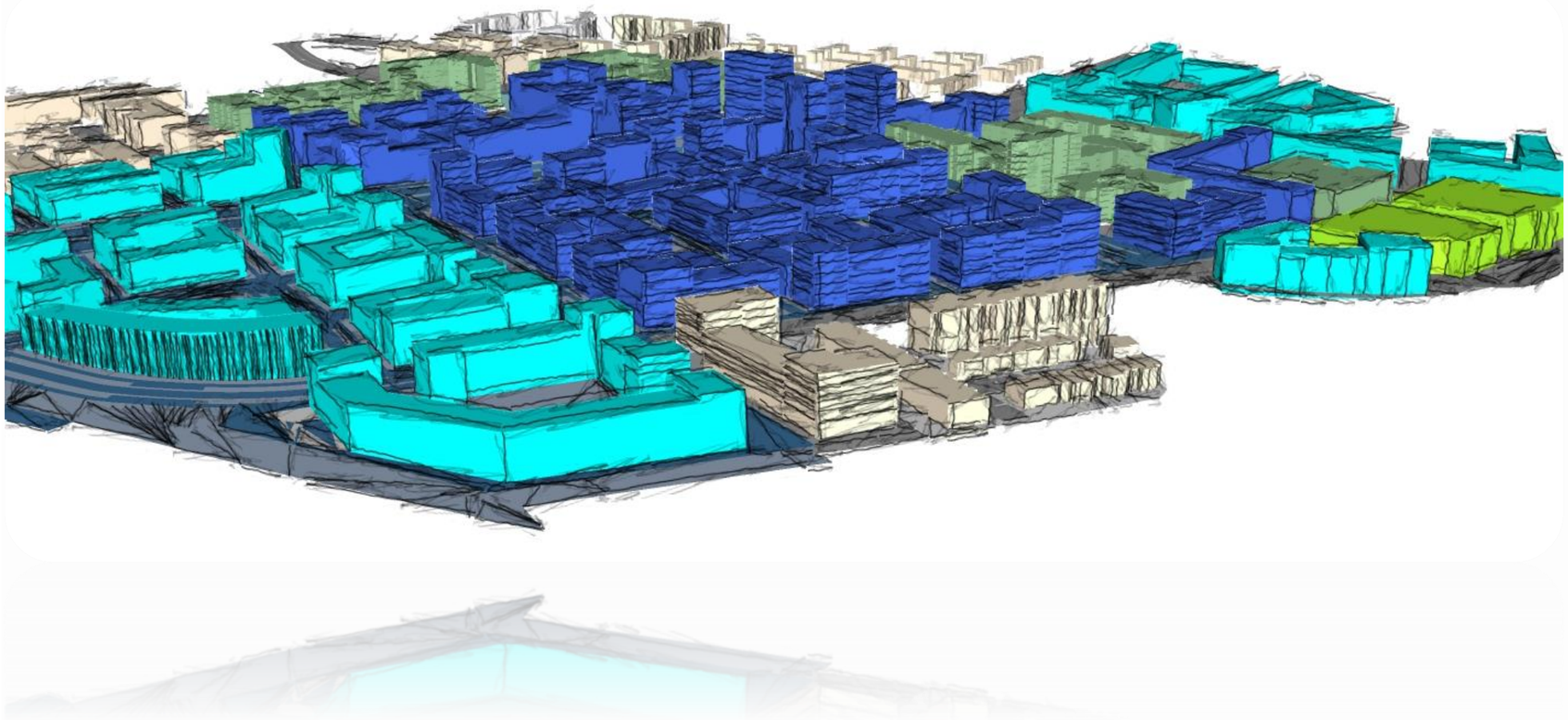
# PROPOSED TOWN CENTRE AND ENVIRONS (TCE) REVIEW

***Sunlight, Daylight & Shadow Assessment (Impact on constructed Units - Performance of Amenity spaces & high-level analysis of the potential for daylight)***

V3

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# Introduction

This is a working document which has been used to examine design iterations on the Proposed Town Centre and Environs (TCE) Height Review and is an analysis of the Built Form of the Loci model and its variants.

This micro-climate assessment has been undertaken at a masterplan level to inform the urban design framework for the Cherrywood Town Centre Review. It is an iterative process with a focus on daylight and sunlight penetration to the public realm, namely streets and civic spaces, and also communal residential spaces, as well as impacts on neighbours. In addition, a high-level assessment comprising of a sample check, has been undertaken for light penetration to the future urban blocks to ensure adequate light penetration at 1st floor level higher levels will typically exhibit better results and GFL often has non-residential use.

The iterative nature of the process and its assessment is evident from the version assessments in the report, which in turn have informed the urban design approach, with resultant changes. Thus, in this regard, the report may be considered as an interim report for this stage of the amendment process (plan preparation), noting that design or framework parameters may be subject to change as part of any statutory amendment process. Further micro-climate assessment and analysis may be undertaken at later stages to inform the urban design approach at a masterplan level.

