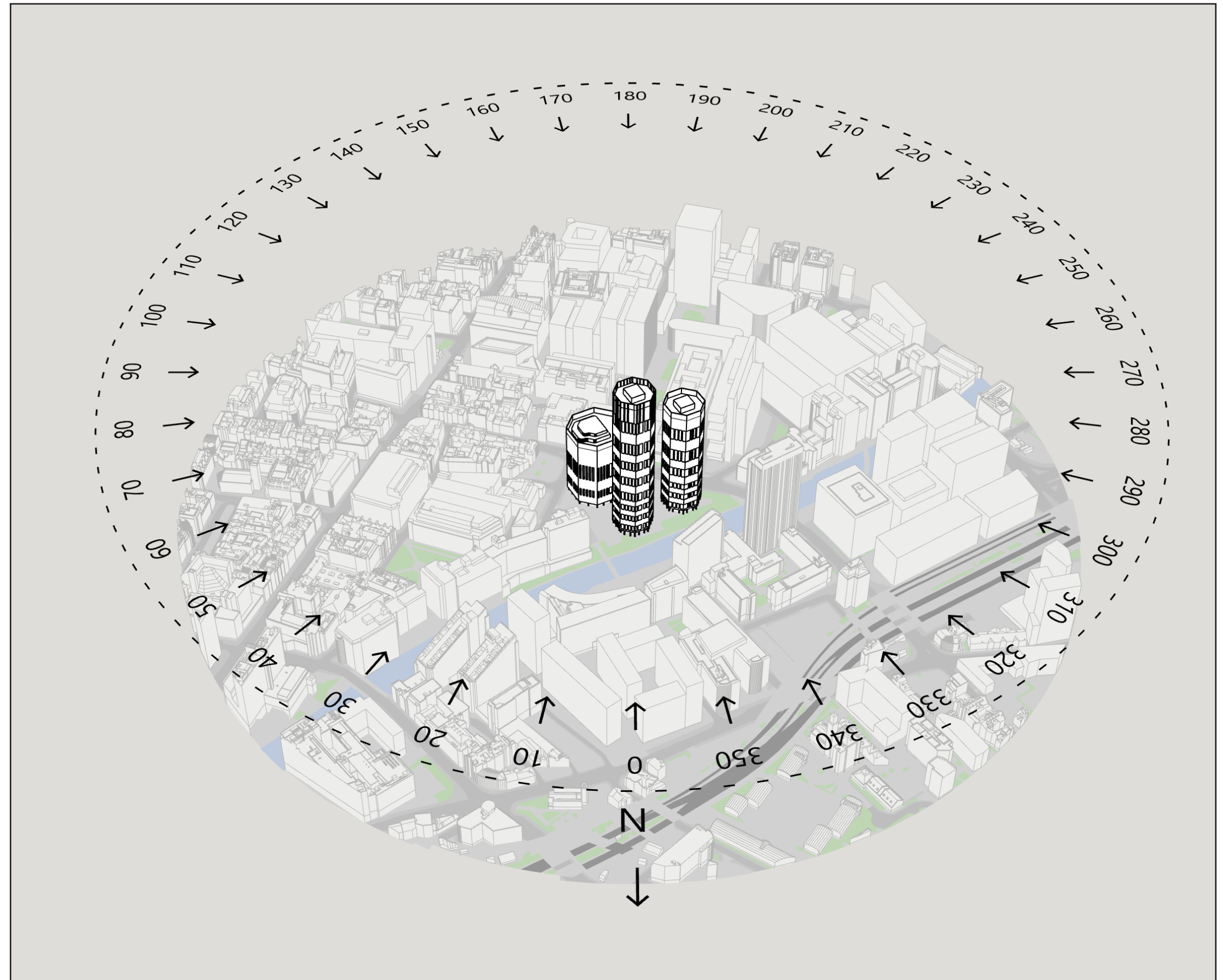
A.2 proposed
scheme with existing
surroundings

