Old Kent Road Masterplan

London Borough of Southwark

WIND MICROCLIMATE ASSESSMENT

BASELINE, PHASE 1, & PHASE 2

Submitted to Southwark Council

Revision 1.3

March 2022

WRC1-A0382

www.wirthresearch.com

Issue History

Issue	Date	Comment	By	Checked
1.0	28/02/2022	Draft report: Baseline 2018	Thomas Avery-Hickmott Dr Giulio Vita	Rob Rowsell
1.1	15/03/2022	Draft Report: Baseline, Phase 1 & Phase 2	Dr Giulio Vita	Rob Rowsell
1.2	21/03/2022	Amendments	Dr Giulio Vita	
1.3	24/03/2022	Final Report Release	Dr Giulio Vita	

Background

Background to Study

Introduction

Wirth Research had been commissioned to investigate the wind microclimate within and around the area interested by the Old Kent Road Masterplan.

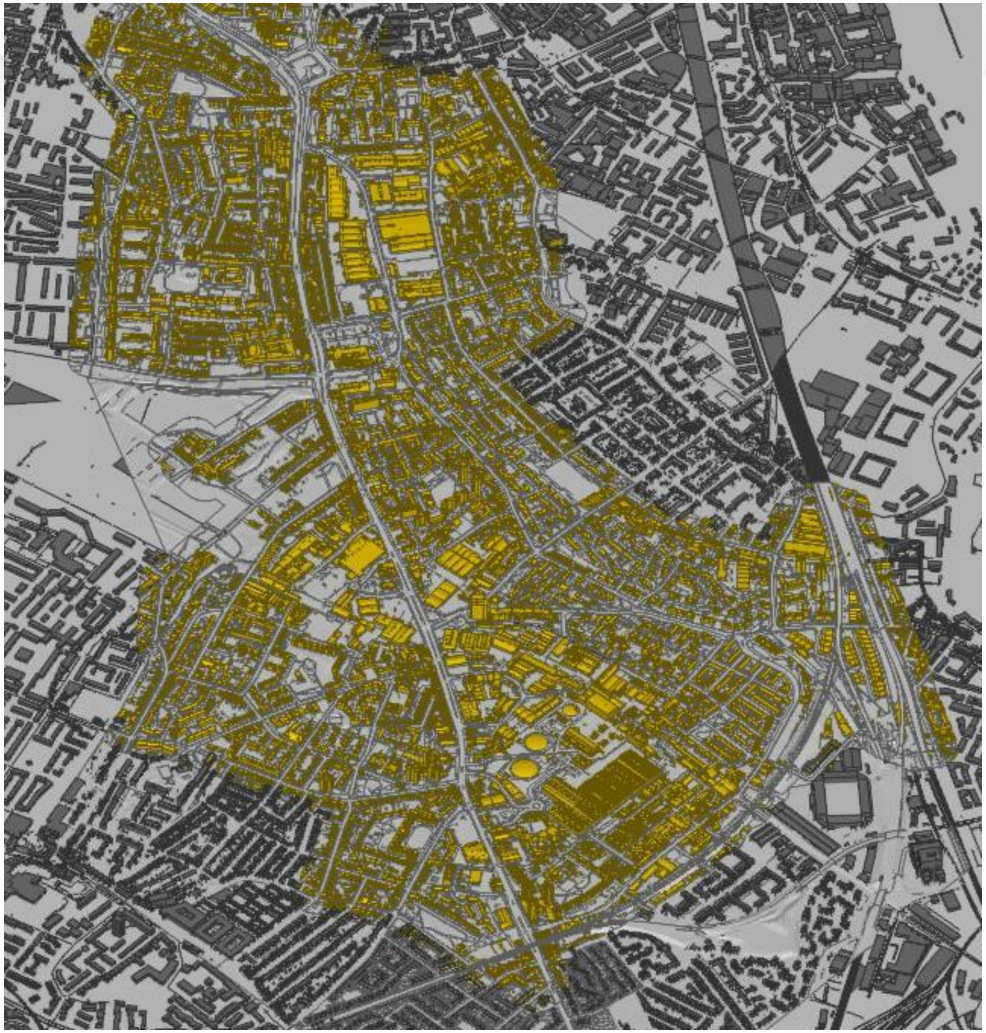
The work is divided into three phases, following the timeline in which transformation of the site will take place:

- Baseline scenario (2018): reference baseline.
- Phase 1 scenario (2030): halfway construction of the site.
- Phase 2 scenario (2040): completed masterplan.

The idea behind the study is to inform the detail design of buildings to guarantee conditions are environmentally performing and liveable for pedestrians and residents.

The present report refers to all the scenarios, which are compared one another in terms of Safety and Comfort.

It is worth noting that the site modelled amounts to one of the largest CFD models of an urban area conducted using computational tools. This provides Southwark Council with a very innovative and unique tool to inform the architectural, landscaping and urban designs.



A view of the Baseline CFD computational model of Old Kent Road

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Masterplan Evolution

Baseline: 2018

The current built environment, composed by low-rise residential buildings and several large industrial warehouses to be dismissed and substituted with residential blocks.

Industrial buildings are also present towards Old Kent Road South.

The 3D geometry of the site has been provided by the architectural firm Farrells, who have implemented a 3D VU.City model of the area within the scope of the Masterplan.

Baseline Scenario

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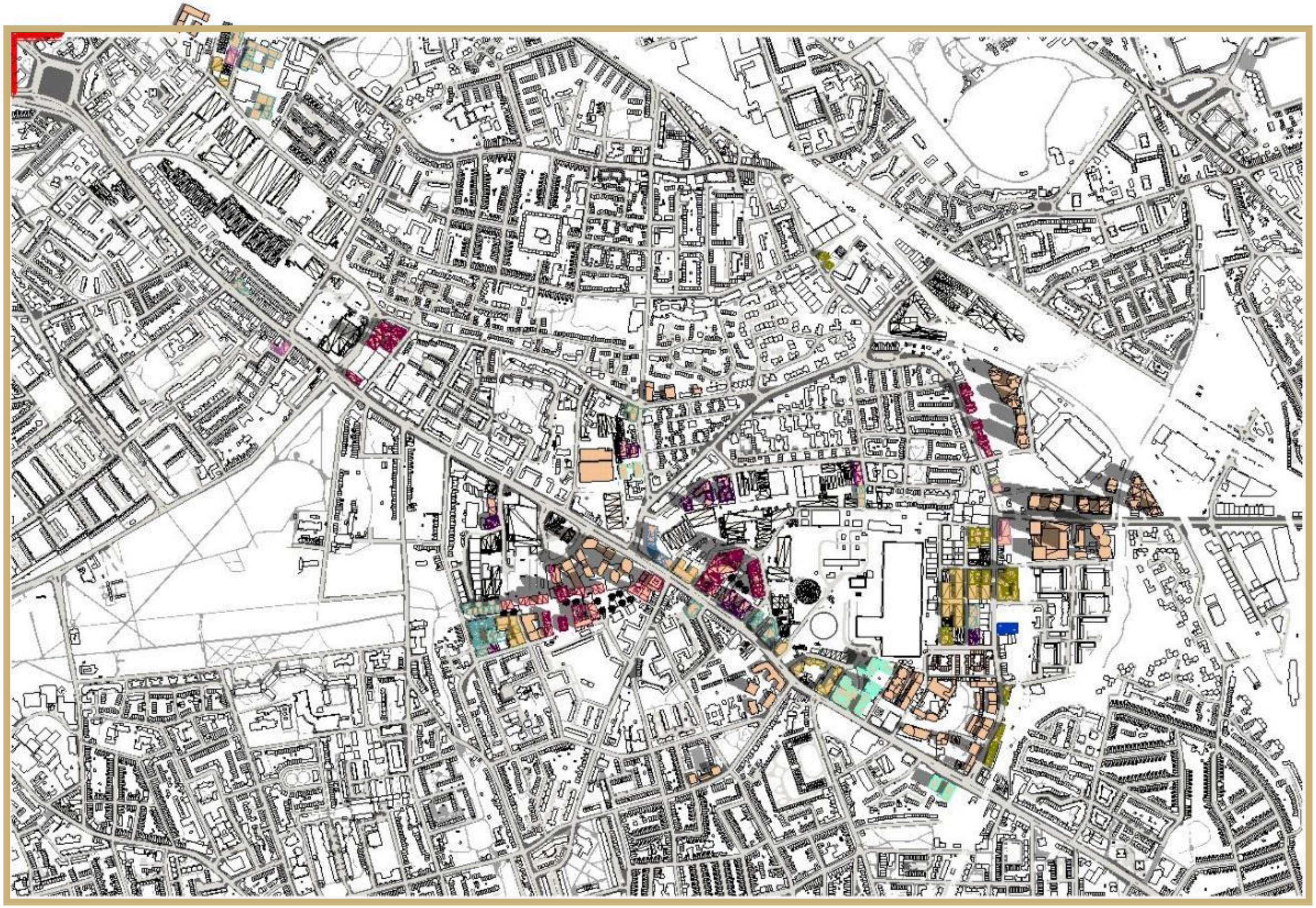
Masterplan Evolution

Phase 1: 2030

A large portion of the buildings will be built by 2030.

The sequence of the buildings and their position is the effect of the combined effort of Wirth Research, GIA, Farrells and the Southwark Council in identifying the correct features of the Masterplan.

New buildings will be built in an area spanning ~3km on both sides of Old Kent Road.



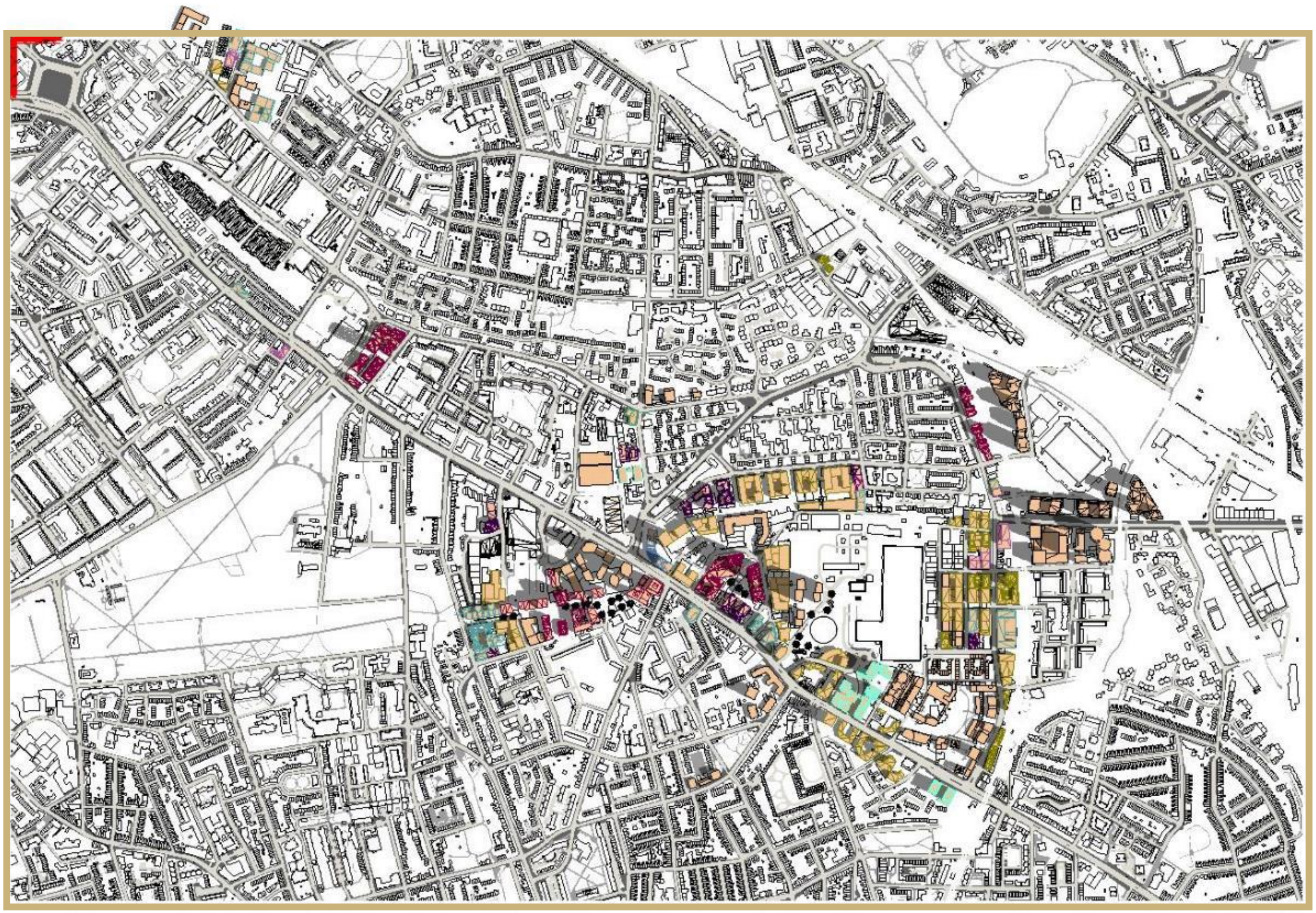
2030 scenario

Masterplan Evolution

Phase 2: 2040

Several towers and residential blocks will compose the new streetscape of Southwark and enhanced landscaping will adorn Old Kent Road.

The image shown in this slide is that provided by Farrells. A group of buildings in Mandela Way is not captured and has been provided by Southwark Council on 28/02/2022 upon a coordinated effort to finalise the work.



2050 scenario

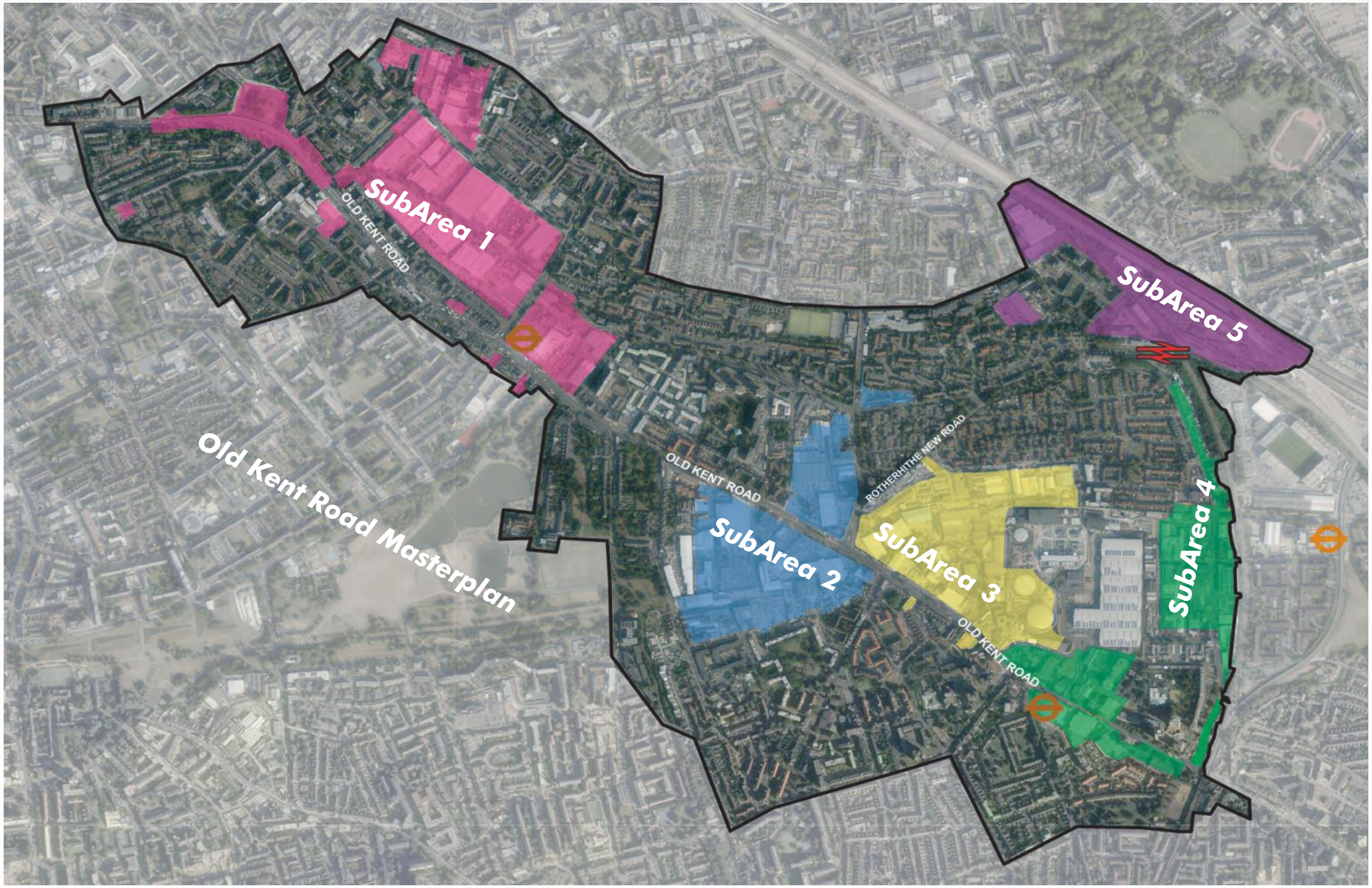
Old Kent Road Masterplan

Sub Areas

The Old Kent Road Masterplan is divided into Sub Areas:

- Sub Area 1: Mandela Way, Crimscott St. & Old Kent Road (North)
- Sub Area 2: Cantium Retail Park & Marlborough Grove
- Sub Area 3: Sandgate St., Verney Rd., & Old Kent Road (South)
- Sub Area 4: Hatcham, Ilderton & Oid Kent Road (South)
- Sub Area 5: South Bermondsey.