Chris Shackleton Consulting (CSC) have assessed the proposed emerging schemes for the following:

- Impact on development blocks already constructed standard BRE check.
- Access to sunlight for proposed amenity spaces.
- Access to skylight for proposed 1st floor levels (potential for daylight performance).

Where we examine the impact that the proposed changes to the Town Centre will have on the constructed element of the same under the original UFDF in terms of sunlight, daylight & shadow.

This analysis has been carried out in accordance with the recommendations of Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice - Third Edition (BRE 2022).

***All references quoted in this report are from BRE document "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice – Third Edition – 2022 (BR 209) by Paul Littlefair et al." unless specifically noted otherwise.***

# Preliminary Overview

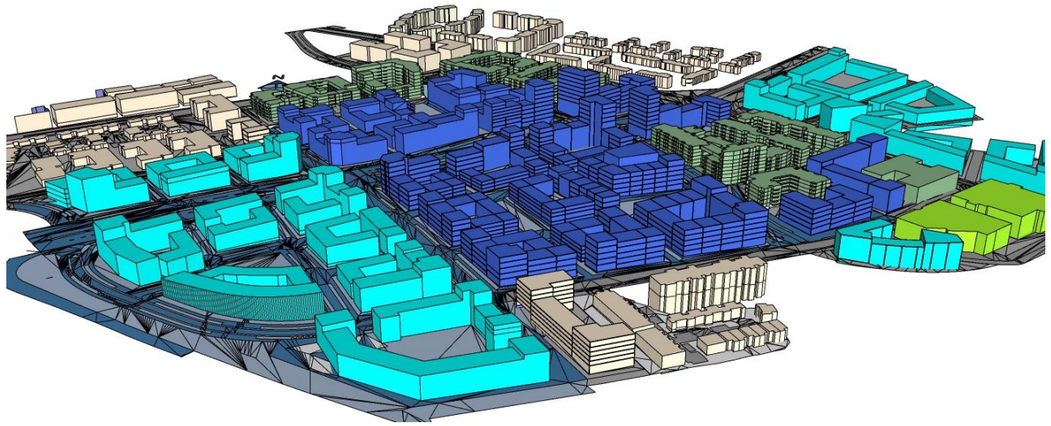
The aerial view shows the context for the site and the proposed elements.


*Google Earth extract © Google 2024*

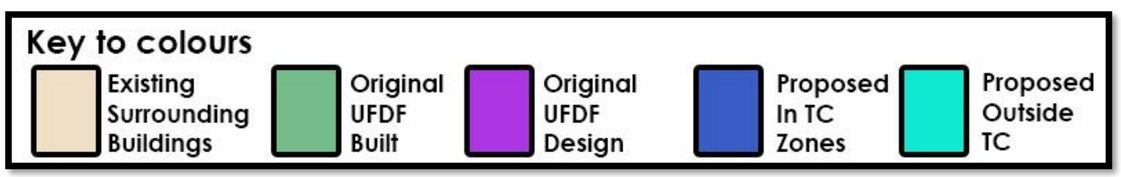
# Design Model

A 3D model of the proposed development and the surrounding neighbouring properties was provided by the Design Team. These had been modelled/designed from relevant information. The model was geo-referenced to its correct location and an accurate solar daylight system was introduced. The analysis is based on the information provided.

Baseline Model



Proposed Model




# Scope of Impact analysis

We have addressed the following items for this section in this report:

## Impact on Existing Neighbours

In this document we will assess the potential impact of the proposed development on the neighbouring residential units. We have tested for the following in relation to impact:

- Existing facing windows for:
  - Impact/Change for Skylight – **V**ertical **S**ky **C**omponent - VSC
  - Impact/Change for **P**robable **S**unlight **H**ours – Annual APSH and Winter WPSH
- Existing amenity spaces for impact/change on Sunlight/Shadow

Testing we have used the baseline condition to be that of the UFDF.

We have tested locations along facades rather than modelling specific windows. We have excluded testing under balconies since those design choices should not guide the overall masterplan.

Specific analysis will need to be carried out by the developer.

In these cases standard BRE analysis parameters have been used. E.g. VSC of 27% and change ratio 0.80
We note that some of this allowance was originally ***"baked in"*** to the relaxations provided by the UFDF.

Still overall change ratios show Figures at or greater than 1.00 indicated a neutral/minor beneficial overall impact.

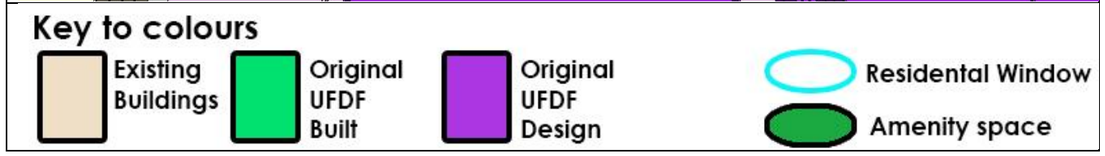
# Adjacent Properties Details

The referencing used later in this report is detailed below.