Plan view of the entire model



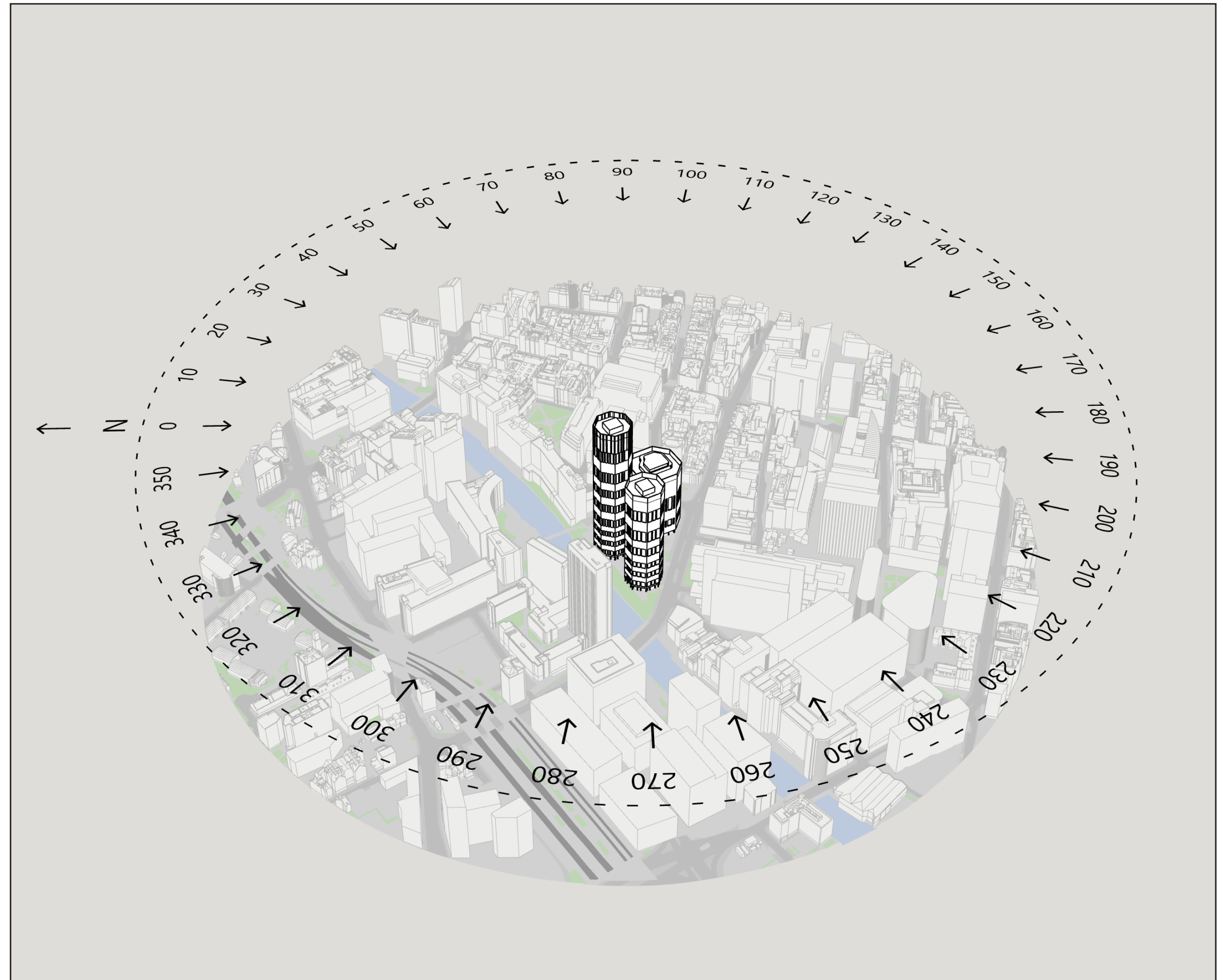
A.2 proposed scheme with existing surroundings