The present report refers specifically to each sub area to ease the interpretation of results.



Old Kent Road Masterplan with sub areas

Old Kent Road Masterplan

Future Density

The Old Kent Road Masterplan will modify significantly the built density across Southwark, hence modified wind microclimate conditions are likely to occur.

The present analysis will provide guidelines to inform the design of the new buildings and respect the current character of the site and conditions enjoyed by its residents and pedestrians.

Conditions will be identifiable with the Baseline scenario, and both new Phases will be referred to that to interpret the change in conditions occurring from the masterplan.

Building height guidance for the Old Kent Road Masterplan

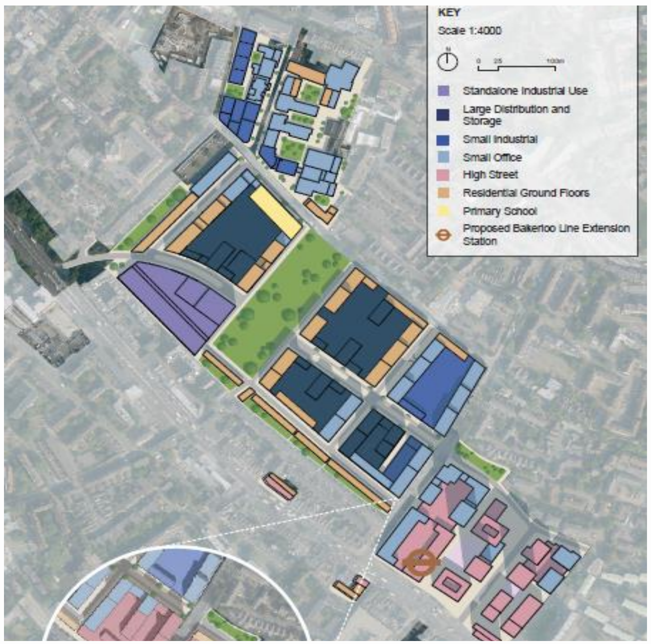
Sub Area 1

Mandela Way, Crimscott St. & Old Kent Road (North)

Sub Area 1 is currently occupied by industrial buildings. Warehouses with a large footprint constitute the almost whole totality of the Sub Area.

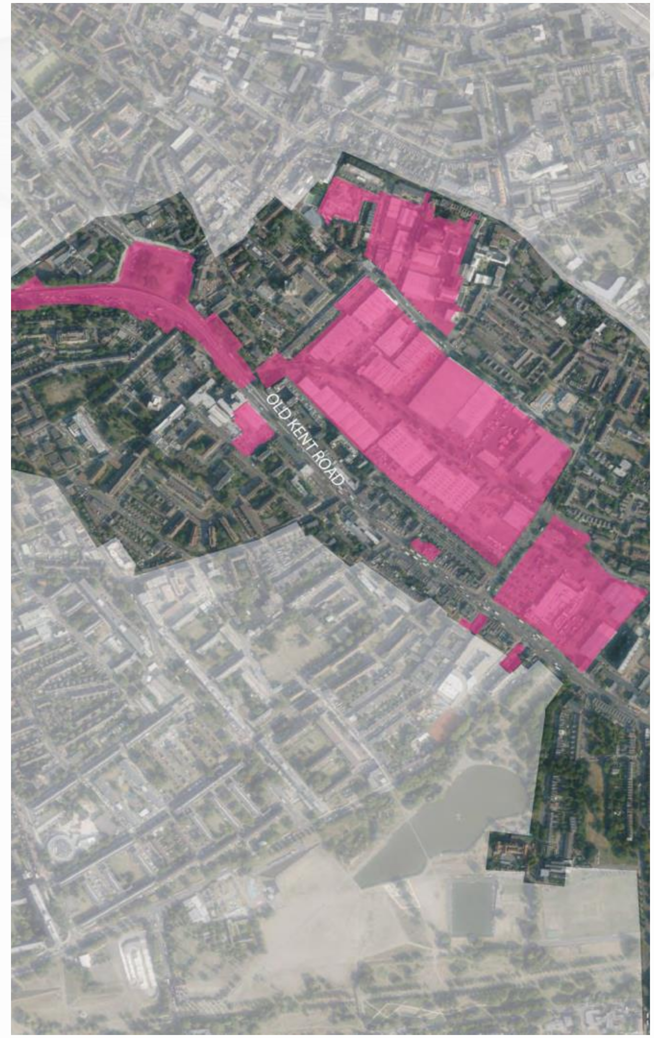
The Building height guidance shows that several towers are going to be built in lieu of the industrial buildings.

Most of Sub Area 1 will be built in Phase 2.



Usage Diagram of new buildings

Building Height Guidance



Sub Area 1 plan view

Sub Areas 2 and 3

Cantium Retail Park & Marlborough Grove and Sandgate St., Verney Rd., & Old Kent Road (South)

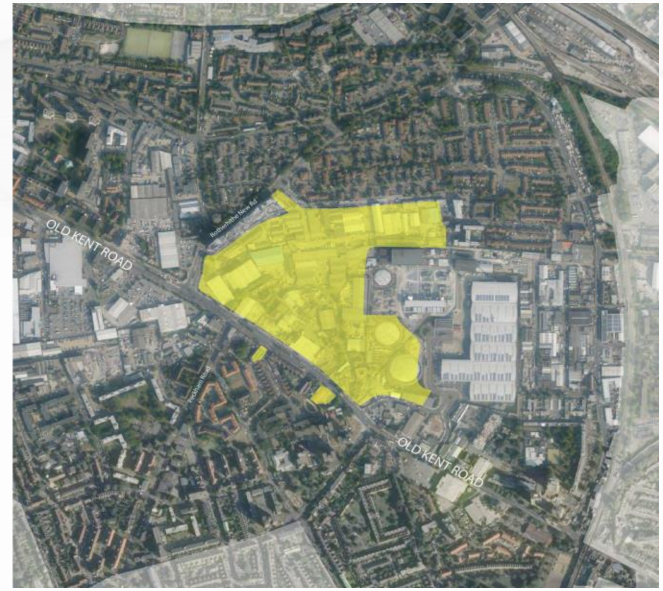
Sub Areas 2 and 3 occupy the centre of the Old Kent Road Masterplan. Most new building density is going to be added at the crossing between Old Kent Road and Rotherhithe New Road.

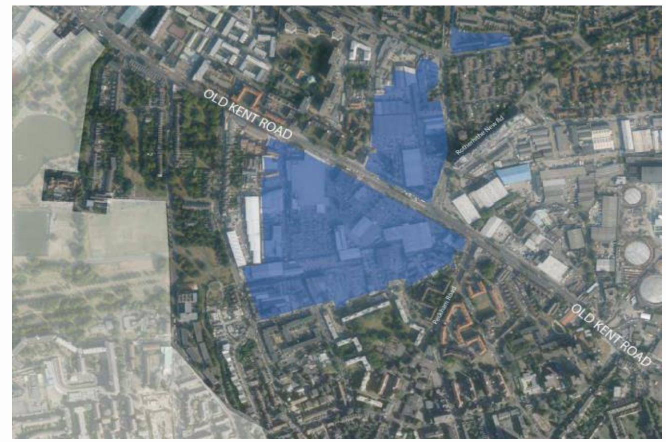
Several towers are designed which will modify the windiness of the currently low in density site, which is mostly occupied by industrial buildings from the water treatment facility to be dismissed.

About half of both Sub Areas will be completed during Phase 1.

Sub Area 3 – Building height guidance

Sub Area 2 – Building height guidance





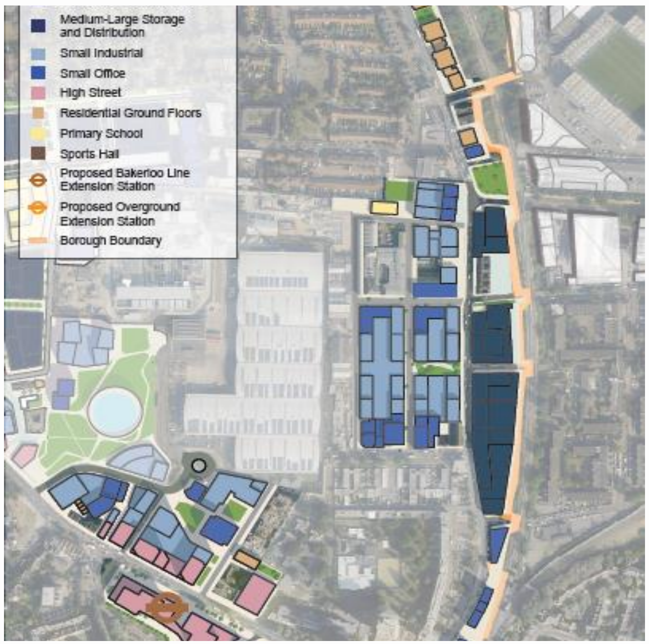
Sub Areas 3 (below) and 2 (above)

Sub Area 4

Hatcham, Ilderton & Old Kent Road (South)

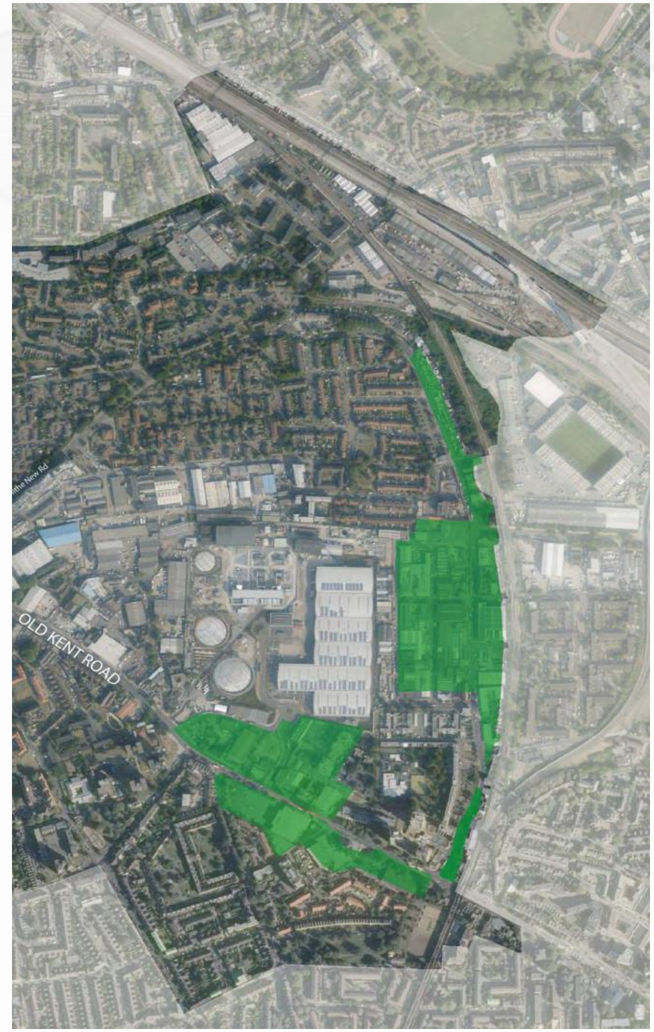
Sub Area 4 is going to increase density, with wind conditions likely to be unchanged from the present analysis.

Most of new buildings will be completed within Phase 1.



Usage diagram of new buildings

Building height guidance



Sub Area 4 - plan

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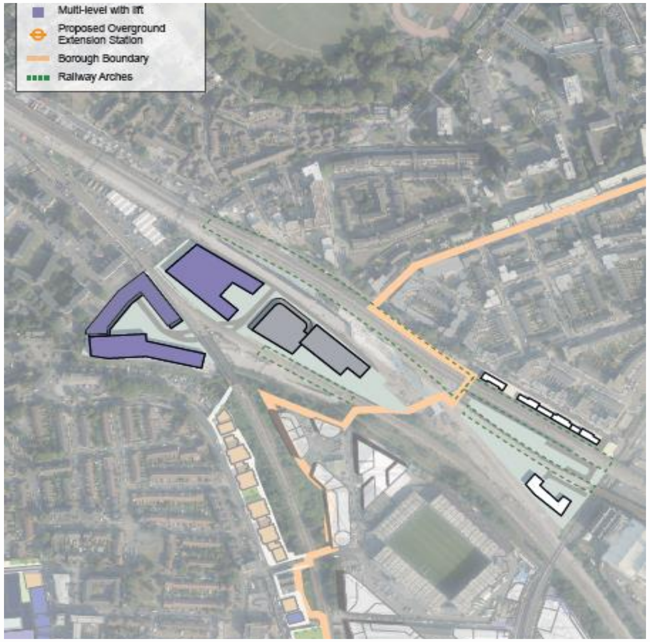
Sub Area 5

South Bermondsey

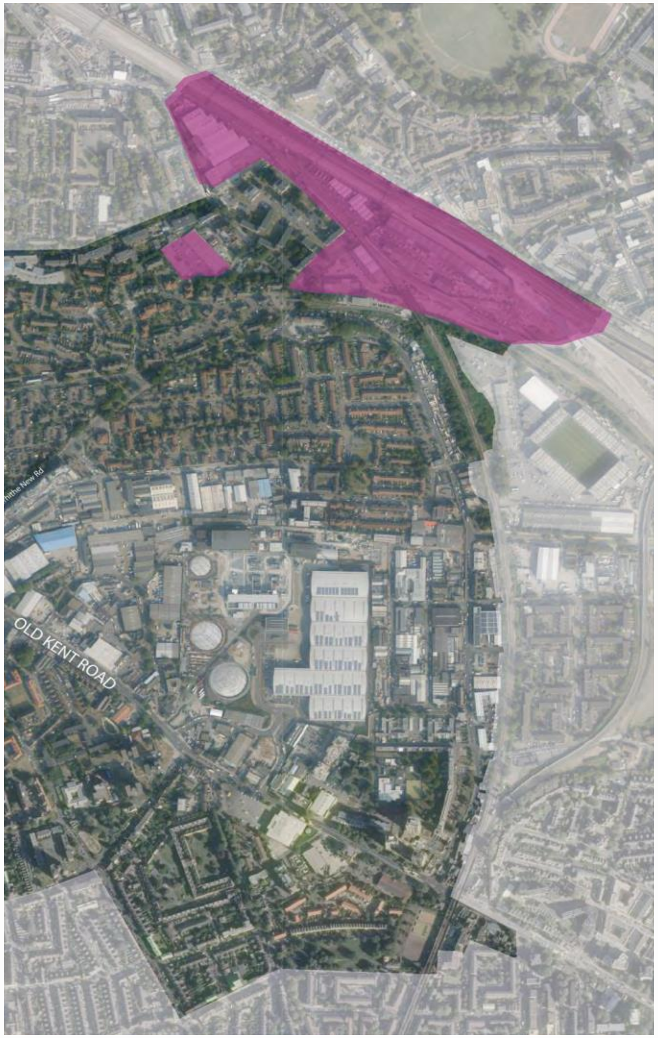
The presence of the railway makes for conditions that are likely to be windier than the rest of the site, due to the openness of the Sub Area. The increase in building density will likely encourage higher winds, that will need to be mitigated against.

Most new buildings will be completed within Phase 2.