## Neighbour Group B1

Windows facing the development

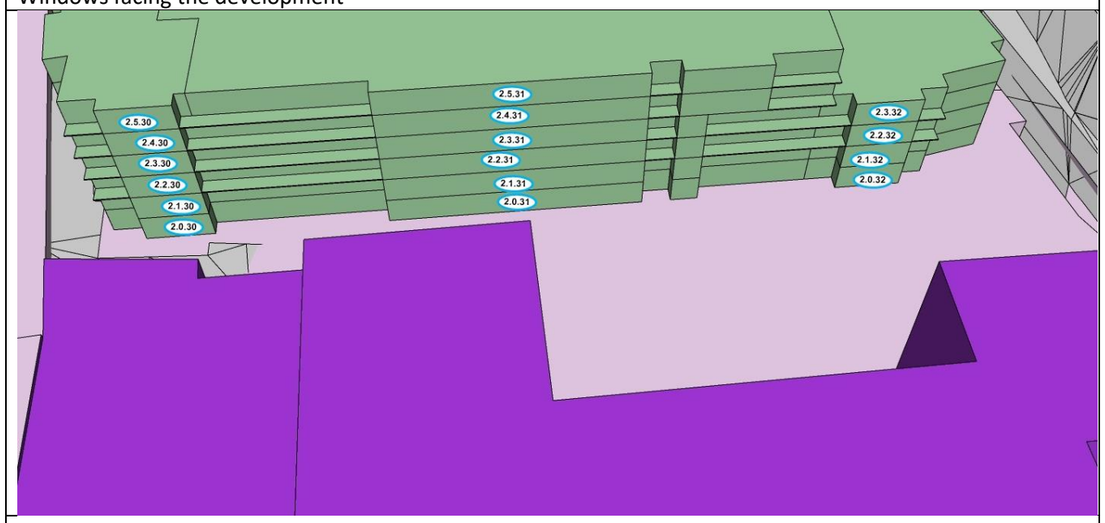

Windows facing the development

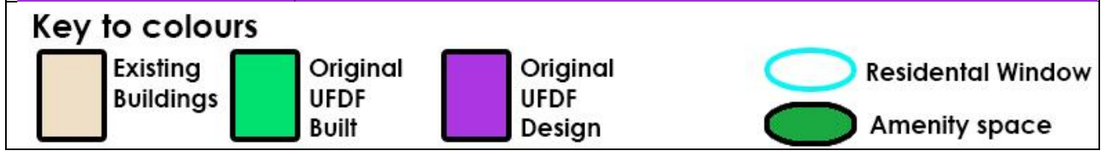




## Neighbour Group B2

Windows facing the development

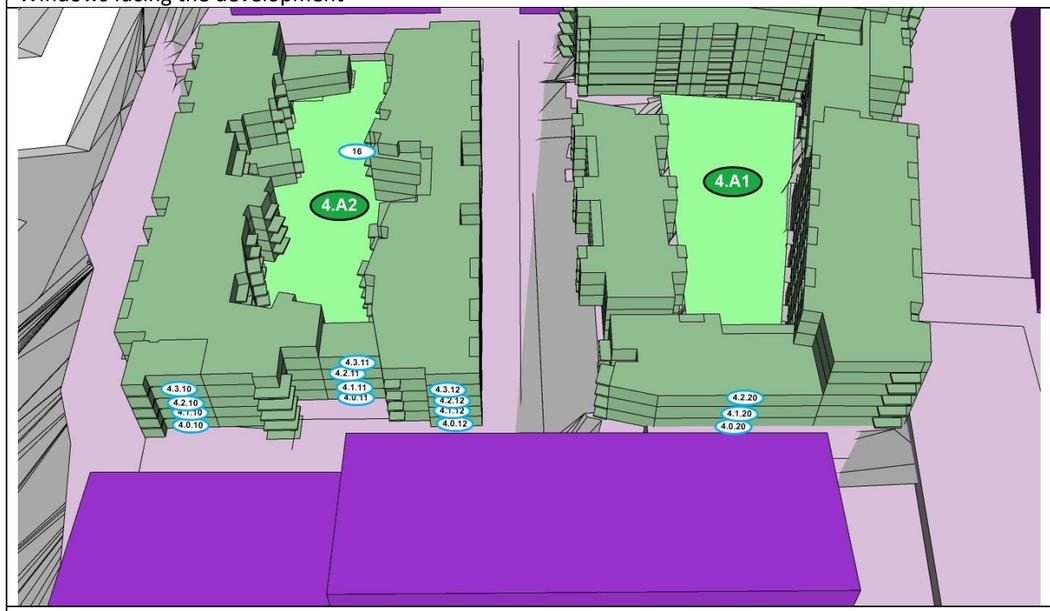

Windows facing the development



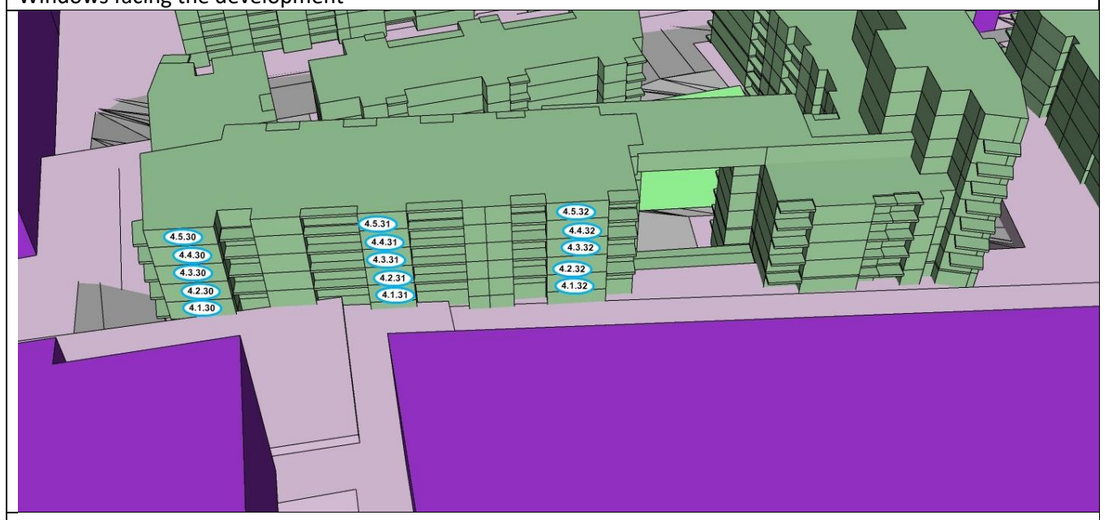


## Neighbour Group B4

Windows facing the development




Windows facing the development




Key to colours

Existing Buildings

Original UFDF Built

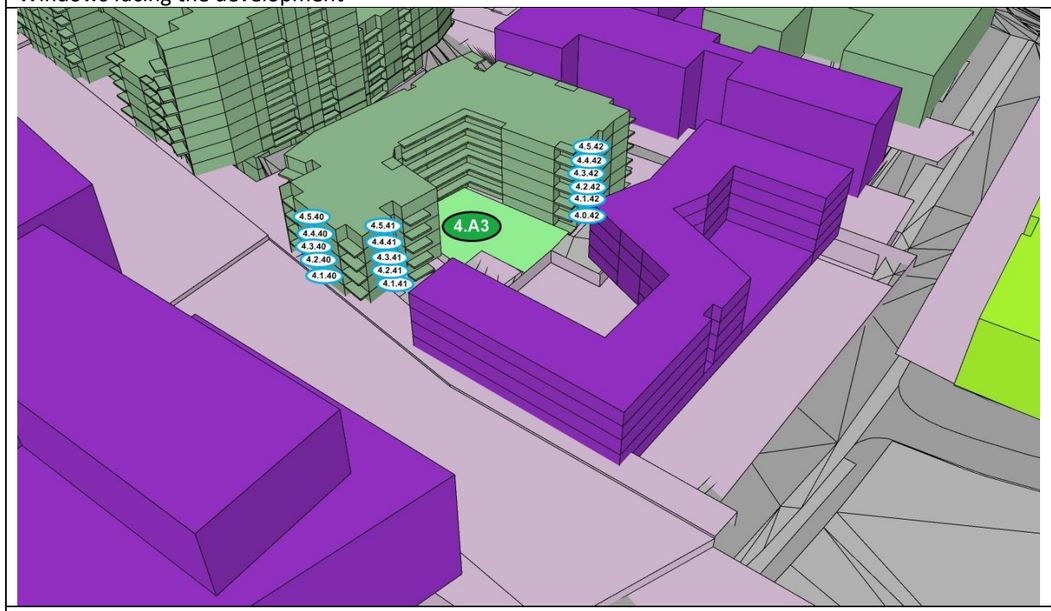
Original UFDF Design

Residental Window

Amenity space

## Neighbour Group B4

Windows facing the development




Windows facing the development

Key to colours

Existing Buildings

Original UFDF Built

Original UFDF Design

Residental Window

Amenity space

# Impact on neighbours

## Adjacent Properties - Light from the Sky impact on neighbouring properties

Tests were carried out to establish the quantity and quality of skylight (daylight) available to a room's windows. Locations tested are based on guideline recommendations for the closest facades which have windows with potential for impact.

We have investigated this impact under clause 2.2.7

> ***2.2.7 If this VSC is greater than 27% then enough skylight should still be reaching the window of the existing building. This value of VSC typically supplies enough daylight to a standard room when combined with a window of normal dimensions, with glass area around 10% or more of the floor area. Any reduction below this level should be kept to a minimum. If the VSC, with the new development in place, is both less than 27% and less than 0.80 times its former value, occupants of the existing building will notice the reduction in the amount of skylight. The area lit by the window is likely to appear gloomier, and electric lighting will be needed more of the time. . . .***

> ***2.2.6 Any reduction in the total amount of skylight can be calculated by finding the VSC at the centre of each main window. In the case of a floor-to-ceiling window such as a patio door, a point 1.6 m above ground (or balcony level for an upper storey) on the centre line of the window may be used. For a bay window, the centre window facing directly outwards can be taken as the main window. If a room has two or more windows of equal size, the mean of their VSCs may be taken. The reference point is in the external plane of the window wall. Windows to bathrooms, toilets, storerooms, circulation areas, and garages need not be analysed. . . .***