Far-field view of the entire model: north



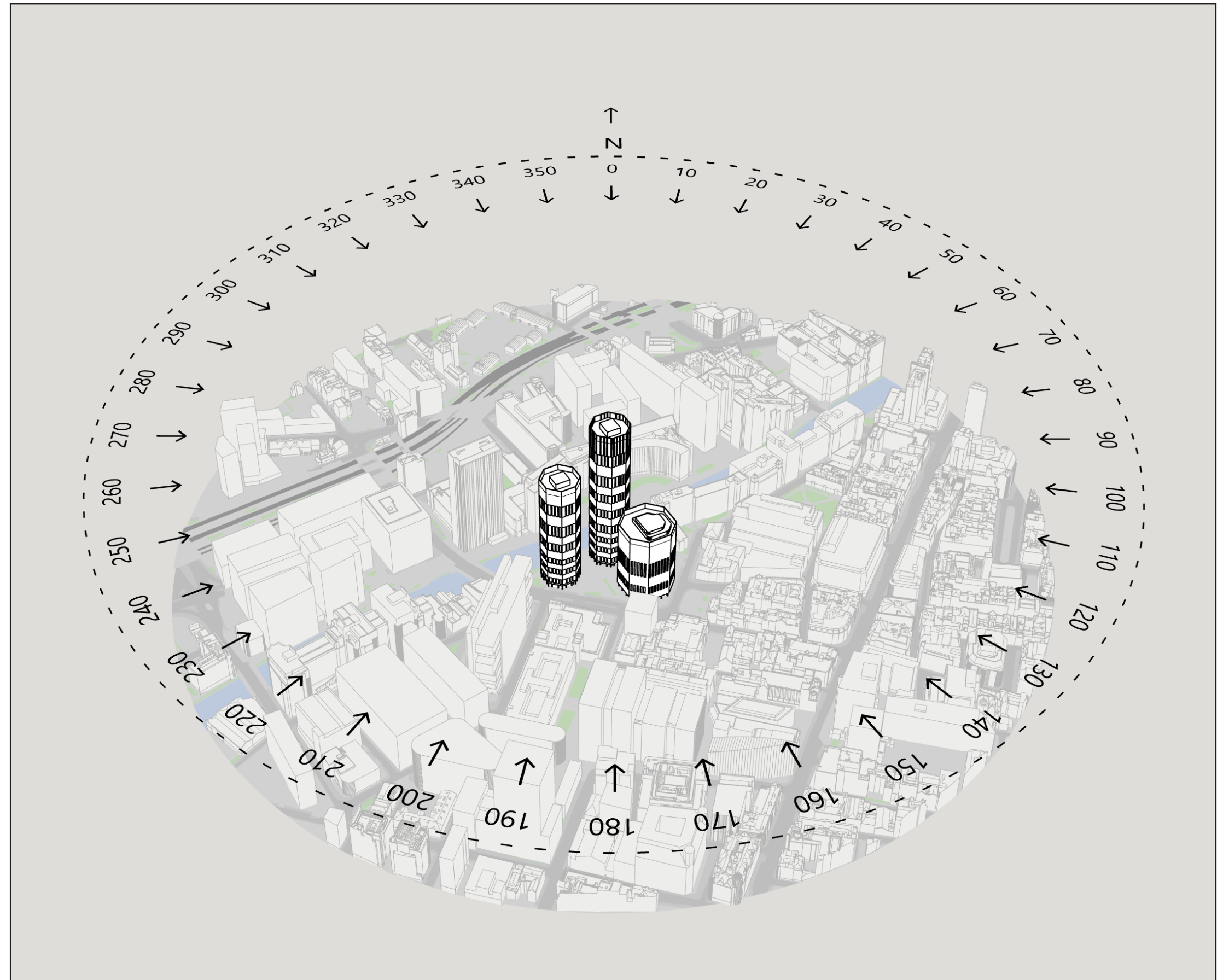
A.2 proposed scheme with existing surroundings