Usage diagram of new buildings

Building height guidance



Sub Area 5 - plan

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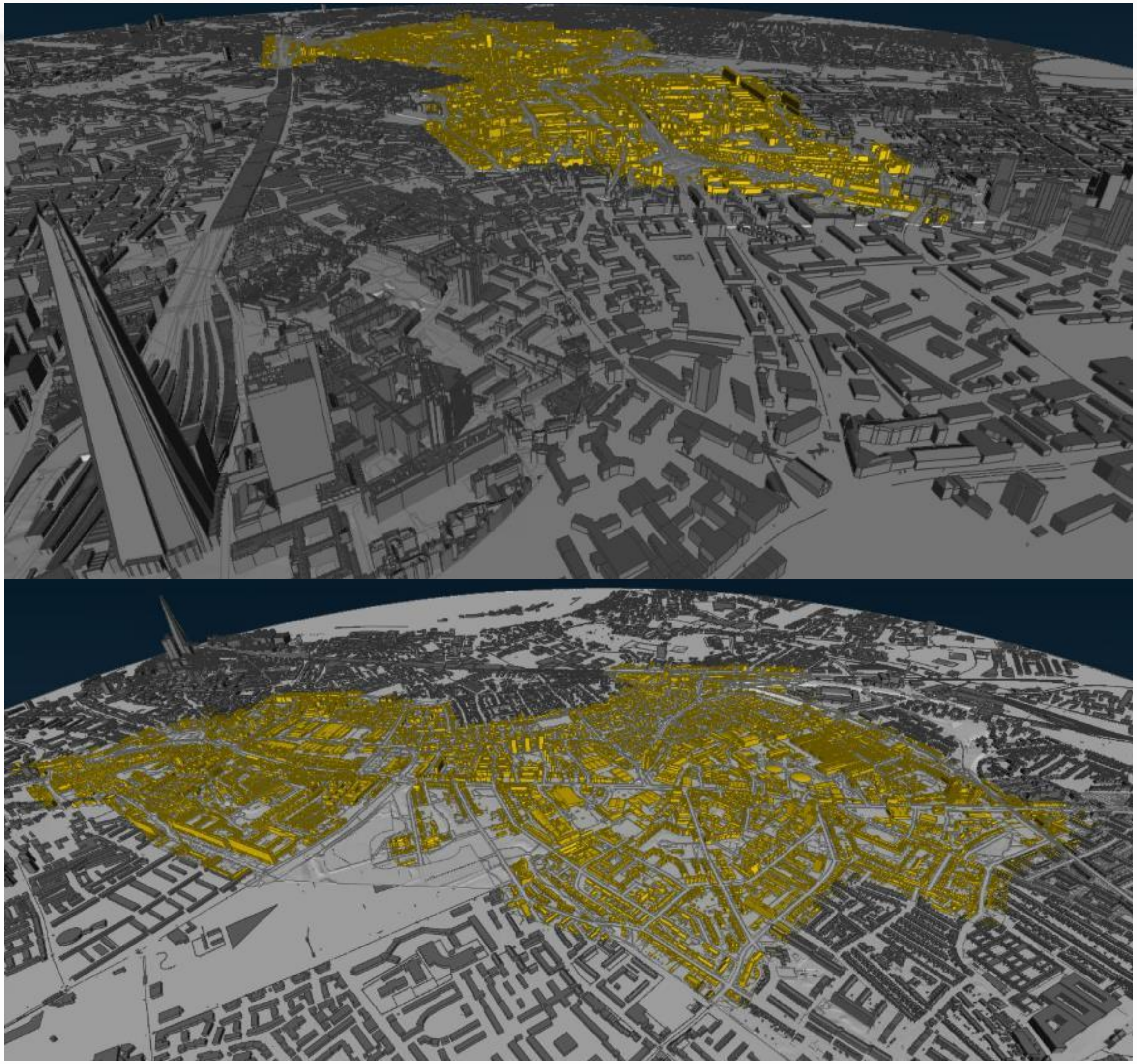
Model Geometry

Computational Domain

Baseline Geometry

The baseline Geometry is built with 3D models from VU-City (Old Kent Road Masterplan Area) and the Open Street Map (Surrounding Context).

Plan view of the CFD model geometry



3D views of the CFD model geometry

Computational Domain

Phase 1

In Phase 1, about a third of the Masterplan will be completed.

Sub Areas 2, 3 and 4 will be those where most buildings will be completed by 2030.

The new buildings will substitute old ones.

This geometry assumes that no demolition of the buildings to be completed during Phase 2 has happened by the time Phase 1 is completed (i.e. context buildings to be demolished for Phase 2 are present in the Phase 1 models).

Plan view of the CFD model geometry

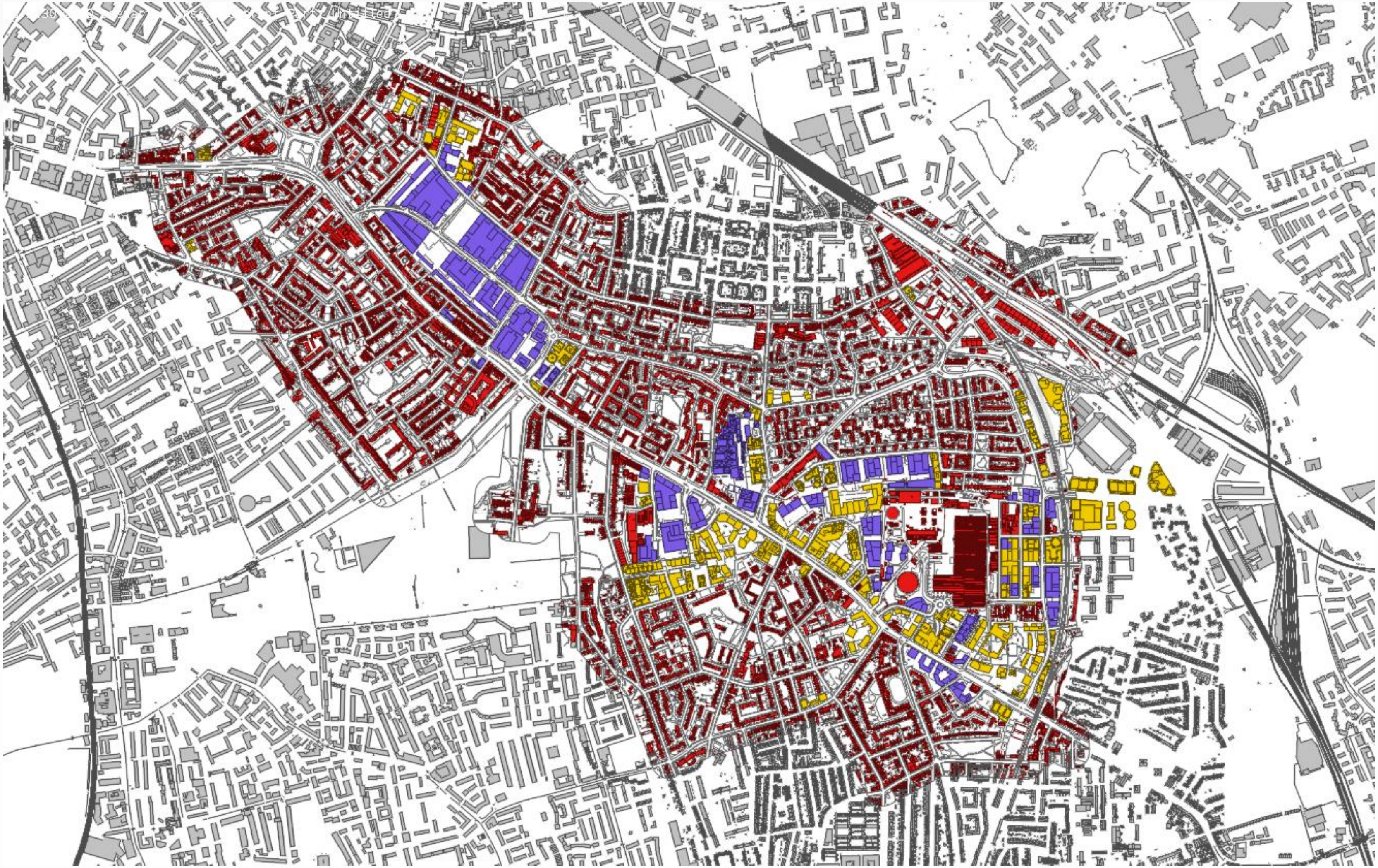
Computational Domain

Phase 2

In Phase 2 a new high density built area will be created in sub areas 2 and 3, where conditions are likely to differ significantly from the baseline.

Sub Area 1 will be also transformed significantly, with evident addition of medium-rise buildings in substitution of low-rise ones.

The water treatment facility is mostly dismissed and replaced by medium-rise buildings.

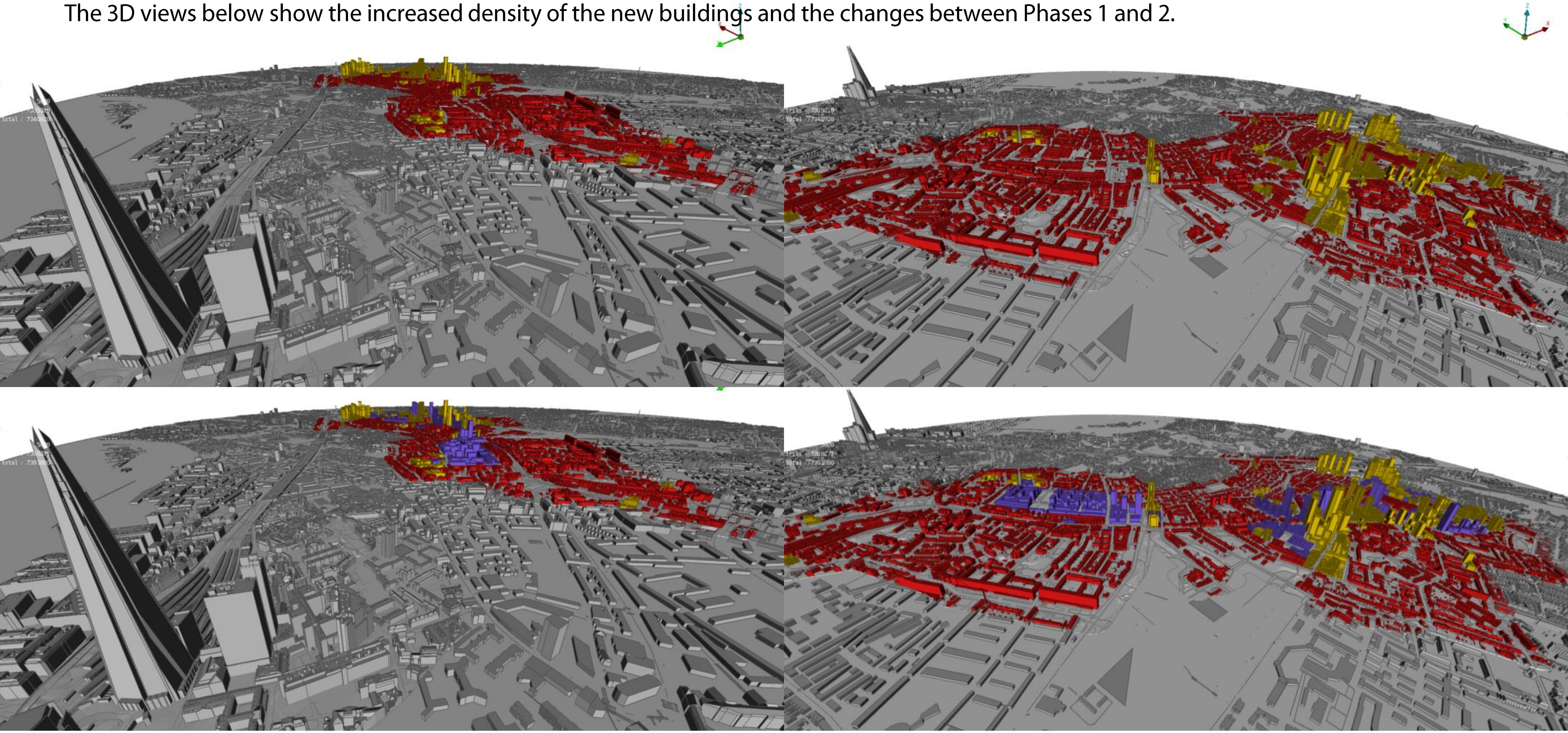


Plan view of the CFD model geometry

Computational Domain

Phase 1 and Phase 2

The 3D views below show the increased density of the new buildings and the changes between Phases 1 and 2.



Old Kent Road Masterplan Geometry: View from North

View from South

Methodology

Assessment Method

Wind Microclimate

Pedestrian comfort and safety are assessed using the LDDC variant of the Lawson comfort criteria, which determines whether conditions are suitable for a given activity dependent on the percentage of the year certain wind speeds can be exceeded. The limits are shown below.

The percentage of exceedance is calculated by combining the results of CFD simulations of 18 wind angles with the statistical Weibull coefficients generated from analysis of a 30 years of wind data, collected from a superstation of Heathrow, Stansted and Gatwick airports.

Lawson Comfort Criterion (LDDC)

Category	Mean wind speed (5% exceedance)	Description
Sitting	<4m/s	Acceptable for outdoor sitting use (e.g. cafes, benches, balconies)
Standing	<6m/s	Acceptable for main building entrances, pick-up / drop-off points and bus stops
Walking (Leisure)	<8m/s	Acceptable for strolling
Walking (Business)	<10m/s	Acceptable for external pavements, walking purposefully without lingering
Uncomfortable	>10m/s	Not comfortable for regular pedestrian access

Lawson Safety Criterion

Category	Mean wind speed (0.22% exceedance)	Description
Safe	<15 m/s	No safety exceedance
S15 (Distress)	>15m/s	Unsafe for frail individuals or cyclists
S20 (Safety)	>20m/s	Wind conditions considered unsafe for all users

Assessment Method

CFD Domain

In order to accurately model local wind conditions, the Site is modelled along with a large portion of its surroundings. The circular CFD Domain is composed of:

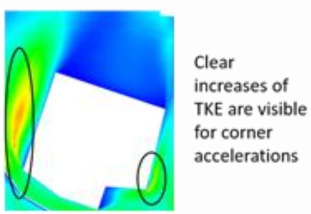
- A farfield region to set the ABL profile and wind direction.
- A context region, with a coarse mesh (shown in grey).
- The site, with a fine mesh (shown in red/yellow**).**

Buildings up to ~2.5km of the centre of the site were included. The overall domain was ~12km in diameter, including 5km of modelled buildings.

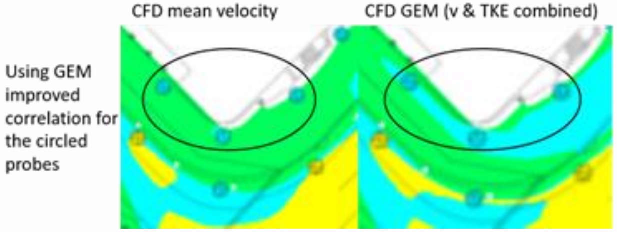
All buildings are placed within a 'CFD turntable' placed at the centre of the domain allowing easy variation of wind directions.

The blockage ratio amounts to about 0.8%.

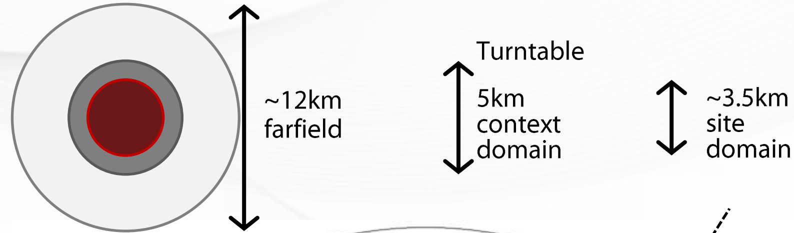
TKE field around typical building corner

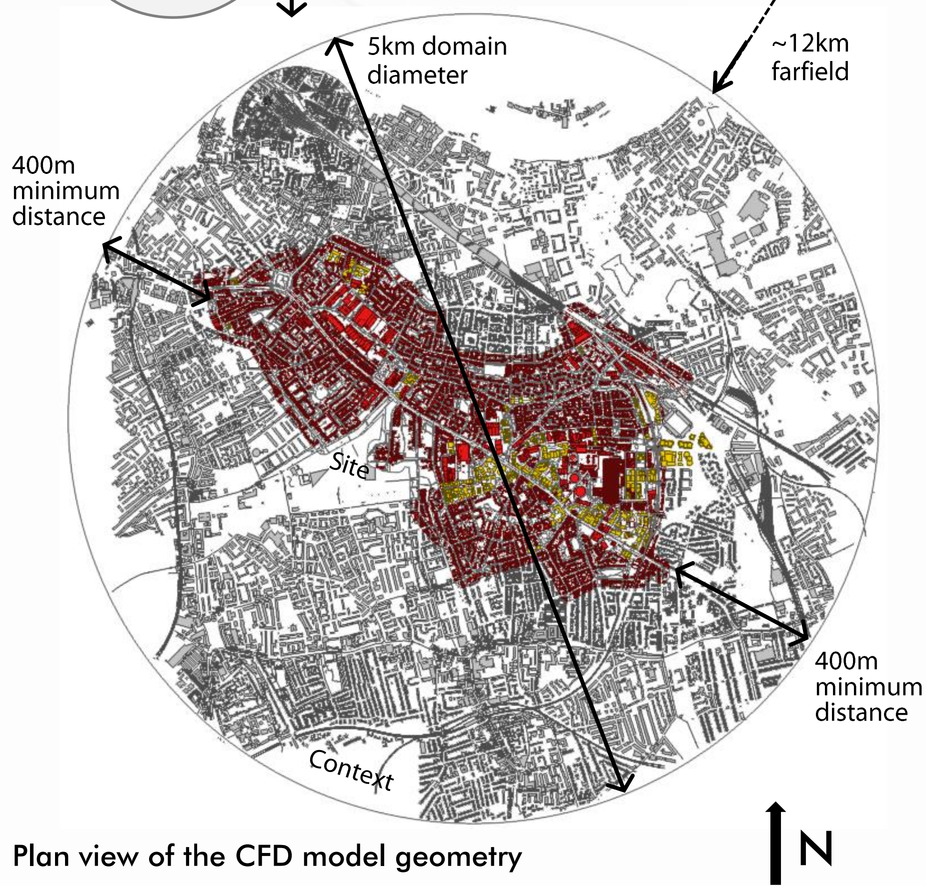


A comparison of WT (dots) and CFD (continuous field) using:
CFD mean velocity CFD GEM (v & TKE combined)



TKE and GEM using in-house validated method.