**Results are tabulated below:**

| | Skylight to habitable rooms | | | | | | |
|---|---|---|---|---|---|---|---|
| | **VSC** | | | | | | |
| **Design** | *Check > 27% or ratio > 0.8* | | | | | | |
| **Group** | **Floor** | **Win** | **Ref** | **BASELINE** | **Proposed** | **Ratio** | **Result** |
| BTC1 | F0 | W10 | 1.0.10 | 16.2% | 24.4% | 1.51 | Pass |
| BTC1 | F0 | W11 | 1.0.11 | 13.4% | 25.5% | 1.90 | Pass |
| BTC1 | F0 | W12 | 1.0.12 | 16.0% | 24.7% | 1.54 | Pass |
| BTC1 | F0 | W20 | 1.0.20 | 20.4% | 22.5% | 1.11 | Pass |
| BTC1 | F0 | W21 | 1.0.21 | 17.0% | 26.9% | 1.58 | Pass |
| BTC1 | F0 | W30 | 1.0.30 | 18.8% | 24.2% | 1.29 | Pass |
| BTC1 | F0 | W31 | 1.0.31 | 23.6% | 25.0% | 1.06 | Pass |
| BTC1 | F1 | W10 | 1.1.10 | 18.9% | 26.2% | 1.39 | Pass |
| BTC1 | F1 | W11 | 1.1.11 | 15.9% | 27.4% | 1.72 | Pass |
| BTC1 | F1 | W12 | 1.1.12 | 18.4% | 27.0% | 1.47 | Pass |
| BTC1 | F1 | W20 | 1.1.20 | 15.7% | 17.7% | 1.13 | Pass |
| BTC1 | F1 | W21 | 1.1.21 | 19.7% | 29.9% | 1.52 | Pass |
| BTC1 | F1 | W30 | 1.1.30 | 22.3% | 27.7% | 1.24 | Pass |
| BTC1 | F1 | W31 | 1.1.31 | 26.5% | 27.8% | 1.05 | Pass |
| BTC1 | F2 | W10 | 1.2.10 | 22.0% | 28.2% | 1.28 | Pass |
| BTC1 | F2 | W11 | 1.2.11 | 19.1% | 29.5% | 1.54 | Pass |
| BTC1 | F2 | W12 | 1.2.12 | 21.7% | 29.3% | 1.35 | Pass |
| BTC1 | F2 | W20 | 1.2.20 | 29.0% | 30.8% | 1.06 | Pass |
| BTC1 | F2 | W21 | 1.2.21 | 24.5% | 30.6% | 1.25 | Pass |
| BTC1 | F2 | W22 | 1.2.22 | 22.4% | 32.9% | 1.47 | Pass |
| BTC1 | F2 | W30 | 1.2.30 | 26.3% | 31.2% | 1.19 | Pass |
| BTC1 | F2 | W31 | 1.2.31 | 29.8% | 30.6% | 1.03 | Pass |
| BTC1 | F3 | W1 | 1.3.1 | 31.1% | 34.4% | 1.10 | Pass |
| BTC1 | F3 | W2 | 1.3.2 | 26.7% | 34.2% | 1.28 | Pass |
| BTC1 | F3 | W3 | 1.3.3 | 25.3% | 35.8% | 1.41 | Pass |
| BTC1 | F3 | W10 | 1.3.10 | 26.3% | 29.3% | 1.12 | Pass |
| BTC1 | F3 | W11 | 1.3.11 | 23.3% | 32.2% | 1.38 | Pass |
| BTC1 | F3 | W12 | 1.3.12 | 25.0% | 31.7% | 1.27 | Pass |
| BTC1 | F3 | W30 | 1.3.30 | 30.5% | 34.6% | 1.13 | Pass |
| BTC1 | F3 | W31 | 1.3.31 | 33.2% | 33.5% | 1.01 | Pass |
| BTC1 | F4 | W20 | 1.4.20 | 33.2% | 37.2% | 1.12 | Pass |
| BTC1 | F4 | W21 | 1.4.21 | 29.2% | 36.9% | 1.27 | Pass |
| BTC1 | F4 | W22 | 1.4.22 | 28.4% | 37.5% | 1.32 | Pass |
| BTC1 | F4 | W30 | 1.4.30 | 34.8% | 36.9% | 1.06 | Pass |
| BTC1 | F4 | W31 | 1.4.31 | 36.5% | 35.8% | 0.98 | Pass |
| BTC2 | F0 | **W30** | 2.0.30 | 26.5% | 19.8% | 0.74 | Marginal |
| BTC2 | F0 | W31 | 2.0.31 | 22.4% | 23.8% | 1.07 | Pass |
| BTC2 | F0 | W32 | 2.0.32 | 24.1% | 26.7% | 1.11 | Pass |
| BTC2 | F1 | **W30** | 2.1.30 | 31.4% | 21.1% | 0.67 | Fail |
| BTC2 | F1 | W31 | 2.1.31 | 24.9% | 25.9% | 1.04 | Pass |
| BTC2 | F1 | W32 | 2.1.32 | 26.6% | 28.9% | 1.09 | Pass |
| BTC2 | F2 | W10 | 2.2.10 | 30.4% | 30.3% | 1.00 | Pass |
| BTC2 | F2 | W11 | 2.2.11 | 29.3% | 30.0% | 1.02 | Pass |