Far-field view of the entire model: west



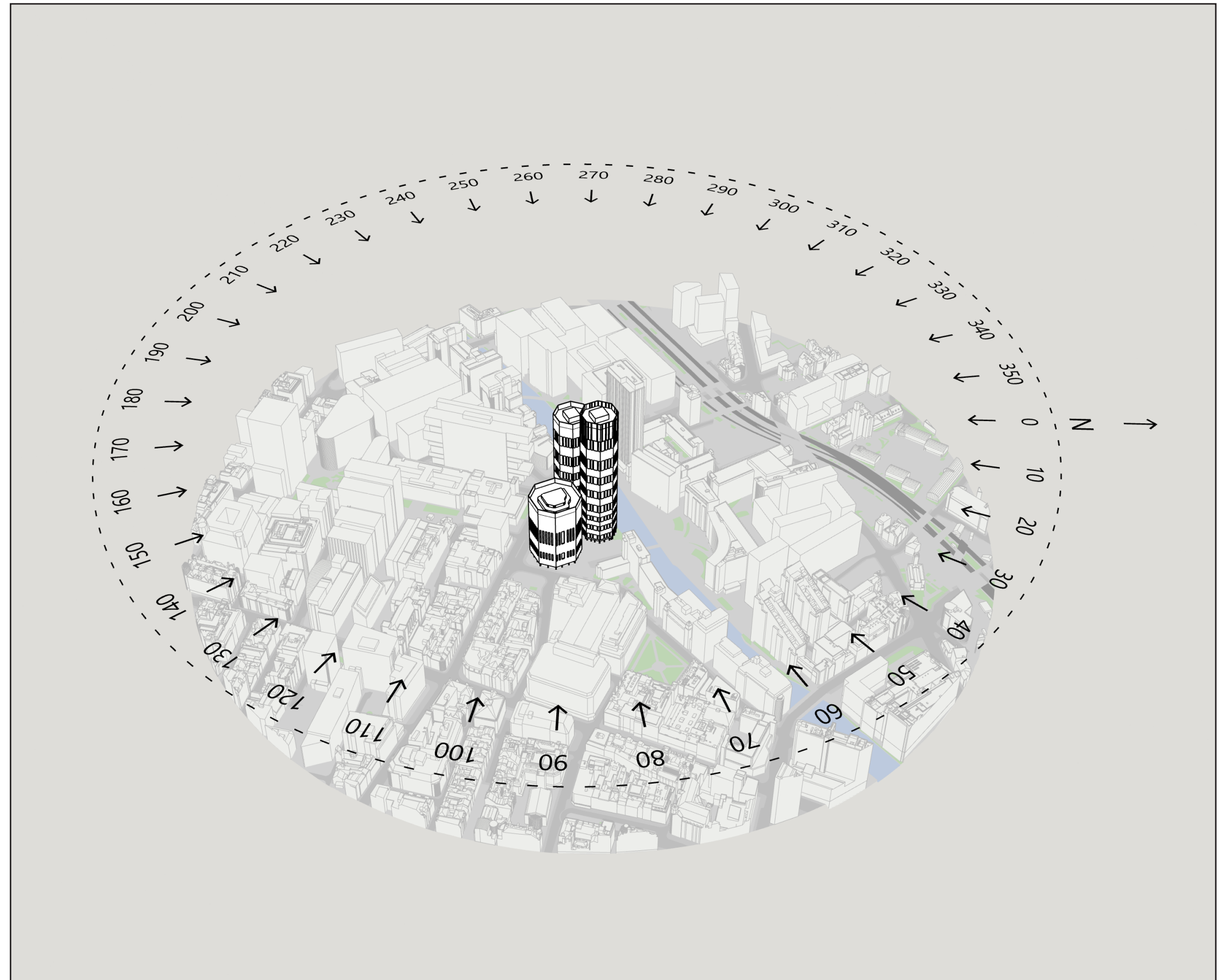
A.2 proposed scheme with existing surroundings