Plan view of the CFD model geometry

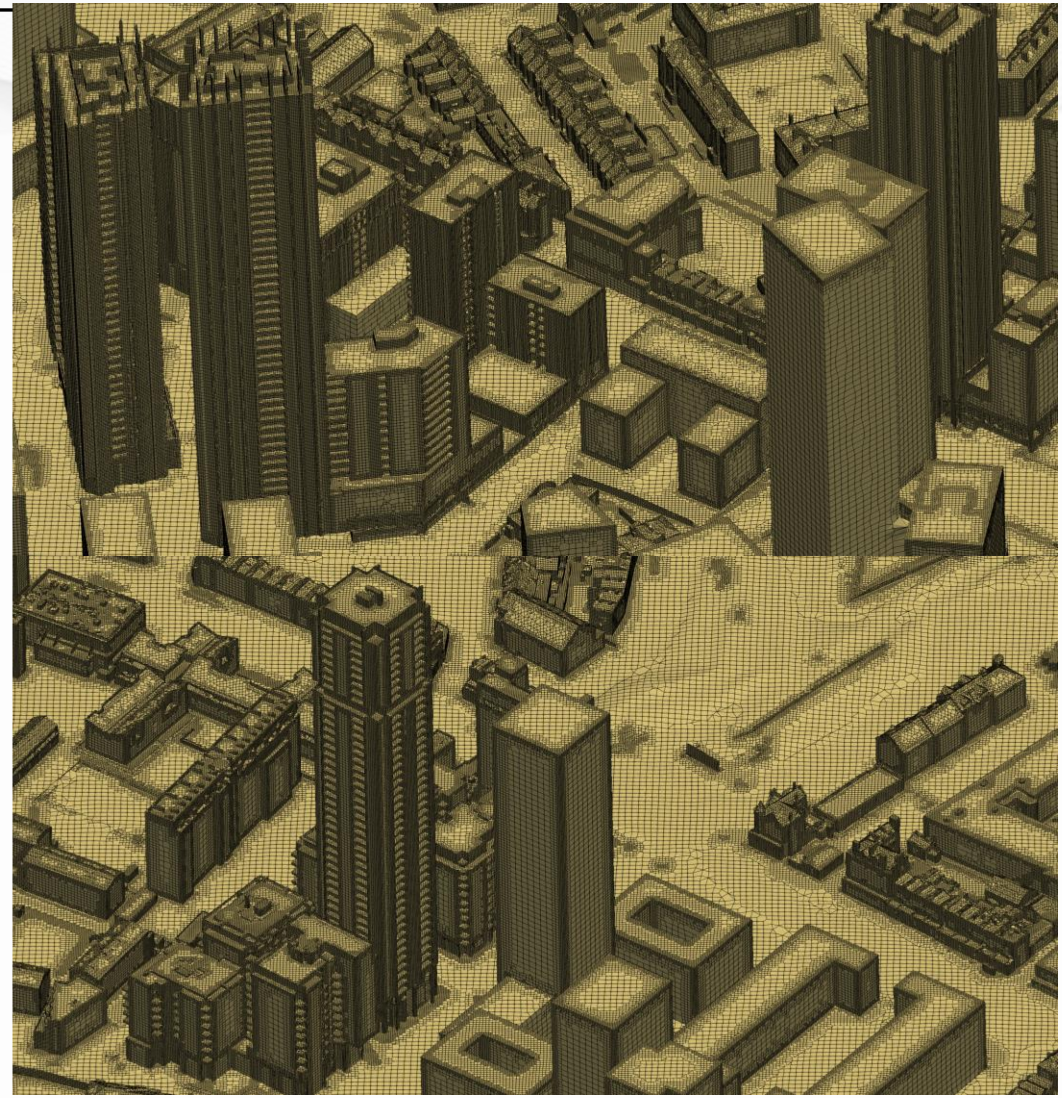
Assessment Method

CFD setup and Computational Grid

The CFD was performed using OpenFOAM. The computational mesh consisted of a hybrid mesh of polyhedral, hexahedral, tetrahedral and prismatic elements. Following assumptions have been implemented

- On site building edge length: 0.05m - 0.3m. Surrounding context edge length: 0.3m - 1m. The total mesh size was almost 200 million cells.
- It was solved using the industry standard Realisable k-epsilon turbulence model with non-equilibrium wall functions. The simulations were steady state and isothermal using a combination of 2nd and 3rd order discretisation schemes.
- Convergence was measured as the residuals of the continuity, x-velocity, y-velocity, z-velocity, k and epsilon equations all falling by at least 2 orders of magnitude, and by measured static pressure on the site buildings varying by less than 1% over the final 100 iterations.

The wind speed is corrected into a “gust-equivalent” mean (GEM). GEM is calculated using a proprietary method which uses the Turbulent Kinetic Energy (TKE) field and the velocity field from the CFD to estimate the gust velocity across the domain. The use of TKE has been questioned due to the known limitations of RANS in predicting absolute TKE values but, for the purposes of generating GEM, only the additional TKE generated by the flow structures within the domain is relevant.



3D views of the CFD model geometry

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Comfort in summer season

Baseline

Comfort in Summer Season

Pedestrians currently enjoy conditions suitable for sitting throughout the summer season.

Some limited locations show conditions suitable for standing, whereas conditions suitable for strolling are only observed close to the Burgess Park.

Real conditions on site are likely to be better than the CFD predictions as the effect of trees has been omitted from this analysis.

Comfort is mainly driven by the building height and currently the site presents buildings of an average height of ~6-8m.

This is going to change with the Old Kent Road Masterplan.

Comfort Category	Colour
Sitting	
Standing	
Leisure Walking	
Business Walking	
Uncomfortable	

Summer comfort.

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Phase 1

Comfort in Summer Season

The Completion of Phase 1 is mostly beneficial to the windiness of Burgess Park, with conditions mostly suitable for standing (down from strolling in the baseline).

While throughout the Site conditions remain broadly suitable for sitting, more locations with conditions suitable for standing are identifiable within Sub Areas 2 and 3. This is to be attributed to the tall buildings that will be built, and this is a concern designer will have to mitigate against.

Comfort Category	Colour
Sitting	Green
Standing	Blue
Leisure Walking	Yellow
Business Walking	Magenta
Uncomfortable	Red

Summer comfort.

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Phase 2

Comfort in Summer Season

After completion of Phase 2, Conditions on Burgess Park are improved compared to both the baseline and Phase 1.

This is likely due to the beneficial shielding effect of the taller buildings.

The areas with increased windiness identified in Phase 1 remain unchanged for phase 2 (from sitting to standing).

Sub Areas 2 and 3 will likely need an ad-hoc strategy for mitigation of wind effect to guarantee conditions remain suitable for sitting as they are in the baseline.

Comfort Category	Colour
Sitting	
Standing	
Leisure Walking	
Business Walking	
Uncomfortable	

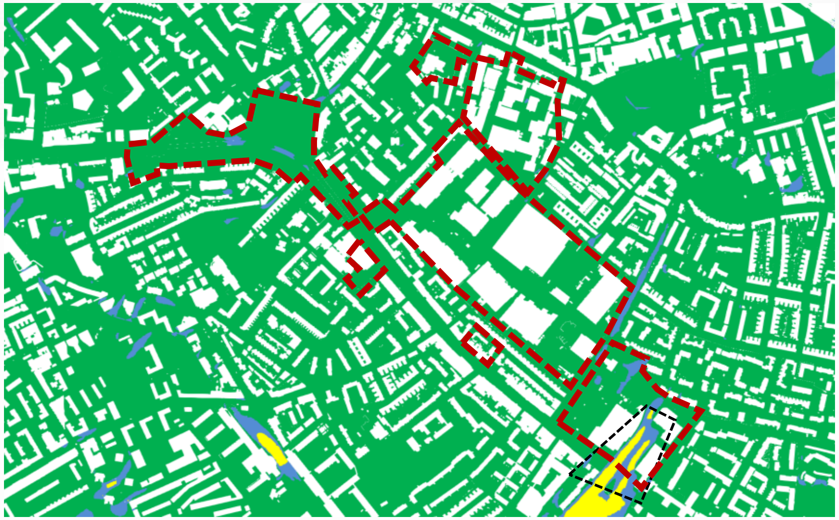
Summer comfort.

BASELINE

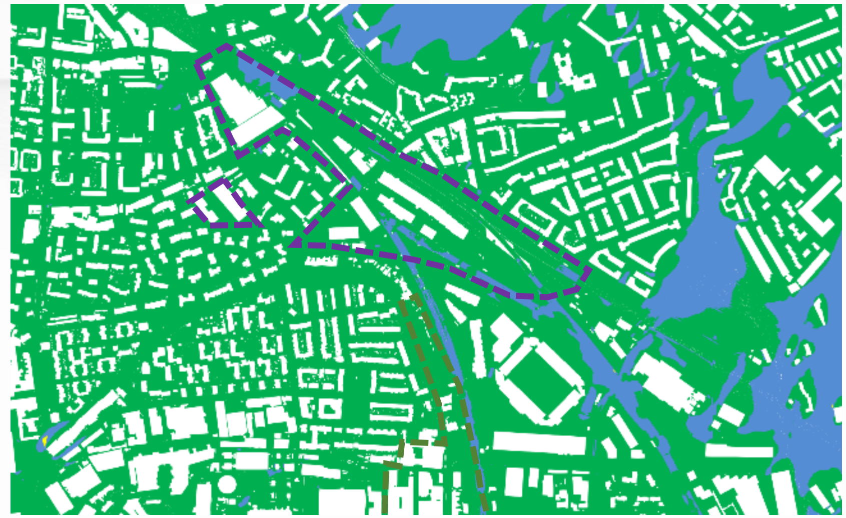
Summer Comfort

Pedestrian comfort in the summer season is largely suitable for sitting throughout all of the Sub Areas.

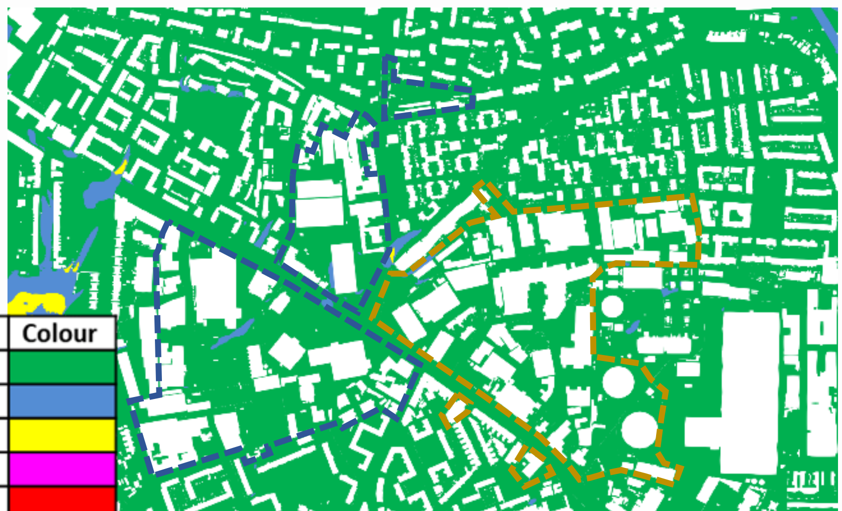
The areas around Burgess Park are more likely to experience conditions suitable for strolling, however the presence of trees (not modelled in this analysis) means that real conditions are likely to be better.



Sub Area 1



Sub Areas 4 and 5



Sub Areas 2 and 3

Sub Area 4

Comfort Category	Colour
Sitting	
Standing	
Leisure Walking	
Business Walking	
Uncomfortable	

PHASE 1

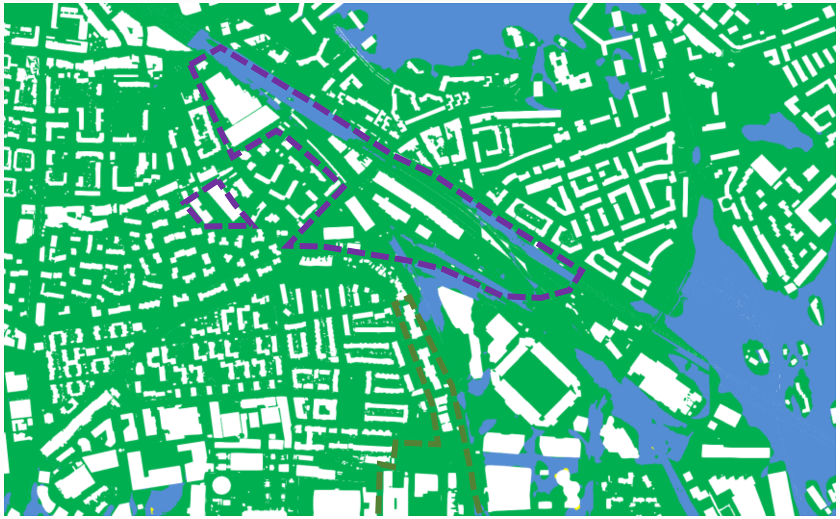
Summer Comfort

Conditions remain suitable for sitting throughout. However, some open areas move from sitting towards standing.

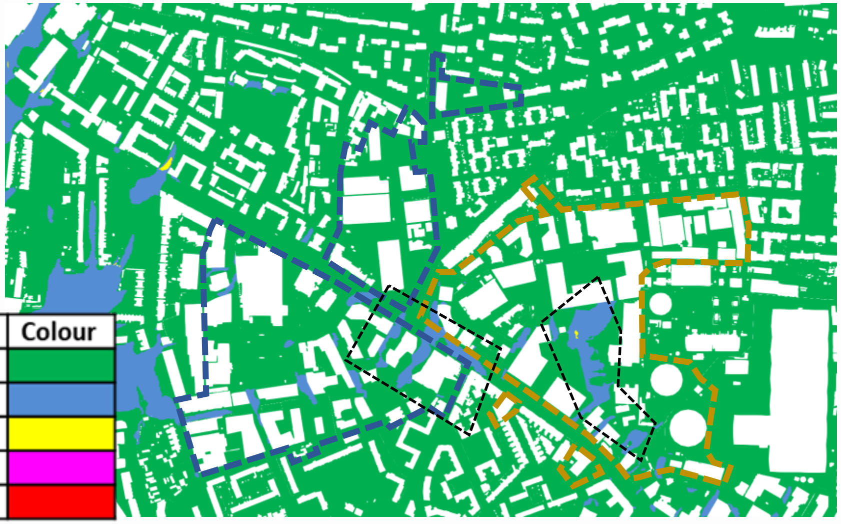
This is common to both sub Areas 2 and 3, which will see taller buildings in substitution of the low rise buildings currently present.

There is an opportunity to improve conditions locally.