| | Skylight to habitable rooms | | | | | | |
|---|---|---|---|---|---|---|---|
| | **VSC** | | | | | | |
| **Design** | *Check > 27% or ratio > 0.8* | | | | | | |
| **Group** | **Floor** | **Win** | **Ref** | **BASELINE** | **Proposed** | **Ratio** | **Result** |
| BTC2 | F2 | W20 | 2.2.20 | 28.7% | 25.6% | 0.89 | Pass |
| BTC2 | F2 | W21 | 2.2.21 | 31.4% | 25.9% | 0.82 | Pass |
| BTC2 | F2 | W22 | 2.2.22 | 32.8% | 26.3% | 0.80 | Pass |
| BTC2 | F2 | **W30** | 2.2.30 | 33.1% | 22.5% | 0.68 | Fail |
| BTC2 | F2 | W31 | 2.2.31 | 27.7% | 28.0% | 1.01 | Pass |
| BTC2 | F2 | W32 | 2.2.32 | 29.2% | 31.2% | 1.07 | Pass |
| BTC2 | F3 | W10 | 2.3.10 | 31.9% | 31.8% | 0.99 | Pass |
| BTC2 | F3 | W11 | 2.3.11 | 31.1% | 31.5% | 1.01 | Pass |
| BTC2 | F3 | W12 | 2.3.12 | 29.7% | 30.6% | 1.03 | Pass |
| BTC2 | F3 | W20 | 2.3.20 | 31.3% | 27.7% | 0.89 | Pass |
| BTC2 | F3 | W21 | 2.3.21 | 34.1% | 28.0% | 0.82 | Pass |
| BTC2 | F3 | W22 | 2.3.22 | 35.3% | 28.4% | 0.80 | Pass |
| BTC2 | F3 | **W30** | 2.3.30 | 34.8% | 23.9% | 0.69 | Fail |
| BTC2 | F3 | W31 | 2.3.31 | 30.6% | 29.9% | 0.98 | Pass |
| BTC2 | F3 | W32 | 2.3.32 | 31.9% | 33.3% | 1.04 | Pass |
| BTC2 | F4 | W10 | 2.4.10 | 33.5% | 33.2% | 0.99 | Pass |
| BTC2 | F4 | W11 | 2.4.11 | 32.9% | 33.0% | 1.00 | Pass |
| BTC2 | F4 | W12 | 2.4.12 | 31.9% | 32.2% | 1.01 | Pass |
| BTC2 | F4 | W20 | 2.4.20 | 33.4% | 30.0% | 0.90 | Pass |
| BTC2 | F4 | W21 | 2.4.21 | 35.6% | 30.2% | 0.85 | Pass |
| BTC2 | F4 | W22 | 2.4.22 | 36.7% | 30.5% | 0.83 | Pass |
| BTC2 | F4 | **W30** | 2.4.30 | 36.4% | 25.5% | 0.70 | Marginal |
| BTC2 | F4 | W31 | 2.4.31 | 33.6% | 31.7% | 0.94 | Pass |
| BTC2 | F5 | W1 | 2.5.1 | 35.4% | 32.2% | 0.91 | Pass |
| BTC2 | F5 | W2 | 2.5.2 | 36.8% | 32.4% | 0.88 | Pass |
| BTC2 | F5 | W3 | 2.5.3 | 37.6% | 32.6% | 0.87 | Pass |
| BTC2 | F5 | W10 | 2.5.10 | 35.0% | 34.6% | 0.99 | Pass |
| BTC2 | F5 | W11 | 2.5.11 | 34.6% | 34.4% | 0.99 | Pass |
| BTC2 | F5 | W12 | 2.5.12 | 34.0% | 33.7% | 0.99 | Pass |
| BTC2 | F5 | W30 | 2.5.30 | 37.7% | 27.0% | 0.72 | Pass |
| BTC2 | F5 | W31 | 2.5.31 | 36.6% | 33.3% | 0.91 | Pass |
| BTC4 | F0 | W10 | 4.0.10 | 22.6% | 27.1% | 1.20 | Pass |
| BTC4 | F0 | W11 | 4.0.11 | 14.6% | 18.5% | 1.26 | Pass |
| BTC4 | F0 | W12 | 4.0.12 | 13.3% | 20.8% | 1.56 | Pass |
| BTC4 | F0 | W20 | 4.0.20 | 16.5% | 14.1% | 0.86 | Pass |
| BTC4 | F0 | W42 | 4.0.42 | 13.3% | 13.6% | 1.02 | Pass |
| BTC4 | F1 | W10 | 4.1.10 | 24.7% | 28.5% | 1.16 | Pass |
| BTC4 | F1 | W11 | 4.1.11 | 17.5% | 21.3% | 1.22 | Pass |
| BTC4 | F1 | W12 | 4.1.12 | 15.1% | 23.3% | 1.54 | Pass |
| BTC4 | F1 | W20 | 4.1.20 | 18.5% | 15.9% | 0.86 | Pass |
| BTC4 | F1 | W30 | 4.1.30 | 21.5% | 23.1% | 1.07 | Pass |
| BTC4 | F1 | W31 | 4.1.31 | 23.7% | 26.8% | 1.13 | Pass |
| BTC4 | F1 | W32 | 4.1.32 | 21.4% | 25.9% | 1.21 | Pass |
| BTC4 | F1 | W40 | 4.1.40 | 21.5% | 25.2% | 1.17 | Pass |
| BTC4 | F1 | W41 | 4.1.41 | 22.3% | 25.5% | 1.14 | Pass |
| BTC4 | F1 | W42 | 4.1.42 | 17.2% | 16.3% | 0.95 | Pass |