Far-field view of the entire model: south



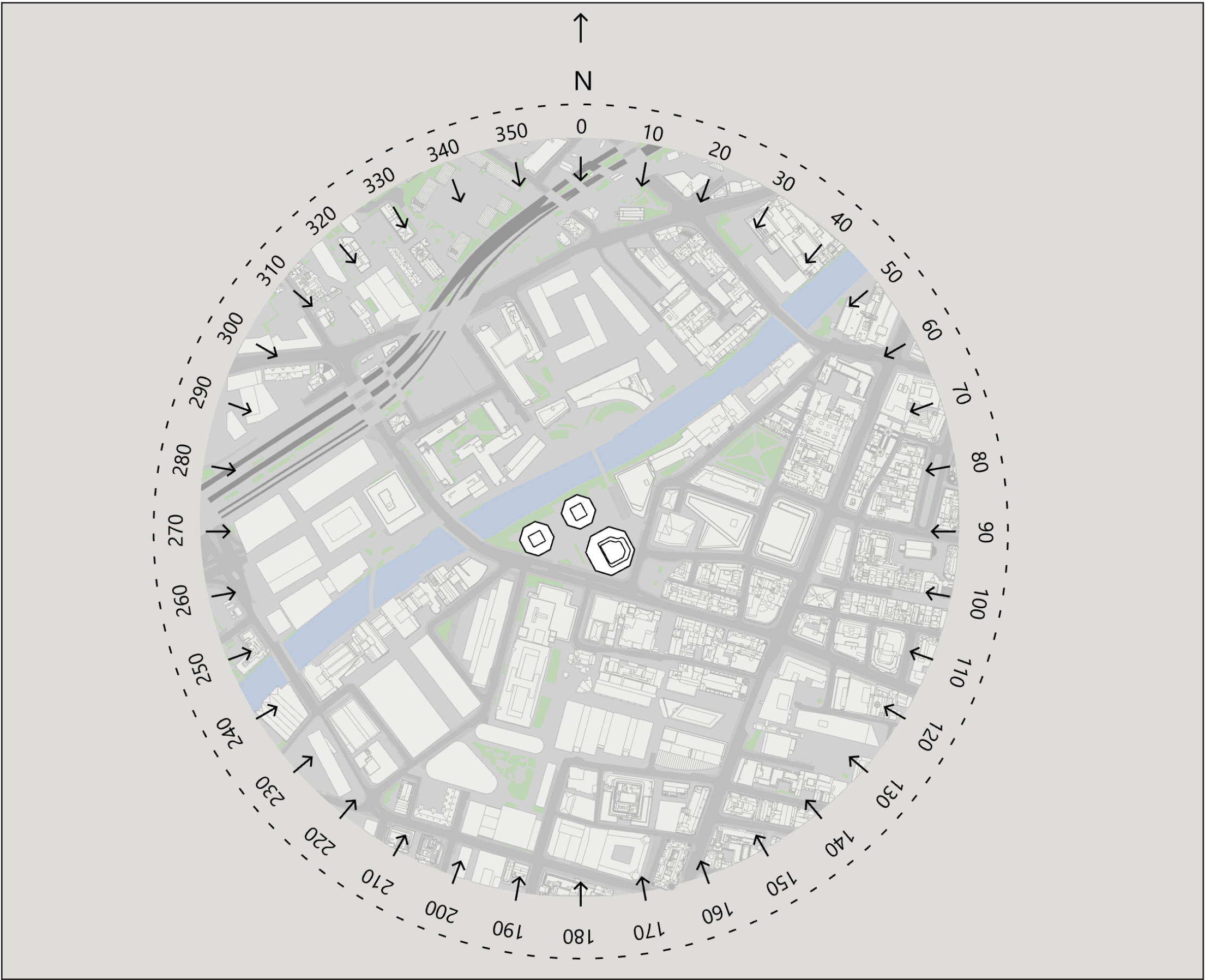
A.2 proposed scheme with existing surroundings