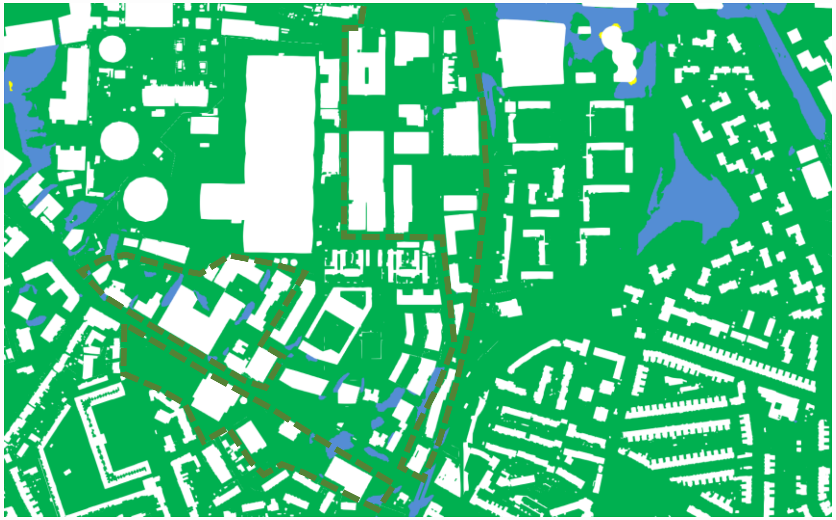
Sub Area 1



Sub Areas 4 and 5



Sub Areas 2 and 3



Sub Area 4

Comfort Category	Colour
Sitting	
Standing	
Leisure Walking	
Business Walking	
Uncomfortable	

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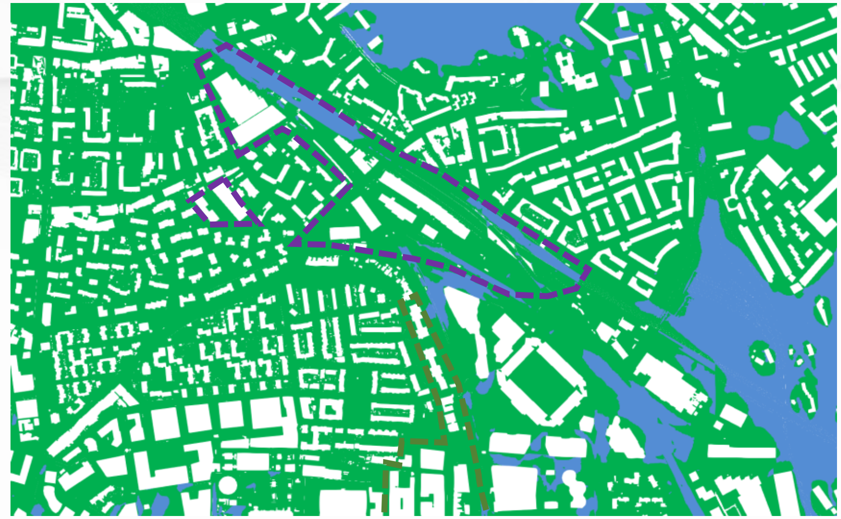
PHASE 2

Summer Comfort

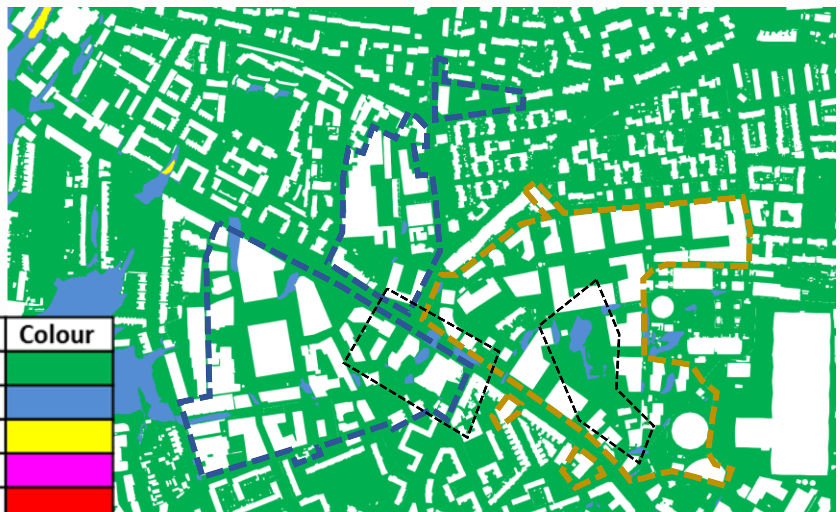
Upon completion of Phase 2 conditions remain largely suitable for sitting.

Sub Area 1 sees a worsening of conditions in the southernmost area, whereas sub areas 2 and 3 experience conditions suitable for standing (slightly improved from phase 1 but worse than the baseline suggests).

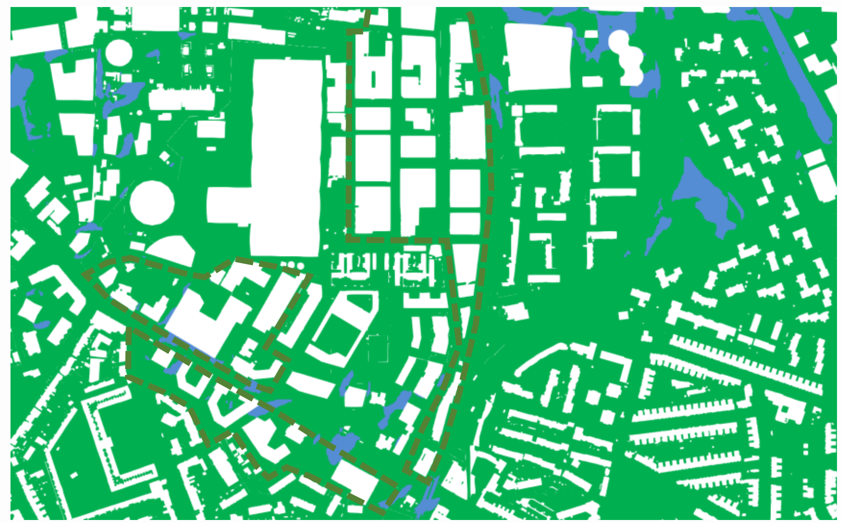
Sub Area 1



Sub Areas 4 and 5



Sub Areas 2 and 3



Sub Area 4

Comfort Category	Colour
Sitting	
Standing	
Leisure Walking	
Business Walking	
Uncomfortable	

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Comfort in windiest season

Baseline

Comfort in Windiest Season

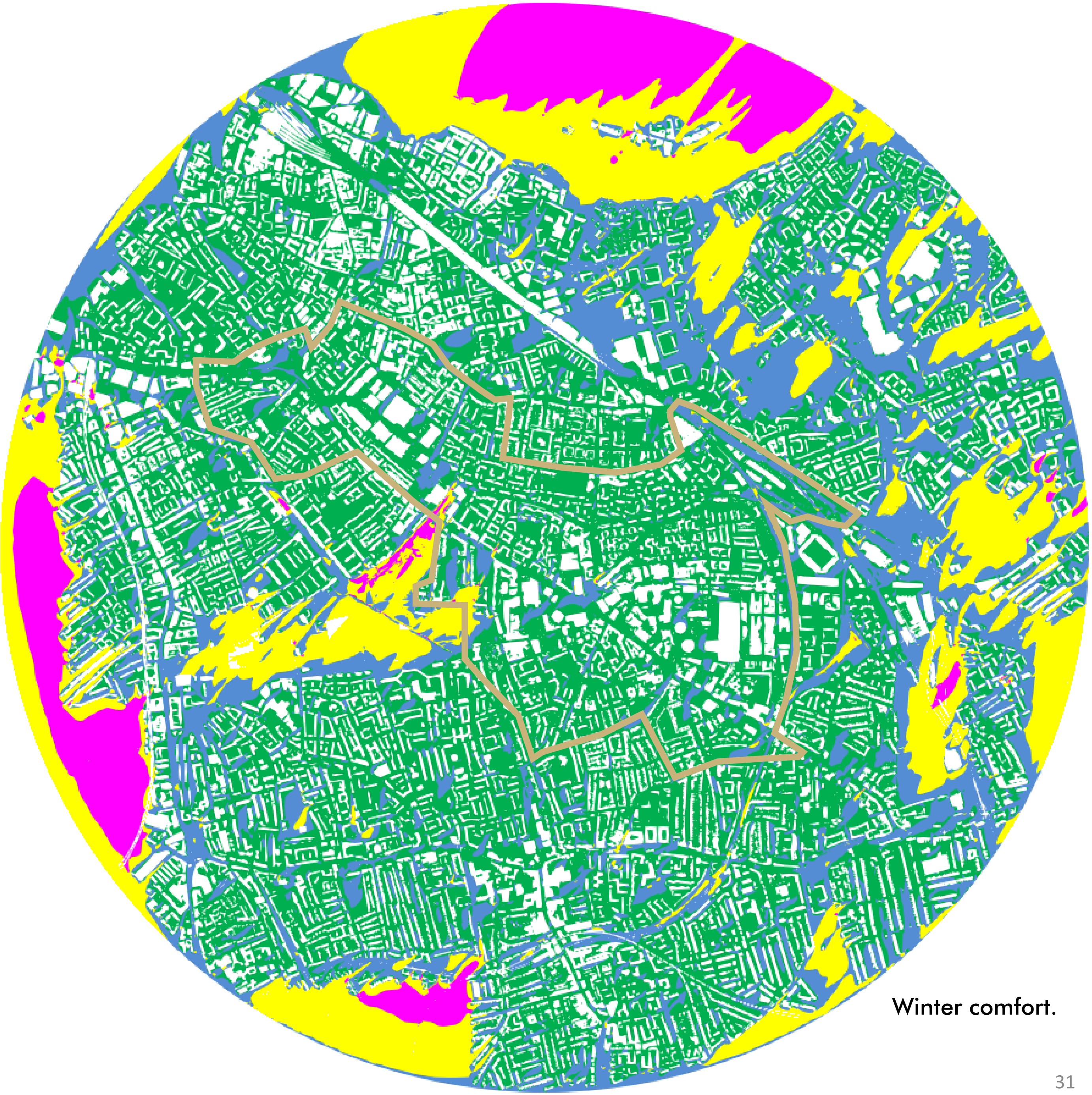
Conditions within the area of interest remain broadly compatible with sitting throughout the windiest season (across winter months).

Areas with increased windiness are present over squares and parks, with conditions largely suitable for standing (throughout the Old Kent Road masterplan) and a mix of strolling and business walking (Burgess Park).

The CFD computational domain includes an area around the Old Kent Road Masterplan comprising of a context of 5km in diameter.

The outer edge of the computational domain shows windier conditions (strolling to business walking) which are compatible with their position at the border of the domain.

Comfort Category	Colour
Sitting	
Standing	
Leisure Walking	
Business Walking	
Uncomfortable	



Winter comfort.

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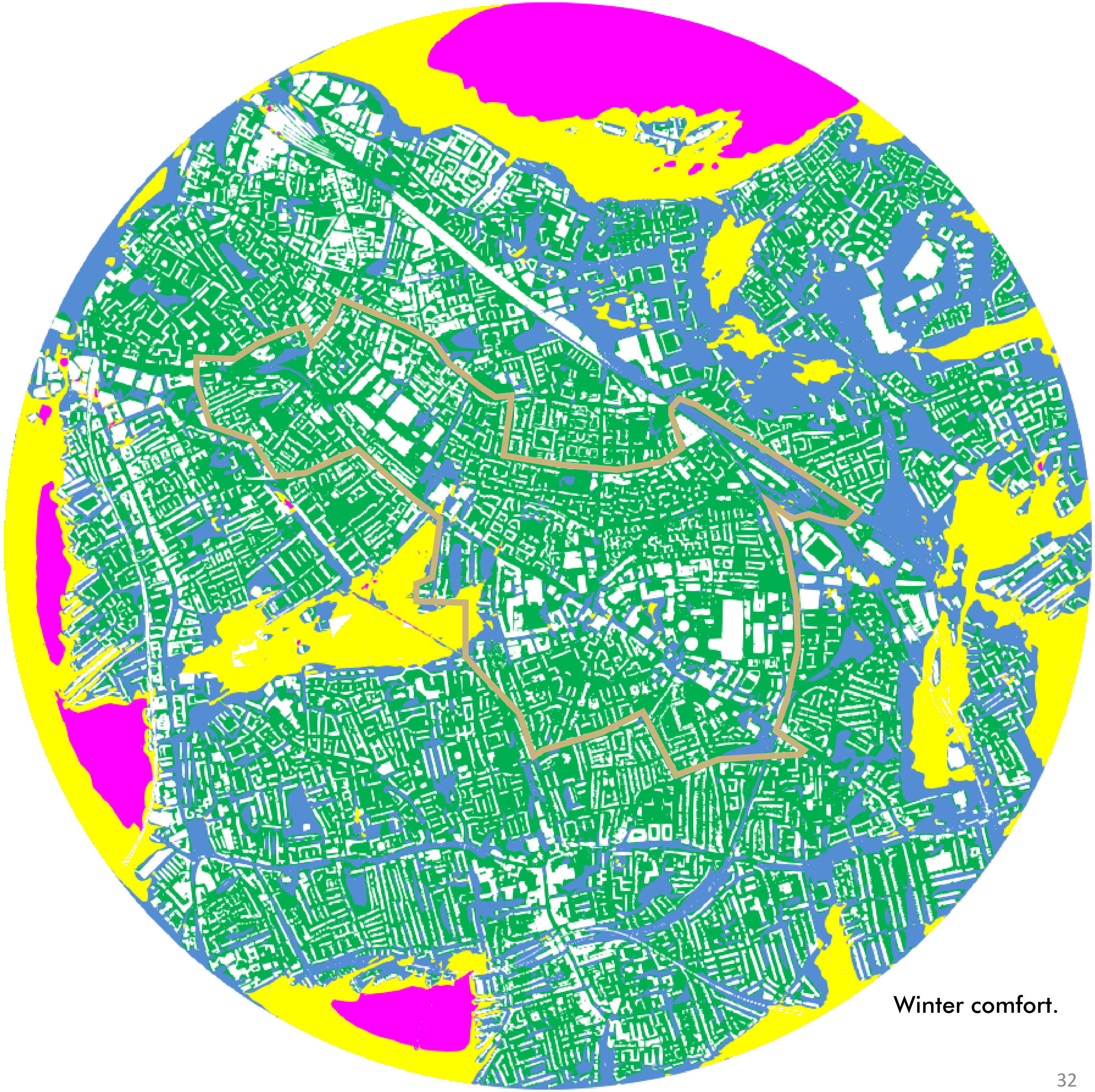
Phase 1

Comfort in Windiest Season

In Phase 1 conditions improve on Burgess Park, with conditions suitable for strolling.

Sub Areas 2 and 3 show conditions switching to a mix of standing and strolling, which is a modification from the current baseline (similarly to what occurs in the Summer season).

Comfort Category	Colour
Sitting	
Standing	
Leisure Walking	
Business Walking	
Uncomfortable	



Winter comfort.