| | Skylight to habitable rooms | | | | | | |
|---|---|---|---|---|---|---|---|
| | **VSC** | | | | | | |
| **Design** | *Check > 27% or ratio > 0.8* | | | | | | |
| **Group** | **Floor** | **Win** | **Ref** | **BASELINE** | **Proposed** | **Ratio** | **Result** |
| BTC4 | F2 | W10 | 4.2.10 | 26.9% | 30.0% | 1.12 | Pass |
| BTC4 | F2 | W11 | 4.2.11 | 20.8% | 24.5% | 1.18 | Pass |
| BTC4 | F2 | W12 | 4.2.12 | 17.3% | 25.9% | 1.50 | Pass |
| BTC4 | F2 | W20 | 4.2.20 | 20.9% | 17.9% | 0.85 | Pass |
| BTC4 | F2 | W30 | 4.2.30 | 24.1% | 25.1% | 1.04 | Pass |
| BTC4 | F2 | W31 | 4.2.31 | 26.2% | 28.7% | 1.10 | Pass |
| BTC4 | F2 | W32 | 4.2.32 | 24.2% | 28.0% | 1.16 | Pass |
| BTC4 | F2 | W40 | 4.2.40 | 23.4% | 27.2% | 1.16 | Pass |
| BTC4 | F2 | W41 | 4.2.41 | 26.0% | 27.9% | 1.07 | Pass |
| BTC4 | F2 | W42 | 4.2.42 | 22.7% | 20.3% | 0.90 | Pass |
| BTC4 | F3 | W10 | 4.3.10 | 29.8% | 32.0% | 1.07 | Pass |
| BTC4 | F3 | W11 | 4.3.11 | 25.0% | 28.6% | 1.14 | Pass |
| BTC4 | F3 | W12 | 4.3.12 | 19.9% | 28.8% | 1.45 | Pass |
| BTC4 | F3 | W30 | 4.3.30 | 27.0% | 27.1% | 1.00 | Pass |
| BTC4 | F3 | W31 | 4.3.31 | 28.8% | 30.5% | 1.06 | Pass |
| BTC4 | F3 | W32 | 4.3.32 | 27.2% | 30.1% | 1.11 | Pass |
| BTC4 | F3 | W40 | 4.3.40 | 25.5% | 29.2% | 1.15 | Pass |
| BTC4 | F3 | W41 | 4.3.41 | 30.4% | 30.7% | 1.01 | Pass |
| BTC4 | F3 | W42 | 4.3.42 | 29.5% | 26.1% | 0.89 | Pass |
| BTC4 | F4 | W30 | 4.4.30 | 30.0% | 29.1% | 0.97 | Pass |
| BTC4 | F4 | W31 | 4.4.31 | 31.6% | 32.3% | 1.03 | Pass |
| BTC4 | F4 | W32 | 4.4.32 | 30.4% | 32.3% | 1.06 | Pass |
| BTC4 | F4 | W40 | 4.4.40 | 27.6% | 31.3% | 1.14 | Pass |
| BTC4 | F4 | W41 | 4.4.41 | 34.8% | 33.6% | 0.97 | Pass |
| BTC4 | F4 | W42 | 4.4.42 | 36.2% | 33.4% | 0.92 | Pass |
| BTC4 | F5 | W30 | 4.5.30 | 33.0% | 30.9% | 0.94 | Pass |
| BTC4 | F5 | W31 | 4.5.31 | 34.1% | 34.0% | 1.00 | Pass |
| BTC4 | F5 | W32 | 4.5.32 | 33.4% | 34.2% | 1.02 | Pass |
| BTC4 | F5 | W40 | 4.5.40 | 29.6% | 33.3% | 1.12 | Pass |
| BTC4 | F5 | W41 | 4.5.41 | 37.0% | 36.3% | 0.98 | Pass |
| BTC4 | F5 | W42 | 4.5.42 | 39.3% | 38.7% | 0.98 | Pass |

Note: When the proposed value exceeds the minimum requirement the ratio check is not required, and the result is coloured grey.