Far-field view of the entire model: east



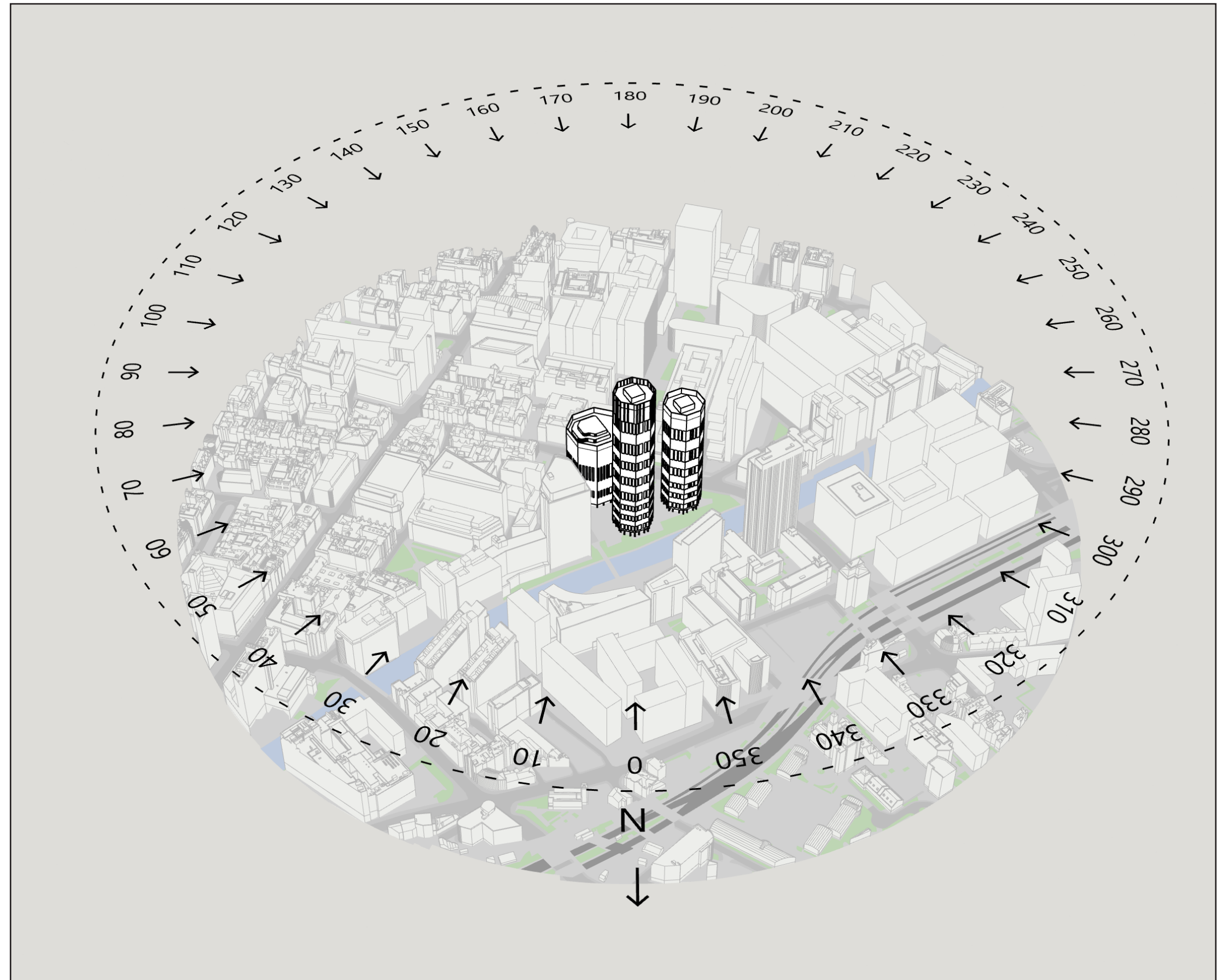
A.3 proposed scheme with future-consented surroundings