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Phase 2

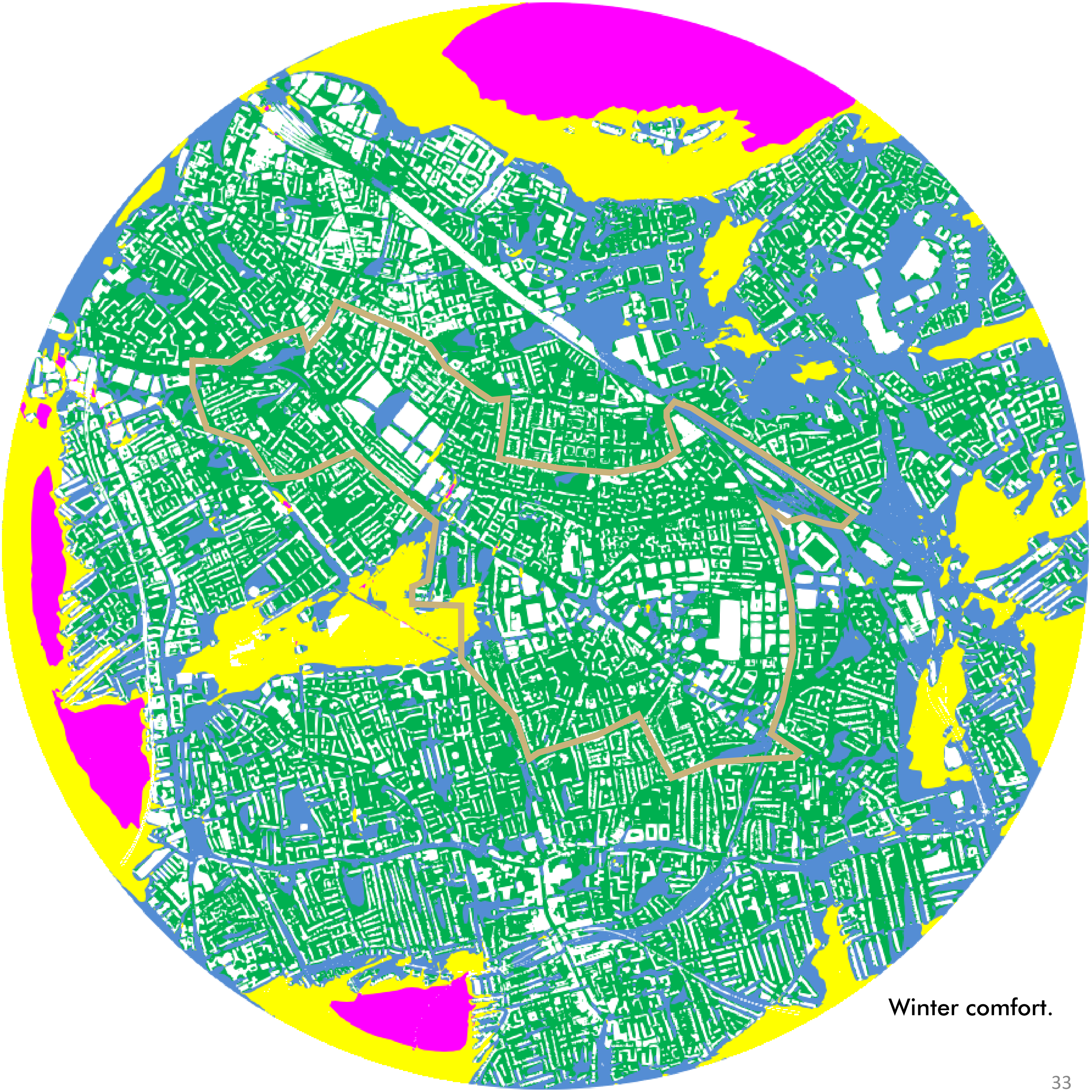
Comfort in Windiest Season

In Phase 2, conditions are further improved on Burgess Park, whereas in sub areas 1, 2 and 3 a few locations occur where conditions switch to business walking.

It is to be reiterated that actual conditions on site are likely to be better than what conservatively modelled in CFD due to the presence of trees.

Arguably, young new trees will be part of the Old Kent Road Masterplan that only partially will fulfil as wind mitigation so the CFD approach, although conservative, might be relevant to the first years after the completion of each phase.

Comfort Category	Colour
Sitting	
Standing	
Leisure Walking	
Business Walking	
Uncomfortable	



Winter comfort.

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BASELINE – Comfort in Windiest Season

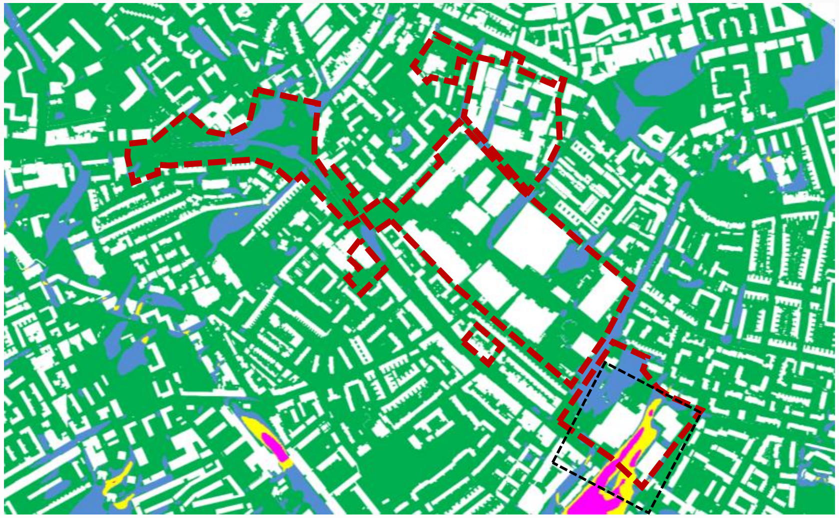
Winter Comfort

Conditions are suitable for sitting throughout. Some open areas are suitable for standing.

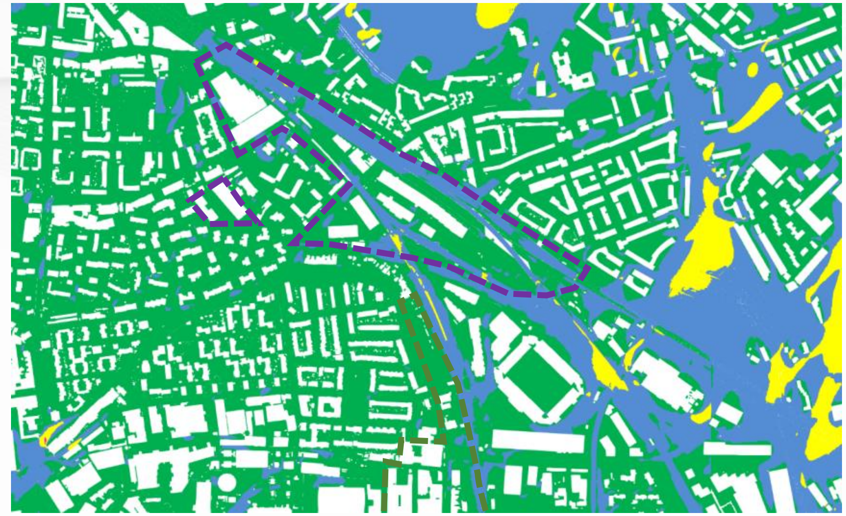
Burgess Park shows some areas suitable for strolling/business walking that are likely to disappear if trees had been modelled, as they shield from wind and are present at that location.

Between Sub Areas 2 and 3, a zone suitable for strolling is identified.

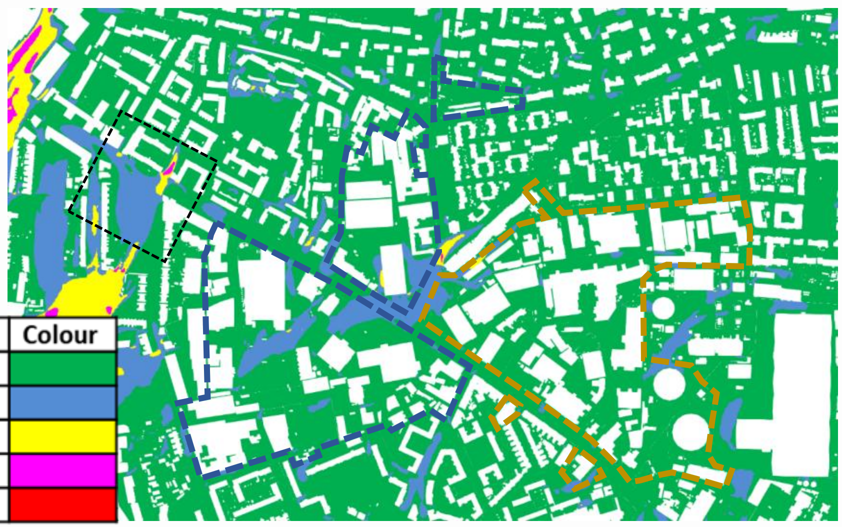
Comfort Category	Colour
Sitting	
Standing	
Leisure Walking	
Business Walking	
Uncomfortable	



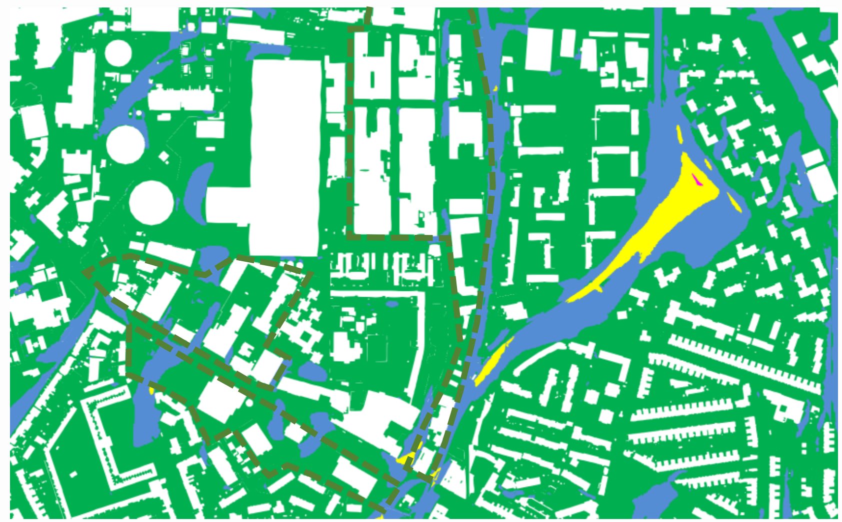
Sub Area 1



Sub Areas 4 and 5



Sub Areas 2 and 3



Sub Area 4

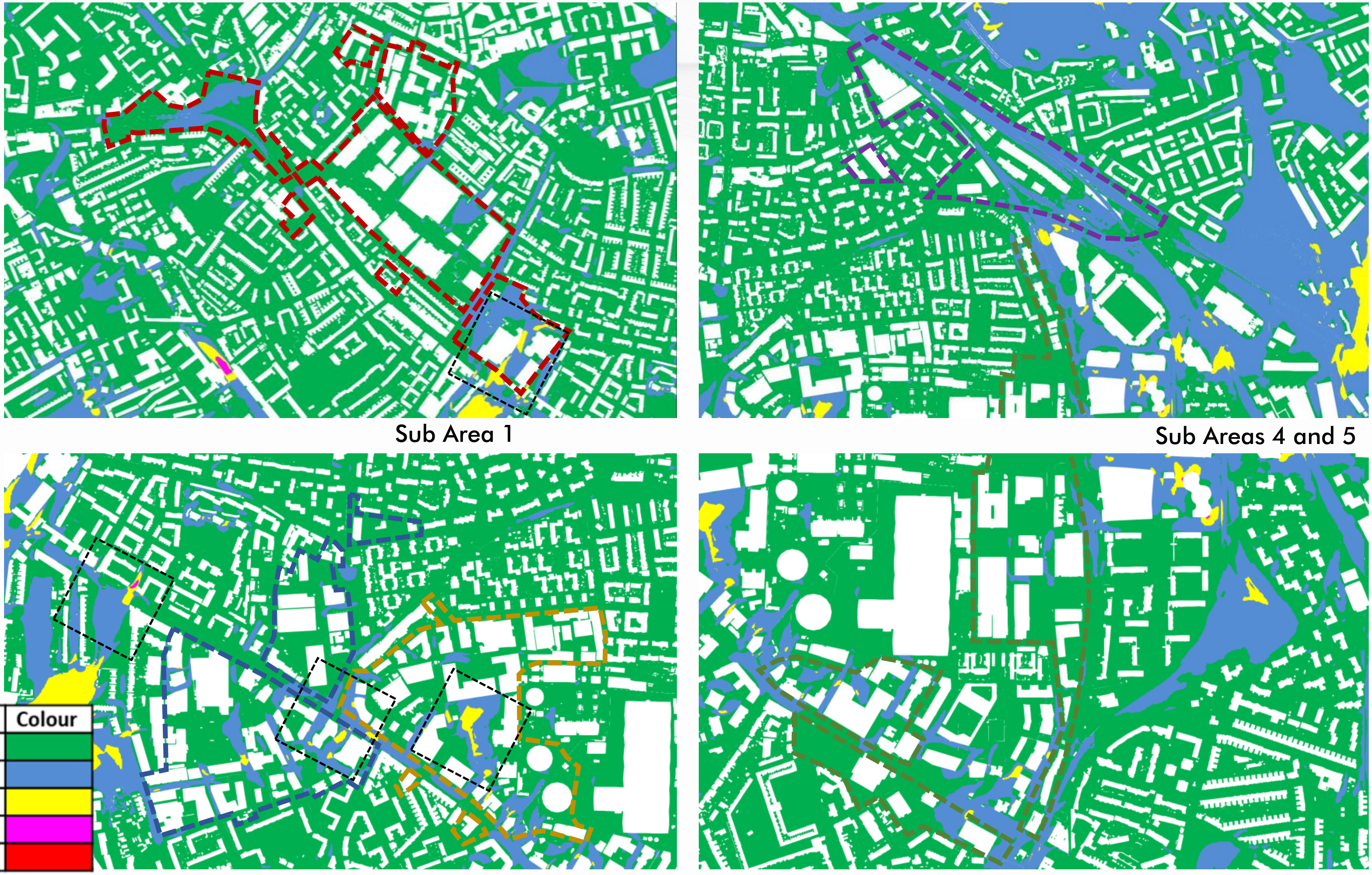
PHASE 1 – Comfort in Windiest Season

Winter Comfort

Conditions remain suitable for sitting throughout, with some open areas suitable for standing.

In Sub Area 1 conditions improve, while Sub Areas 2 and 3 show areas suitable for strolling. Mitigations should be taken with the new masterplan not to decrease comfort in this area.

There is an opportunity to improve conditions locally.



Sub Area 1

Sub Areas 4 and 5

Sub Areas 2 and 3

Sub Area 4

Comfort Category	Colour
Sitting	Green
Standing	Blue
Leisure Walking	Yellow
Business Walking	Magenta
Uncomfortable	Red

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PHASE 2 – Comfort in Windiest Season

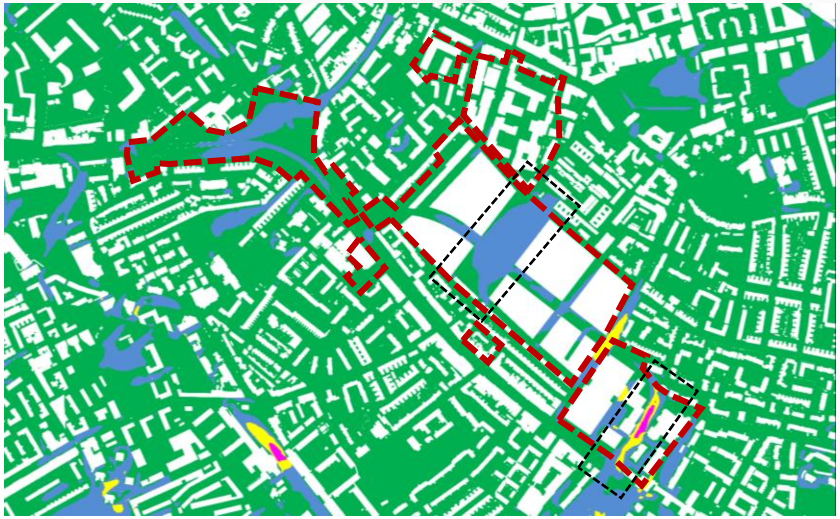
Winter Comfort

Conditions remain suitable for sitting throughout, with some open areas suitable for standing.

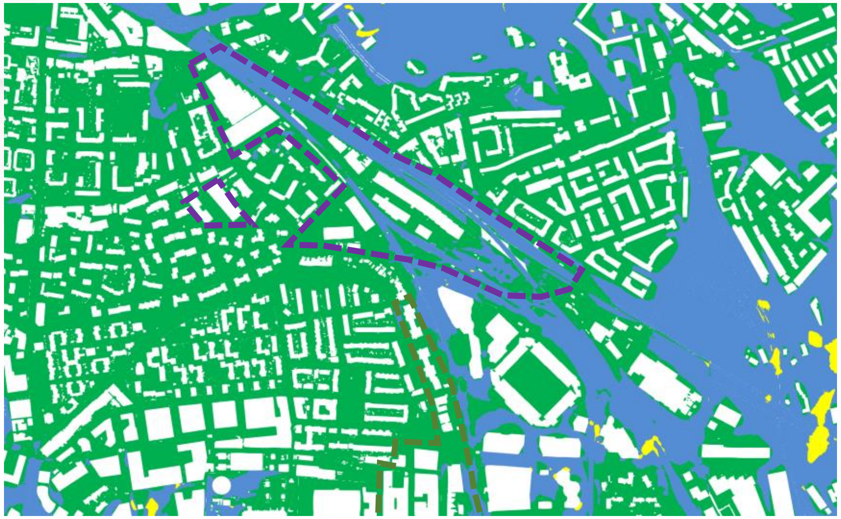
Sub Area 1 shows that conditions might differ significantly from Phase 1, with large areas suitable for standing and some spots suitable for business walking that should be mitigated.

Conditions improve slightly for sub areas 2 and 3, but still worse than baseline.

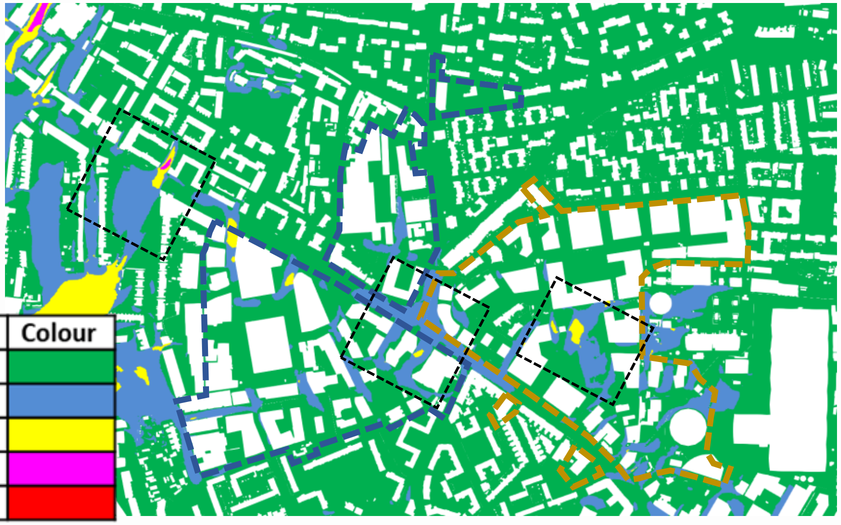
Comfort Category	Colour
Sitting	
Standing	
Leisure Walking	
Business Walking	
Uncomfortable	



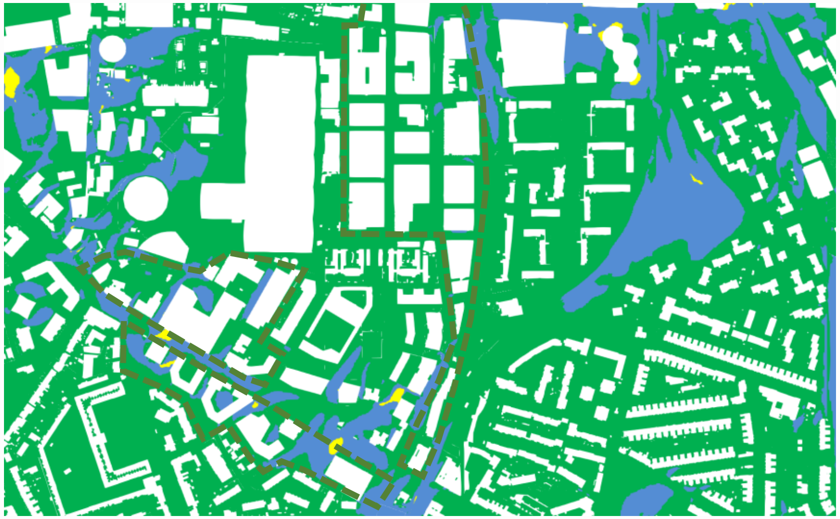
Sub Area 1



Sub Areas 4 and 5



Sub Areas 2 and 3



Sub Area 4

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Annual Safety

Baseline

Annual Safety

Pedestrian safety throughout the site is appropriate, with no safety exceedance noticeable throughout the extent of the site.

Safety Category	Colour
No Safety Exceedance	
S15 (distress)	
S20 (safety)	

Annual safety

Phase 1

Annual Safety

The safety exceedance plots confirm the trend observed for the comfort plots, with a general improvement of extreme conditions.

Safety Category	Colour
No Safety Exceedance	
S15 (distress)	
S20 (safety)	

Annual safety

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Phase 2

Annual Safety

In Phase 2 a new area concerning safety is identified in Sub Area 1, which is an adverse effect that needs mitigation.

Otherwise, no exceedance of safety is observed throughout the Phase 2 of the Masterplan.

Safety Category	Colour
No Safety Exceedance	
S15 (distress)	
S20 (safety)	

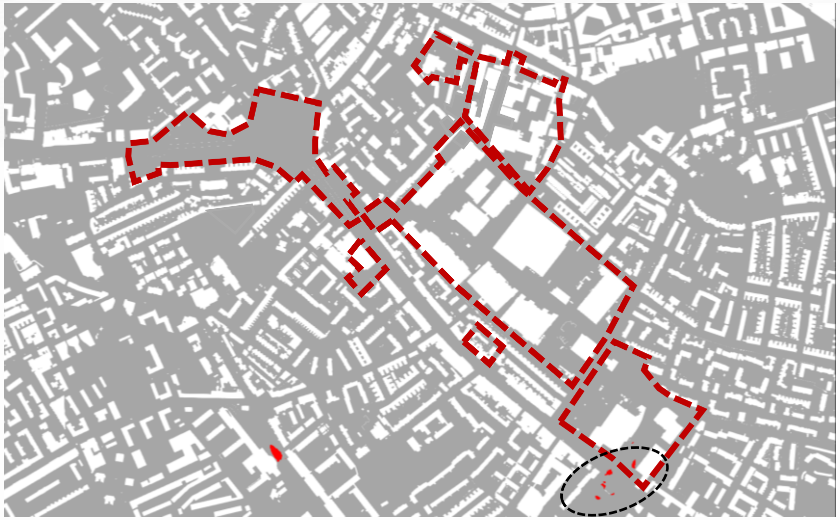
Annual safety

Annual Safety - BASELINE

Sub Areas

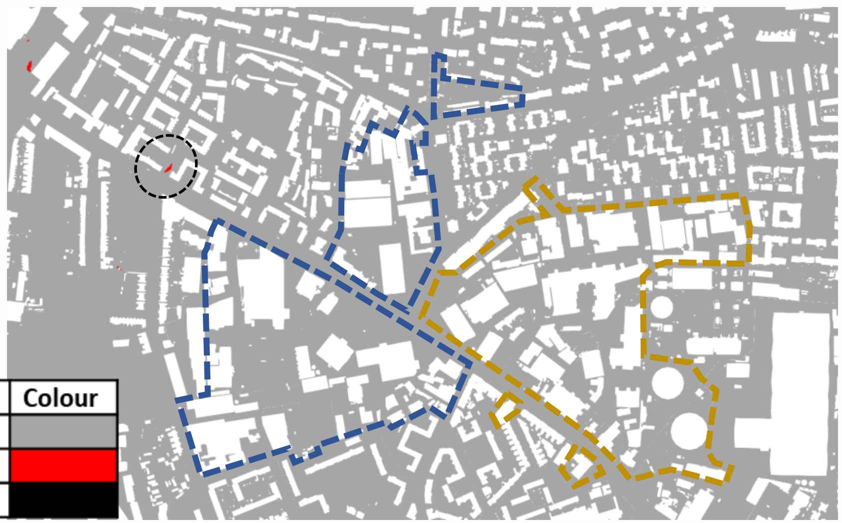
No safety exceeding areas are noticeable from this analysis.

Some small areas of exceedance in conjunction with Burgess Park are observed that although not concerning due to their limited extent indicate the higher windiness of those areas compared to the remainder of the site.



Sub Area 1

Sub Areas 4 and 5



Sub Areas 2 and 3

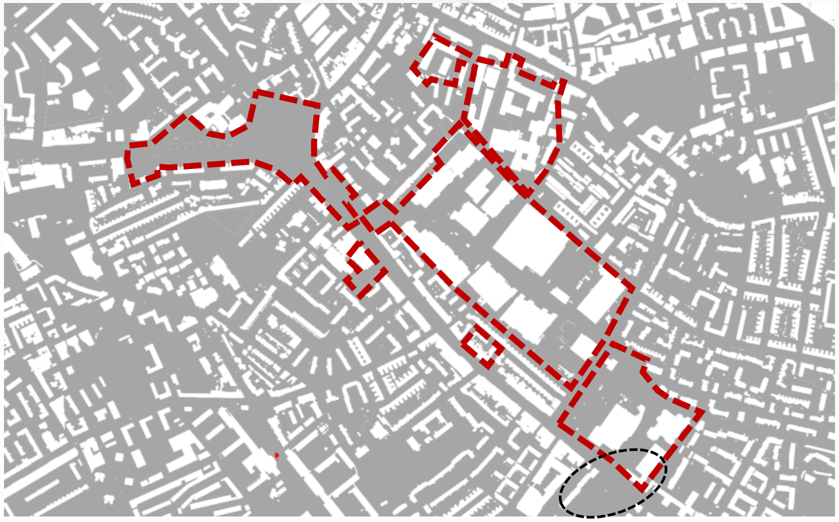
Sub Area 4

Safety Category	Colour
No Safety Exceedance	
S15 (distress)	
S20 (safety)	

Annual Safety – PHASE 1

Sub Areas

In Phase 1 no safety concerns are identified by the analysis.



Sub Area 1

Sub Areas 4 and 5

Sub Areas 2 and 3

Sub Area 4

Safety Category	Colour
No Safety Exceedance	
S15 (distress)	
S20 (safety)	

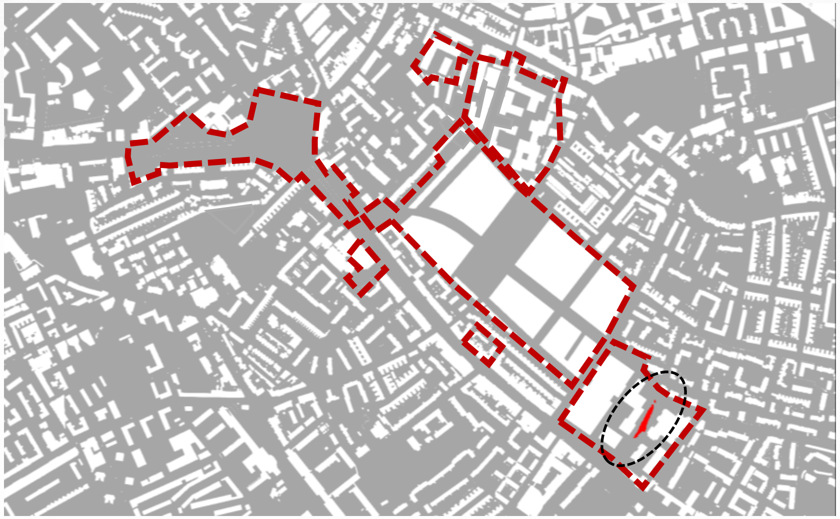
Annual Safety – PHASE 2

Sub Areas

In Phase 2, a new area concerning safety is identified in sub area 1.

The most effective way to mitigate is to modify and optimize the massing of the masterplan against windiness.

Other mitigation strategies include the ad-hoc design of wind mitigations (screens, barriers, etc) or the less performing vegetation (large trees).



Sub Area 1

Sub Areas 4 and 5

Sub Areas 2 and 3

Sub Area 4

Safety Category	Colour
No Safety Exceedance	
S15 (distress)	
S20 (safety)	

Significance plots

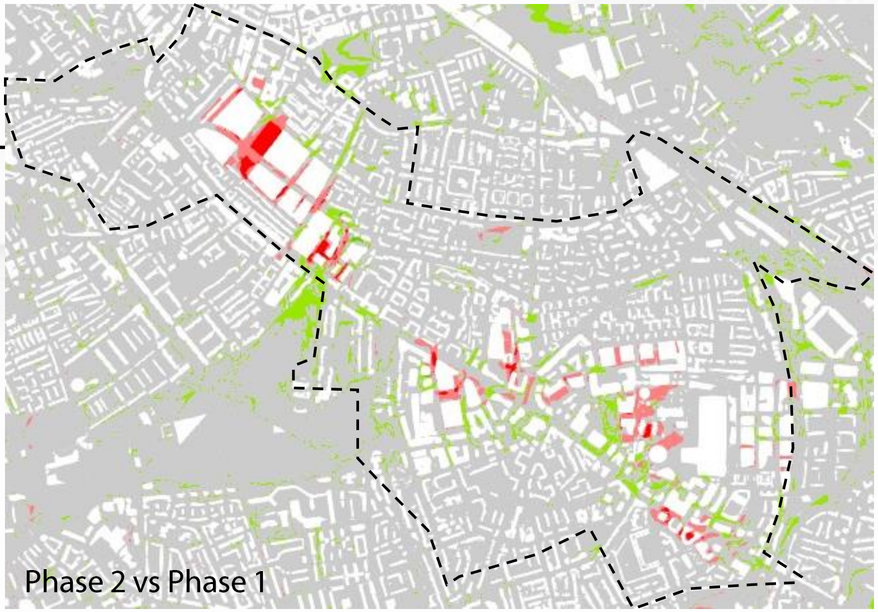
Significance plots - Winter

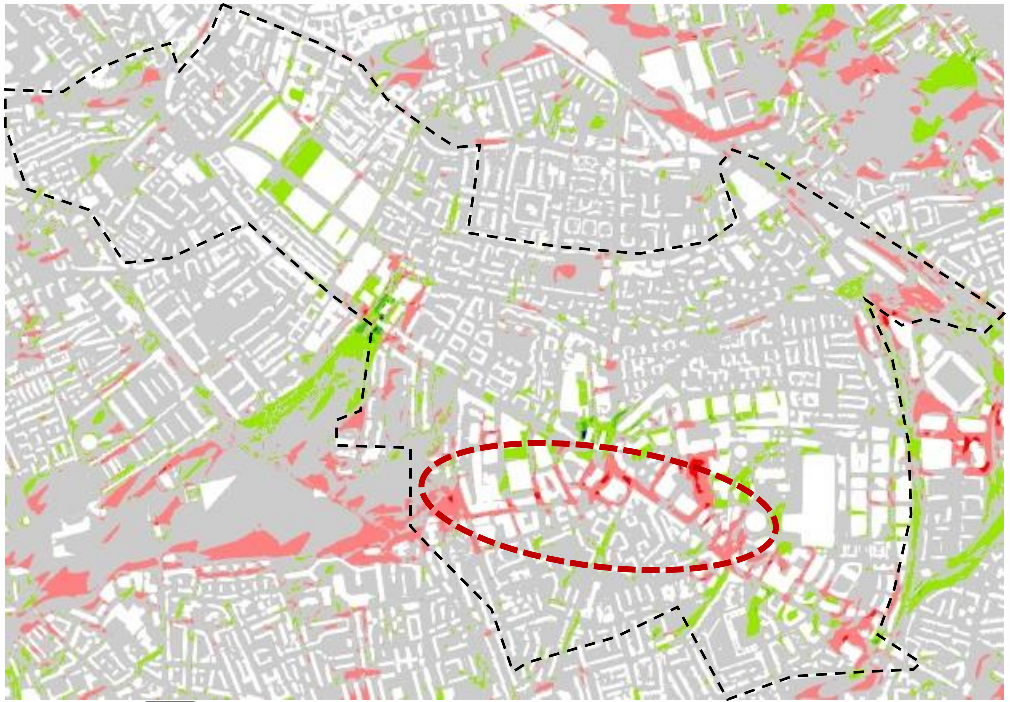
Compared wind microclimate

In winter, the new masterplan shows minor to moderate adverse effects in windiness when comparing Phase 2 with baseline conditions.

Between Phase 1 and Phase 2 a reduction in windiness is noticeable, and potentially temporary mitigations might be required.

Significance	Colour
Substantial Beneficial	
Moderate Beneficial	
Minor Beneficial	
Negligible	
Minor Adverse	
Moderate Adverse	
Substantial Adverse	





Phase 1 vs Baseline

Phase 2 vs Baseline

Significance plots - Summer

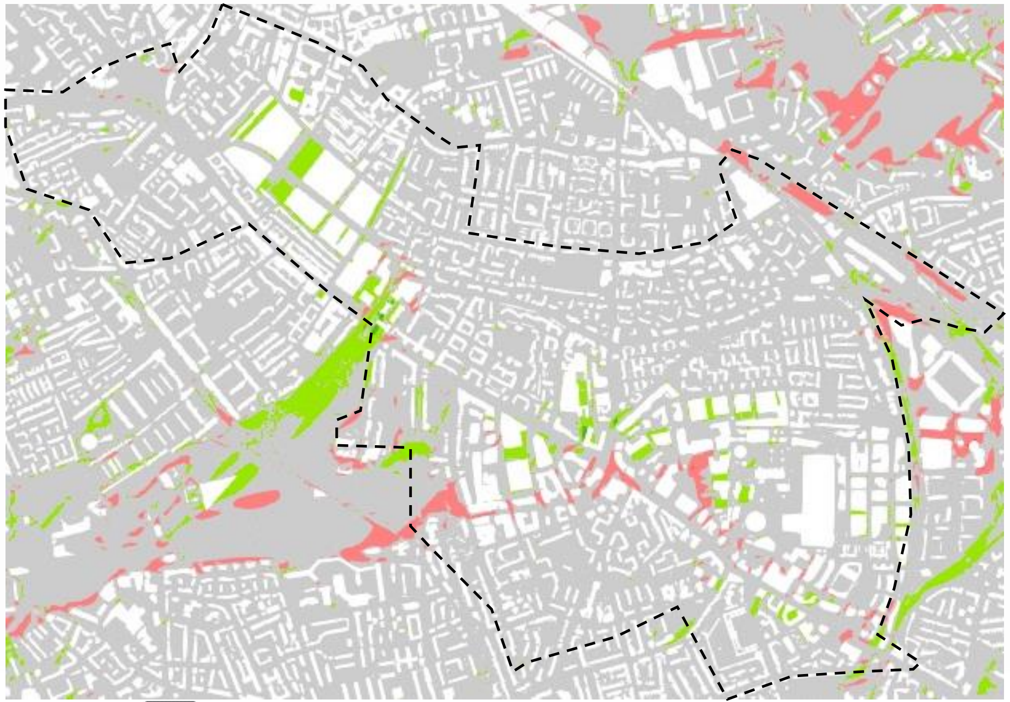
Compared wind microclimate

In summer, a minor beneficial wind effect is noticeable over Burgess Park.