Plan view of the entire model



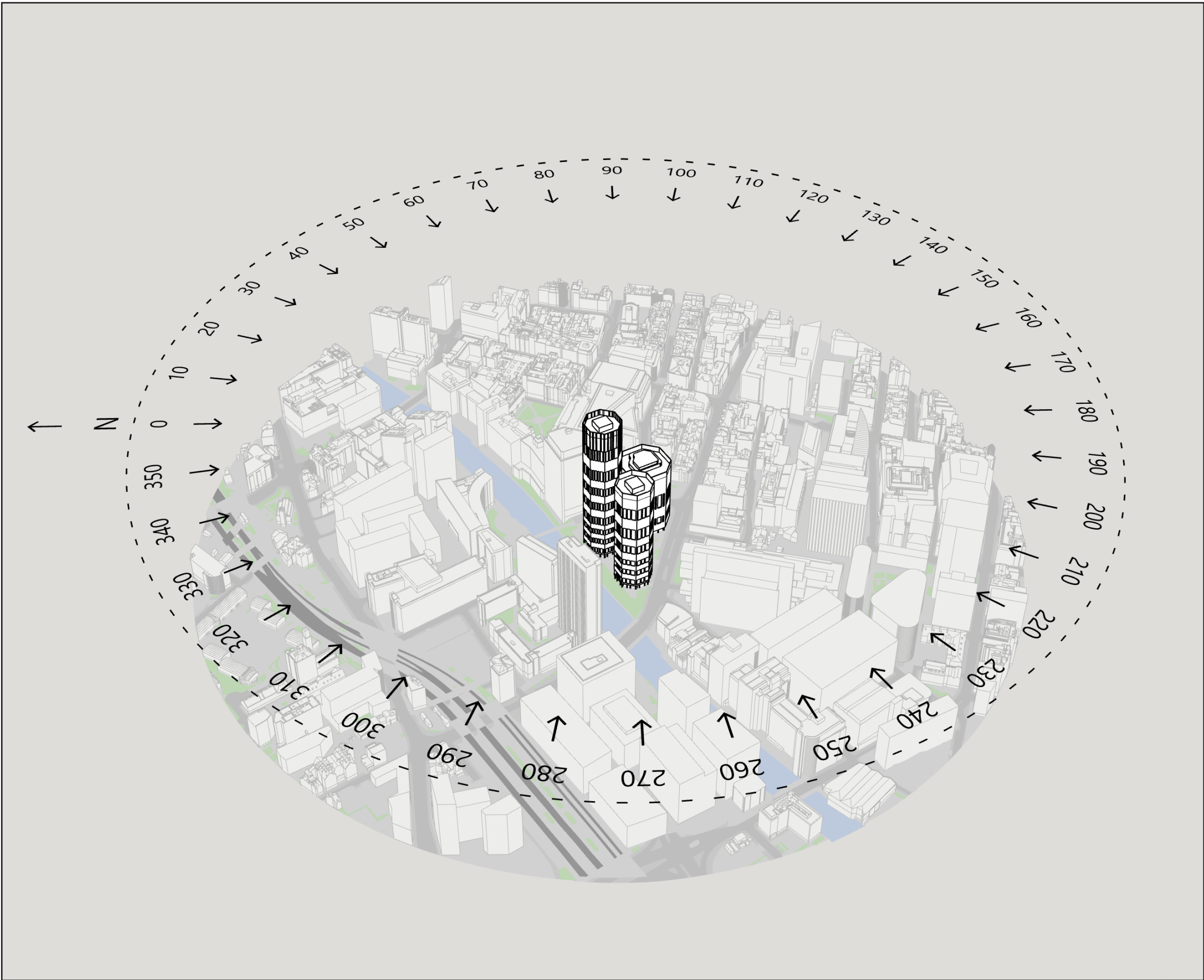
A.3 proposed scheme with future-consented surroundings

Far-field view of the entire model: north



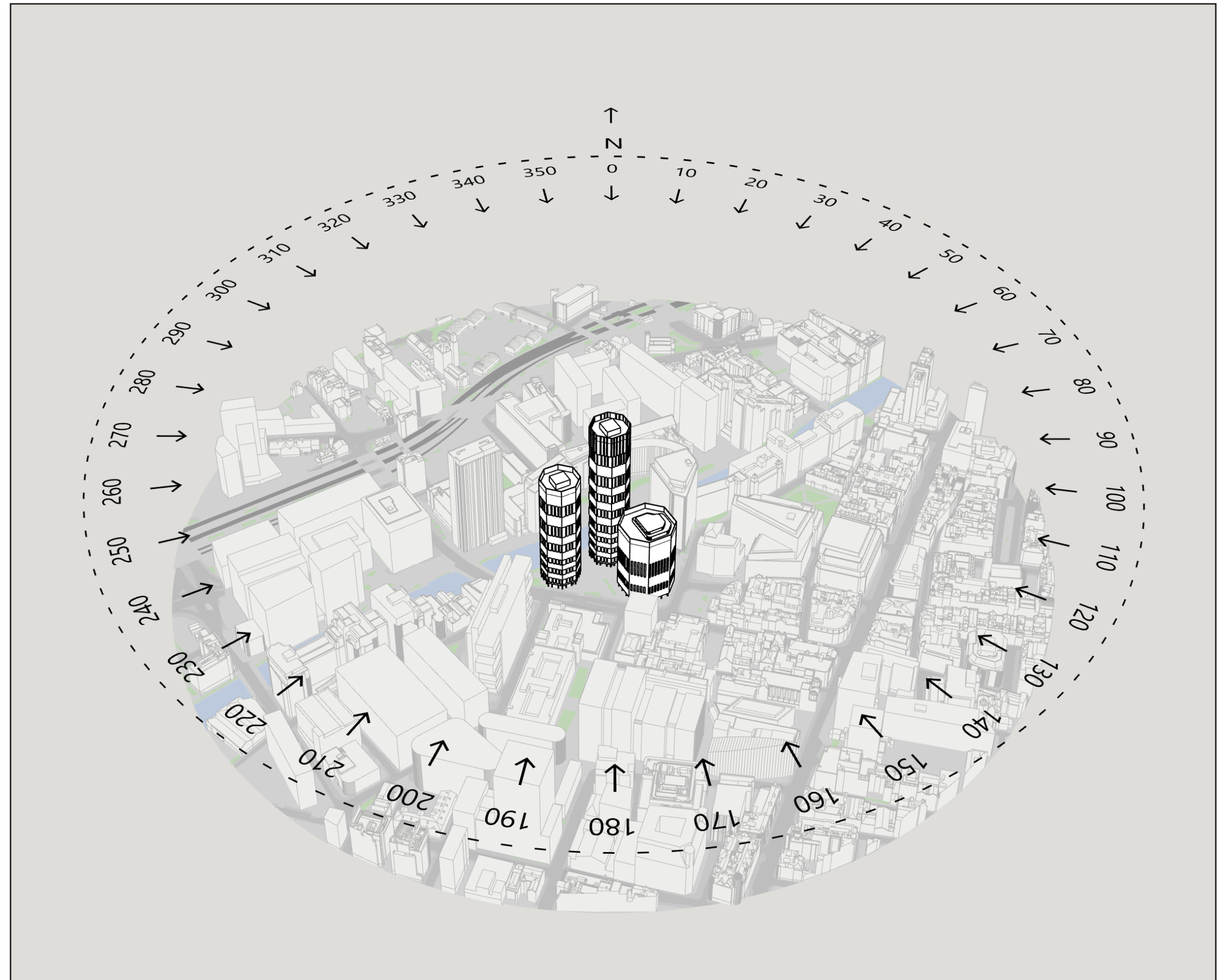
A.3 proposed scheme with future-consented surroundings

Far-field view of the entire model: west



A.3 proposed scheme with future-consented surroundings

Far-field view of the entire model: south



A.3 proposed scheme with future-consented surroundings

Far-field view of the entire model: east