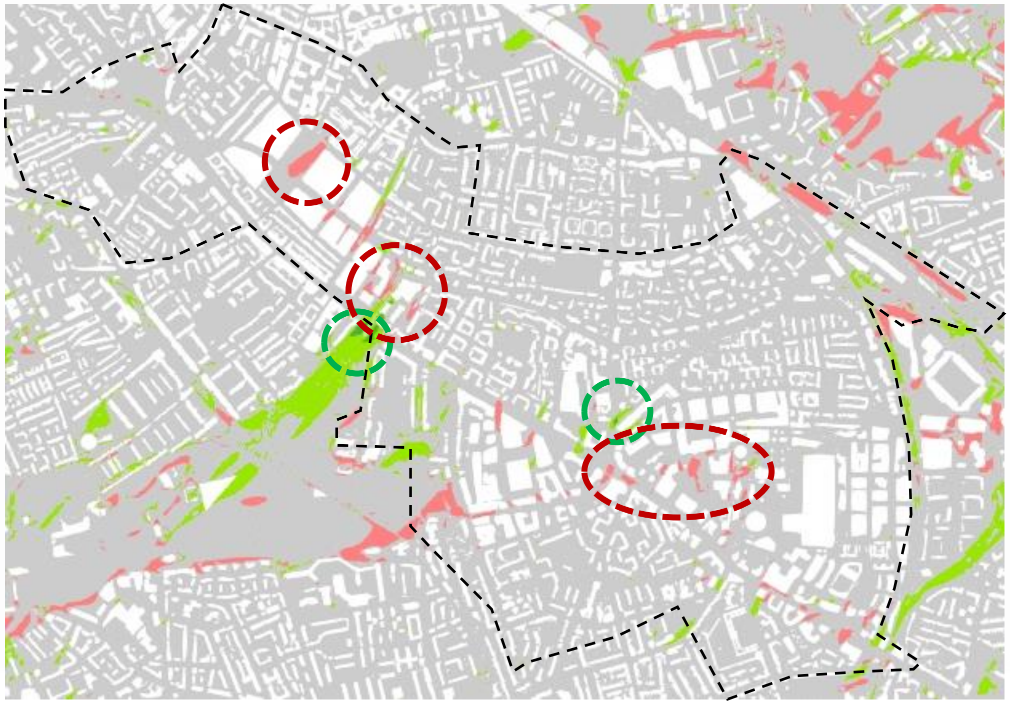
In general minor adverse wind conditions occur around new buildings, with a larger portion in Phase 1 than Phase 2.

Significance	Colour
Substantial Beneficial	
Moderate Beneficial	
Minor Beneficial	
Negligible	
Minor Adverse	
Moderate Adverse	
Substantial Adverse	

Phase 2 vs Phase 1



Phase 1 vs Baseline



Phase 2 vs Baseline

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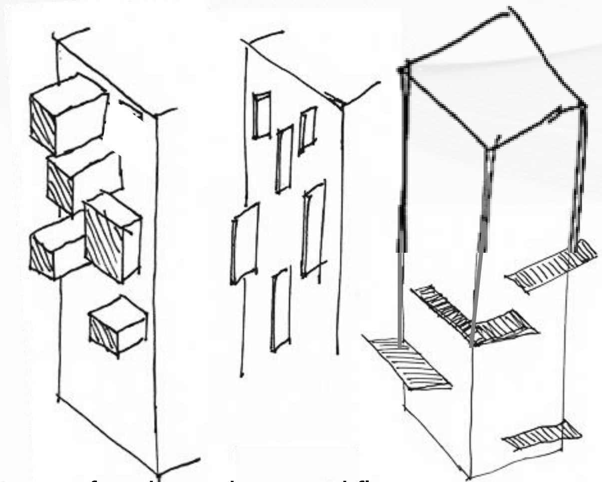
Mitigation of Adverse Effects

Mitigation of Adverse Effects

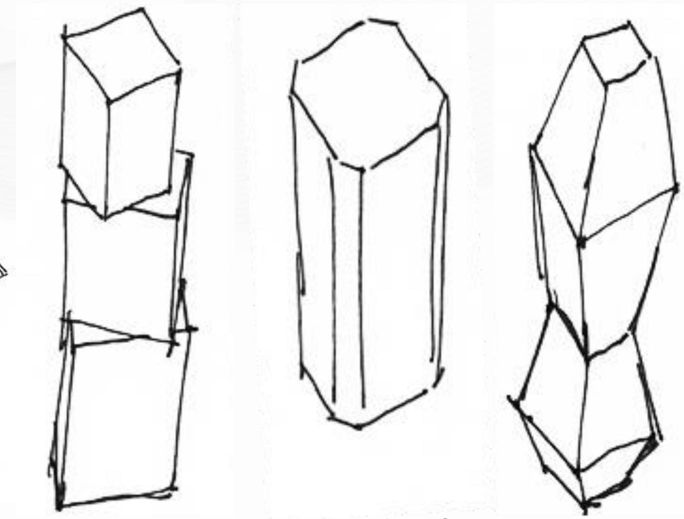
Mitigation through Massing

Upon detailed design of buildings within the masterplan, the massing is the main feature affecting wind behaviour at pedestrian level. Designers might want to consider massing strategies that are likely to perform adequately against wind safety and comfort without the need for additional wind mitigations.

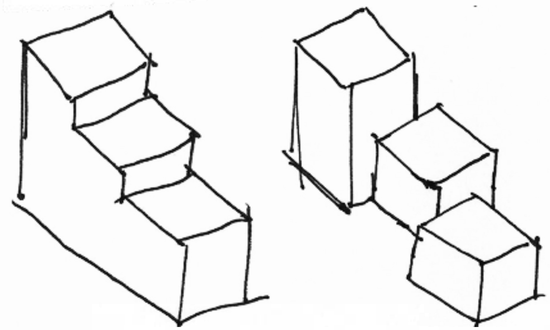
To succeed, it is key to break up the correlation of vortices along the building façade, by breaking up tall tower or elongated buildings into portions with different orientation, chamfering or rounding corners to reduce the wind accelerations associated with sharp edges, or disrupting channel flows misaligning and moving building shapes.



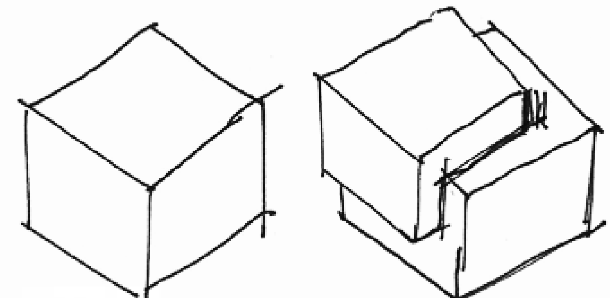
Uneven façades and recessed floors



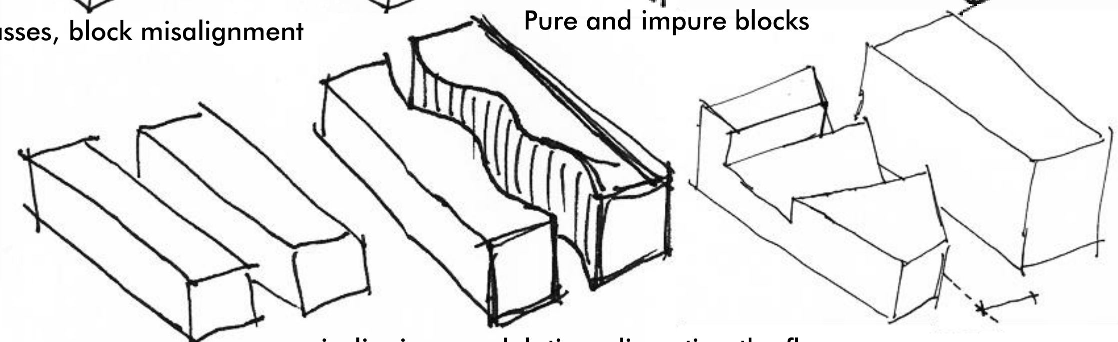
Uneven massing, tapering, chamfering



Sloping masses, block misalignment



Pure and impure blocks



misaligning, modulating, disrupting the flow

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Mitigation of Adverse Effects

Mitigation through Architectural Elements

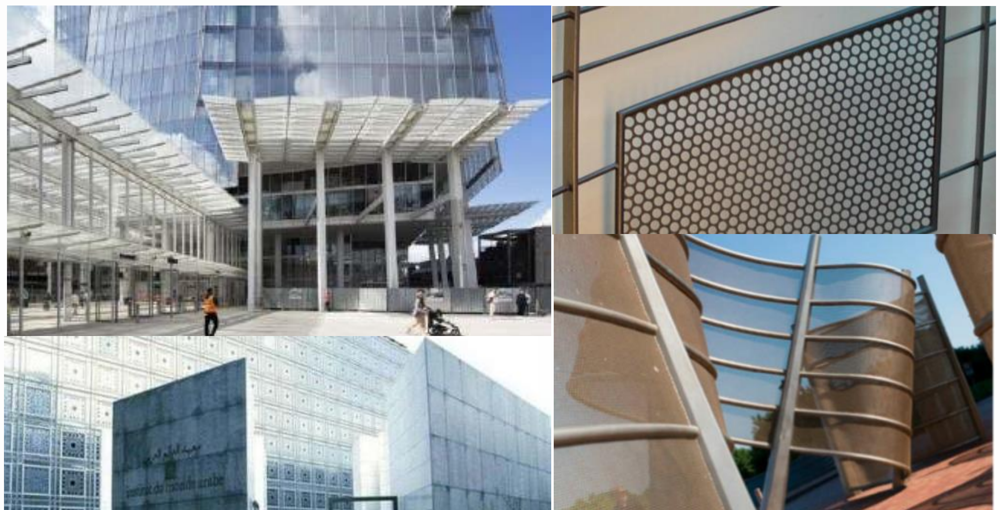
When massing cannot be modified to reduce windiness, it is necessary to add architectural elements to mitigate against adverse wind effects.

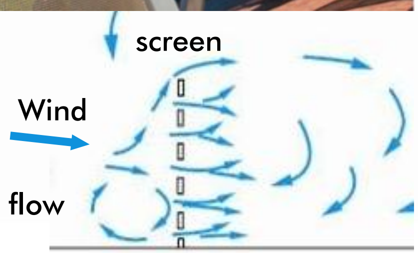
Mitigations include canopies, balustrades or parapets, porous screens, pergolas and colonnades, large size artwork that is designed specifically to slow down wind gusts from the building features.

Mitigation through Landscaping

Vegetation provides a porous volume that dissipates the wind and therefore mitigates against local excessive windiness.

The landscaping can be divided into soft- and hard-landscaping, namely vegetation and architectural features that can be optimised to mitigate wind effects. Pergolas, colonnades, canopies, planters, and fences can all be coupled with trees and hedges to create a suitable wind environment.





Canopies, screens, artwork, diverting the flow

Pergolas, colonnades, canopies, soft landscaping

Discussion and Conclusions

Discussion

Baseline

The baseline configuration represents the site in its 2018 status, i.e. with a mixture of residential and industrial buildings, with some middle-rise buildings, and an overarching majority of low-rise buildings.

Conditions are mostly suitable for sitting, with some locations within squares and wider roads showing conditions suitable for standing. Burgess Park presents a mixture of conditions suitable for strolling and business walking in winter. It is fair to assume that real conditions are likely to be less windy due to the presence of trees, which are conservatively not modelled in the present analysis.

No safety concerns are highlighted by the analysis, with the exception of a minor spot between sub areas 1 and 2, west to Burgess Park, that can be easily managed increasing the level of detail of the model.

The Old Kent Road Masterplan plans for several high-rise buildings to substitute most of the current industrial buildings, with an overall increase in the built density within the site, especially between sub areas 2 and 3.

The increased building density will be necessarily associated with a modification to the windiness of the site, and some locations where conditions will require wind mitigation are to be expected.

Wind conditions identified for the baseline will serve as guidance on the current character of the windiness of the site and will provide a reference for the design of buildings which are going to be mindful of the pedestrian comfort and safety. In turn a better enjoyment of the site will be guaranteed and an innovative way of redesigning the urban space for environmental performance and enhanced liveability.

Effect of Phases 1 and 2

The transformation of the Old Kent Road Sub Areas will take approximately 20 years. Two configurations are modelled, namely 2030 and 2040, that picture two key phases of the construction.

Phase 1 shows that more than 50% of buildings in sub areas 2 and 3 will be built, and approximately a third of buildings in other sub areas. As a results windiness of the Burgess Park is expected to decrease, while windiness within sub areas 2 and 3 is likely to increase, with a switch from conditions suitable for sitting to standing occurring.

The pejorative effect is further enhanced upon completion of Phase 2, with sub area 1 showing a safety exceedance, and a generalised switch to conditions suitable for standing. While sub areas 2 and 3 show a general decrease of windiness compared to Phase 1, conditions are still likely to worsen compared to baseline conditions.

The work also shows that in general conditions around the site remain unvaried, with new building only affecting their immediate vicinity.

Burgess Park shows a gradual improvement of conditions from the baseline to Phase 2. Although this effect might be amplified by the absence of trees in the CFD model, this is sensible as the increase building density has also a beneficial shielding effect from otherwise unimpeded wind.

These preliminary analyses will guide designs of each Sub Area to conserve the already positive wind comfort and safety enjoyed by pedestrians at present.

Conclusions

Conclusions

The wind microclimate analysis hereby conducted has identified adverse effects to the windiness of the site following construction of the Old Kent Road Masterplan.

The work has focussed on critical sub areas which have been investigated in detail taking into account their own morphology.

Sub area 1 is that where the most critical variation in windiness occurs, with an areas identified as a safety exceedance (western side of sub area 1) and a generalized increase from conditions suitable for sitting to standing. This is an adverse effect that will require mitigation to restore the current conditions suitable for sitting. Subject to mitigation, it is sensible to assume that any adverse effect identified in the current analysis can be removed.

Sub areas 2 and 3 are those that show the most dramatic increase in building density. As a result, the wind environment varies from conditions suitable for sitting to a mix of standing and strolling, especially towards the centre of each sub areas, where needed conditions would be likely suitable for sitting.

Sub areas 4 and 5 will likely maintain the current conditions, with only minor modifications easily resolved with landscaping that is already present.

This work concludes that specific focus should be dedicated to sub area 1 to mitigate wind safety exceedance, and to sub areas 2 and 3 to improve comfort.

Next phases of the work

Individual sites as they come forward for planning permission would be expected to be accompanied by wind microclimate assessment reports. The detailed design, including any mitigation, would be considered as part of those reports.

It is therefore recommended that the present report is treated as an indicative baseline with respect to the general wind environment of the site. Any detailed design solution should be appropriately tested for its impact within the whole masterplan.

Although comprehensive, the present work does not consider demolished areas that might be present upon completion of Phase 1 and that might affect results. However this is likely to represent a minor adverse effect that can be easily managed within the limited scope of the duration of a construction site.

The inclusion of landscaping in the model is also likely to affect local wind conditions, and it might be useful to check the area around Burgess Park against possible wind funnelling effects.

Given the area extension, it would be good practice to also check against thermal related comfort issue (a minor undertaking given that CFD results are available from the wind microclimate analysis).

Another issue might be represented by the multiple building sites that will affect the Old Kent Road Masterplan. A crane positioning tool optimising for wind conditions and reduce the overall downtime costs due to wind would also be useful and easily achievable from the present completed analysis.

Finally, several squares and smaller parks are going to be added to Southwark. Conditions over those areas can be optimised with reference to wind driven rain and evaporative cooling to guarantee the superior comfort for pedestrians which will translate in a more liveable Southwark.

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