## Conclusion

When tested with the new development in place
**96%** *(98% including marginals)* of the tested façade locations comply with the 27% and/or 0.8 ratio requirements for habitable rooms.

The average change ratio for VSC is **1.09**

The proposed development generally complies with the BRE Guidelines in relation to neighbours skylight availability.

## Adjacent Properties - Sunlight into living spaces

Tests for the amount of sunlight that windows to living room and/or conservatory can receive over both annual and winter periods.

> ***3.2.3 To assess loss of sunlight to an existing building, it is suggested that all main living rooms of dwellings, and conservatories, should be checked if they have a window facing within 90° of due south. Kitchens and bedrooms are less important, although care should be taken not to block too much sun. Normally loss of sunlight need not be analysed to kitchens and bedrooms, except for bedrooms that also comprise a living space, for example a bed sitting room in an old people's home. . . .***
>
> ***3.2.4 To calculate the loss of sunlight over the year, a different metric, the annual probable sunlight hours (APSH), is used. Here 'probable sunlight hours' means the total number of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness for the location in question (based on sunshine probability data). The sunlight reaching a window is quantified as a percentage of this unobstructed annual total. … The APSH is a better way of quantifying loss of sunlight because it takes into account sunlight received over the whole year, not just on one particular date.***
>
> ***3.2.13 If a living room of an existing dwelling has a main window facing within 90° of due south, and any part of a new development subtends an angle of more than 25° to the horizontal measured from the centre of the window in a vertical section perpendicular to the window, then the sunlighting of the existing dwelling may be adversely affected. This will be the case if the centre of the window:***
> ***• receives less than 25% of annual probable sunlight hours and less than 0.80 times its former annual value; or less than 5% of annual probable sunlight hours between 21 September and 21 March and less than 0.80 times its former value during that period;***
> ***• and also has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.***

While not all windows relate to living rooms, we have for completeness tested all of them.

Note only windows which face within 90˚of due South require testing and those that do not, are notionally labelled as "North" in the table below.

### The results are tabulated below:

Sunlight on windows to living room spaces check

**Annual - 25% and Winter - 5%**

| Design | | | | *Check > 25% or ratio > 0.8* | | | | | *Check > 5% or ratio > 0.8* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | Floor | Win | Ref | BASELINE | Proposed | Ratio | Result | | BASELINE | Proposed | Ratio | Result |
| BTC1 | F0 | W10 | 1.0.10 | 32.9% | 56.3% | 1.71 | Pass | | 1.9% | 16.3% | 8.40 | Pass |
| BTC1 | F0 | W11 | 1.0.11 | 31.0% | 54.0% | 1.74 | Pass | | 1.9% | 14.9% | 8.00 | Pass |
| BTC1 | F0 | W12 | 1.0.12 | 37.8% | 54.8% | 1.45 | Pass | | 3.7% | 9.4% | 2.52 | Pass |
| BTC1 | F0 | W20 | 1.0.20 | 41.3% | 48.1% | 1.16 | Pass | | 4.7% | 6.3% | 1.35 | Pass |
| BTC1 | F0 | W21 | 1.0.21 | 41.4% | 60.6% | 1.46 | Pass | | 4.4% | 13.6% | 3.13 | Pass |
| BTC1 | F0 | W30 | 1.0.30 | 46.3% | 56.4% | 1.22 | Pass | | 5.8% | 7.0% | 1.20 | Pass |
| BTC1 | F0 | W31 | 1.0.31 | 54.2% | 59.2% | 1.09 | Pass | | 12.9% | 12.0% | 0.93 | Pass |
| BTC1 | F1 | W10 | 1.1.10 | 38.9% | 60.9% | 1.56 | Pass | | 3.0% | 17.8% | 5.87 | Pass |
| BTC1 | F1 | W11 | 1.1.11 | 37.8% | 59.4% | 1.57 | Pass | | 2.7% | 18.5% | 6.80 | Pass |
| BTC1 | F1 | W12 | 1.1.12 | 43.3% | 59.3% | 1.37 | Pass | | 5.1% | 13.1% | 2.55 | Pass |
| BTC1 | F1 | W20 | 1.1.20 | 30.5% | 35.7% | 1.17 | Pass | | 10.4% | 12.3% | 1.18 | Pass |
| BTC1 | F1 | W21 | 1.1.21 | 47.3% | 66.4% | 1.40 | Pass | | 7.7% | 18.4% | 2.39 | Pass |
| BTC1 | F1 | W30 | 1.1.30 | 51.0% | 62.2% | 1.22 | Pass | | 7.9% | 11.3% | 1.42 | Pass |
| BTC1 | F1 | W31 | 1.1.31 | 60.4% | 64.3% | 1.06 | Pass | | 14.6% | 14.0% | 0.96 | Pass |
| BTC1 | F2 | W10 | 1.2.10 | 45.6% | 65.4% | 1.43 | Pass | | 4.8% | 19.1% | 3.97 | Pass |
| BTC1 | F2 | W11 | 1.2.11 | 46.2% | 65.3% | 1.41 | Pass | | 3.8% | 20.5% | 5.39 | Pass |
| BTC1 | F2 | W12 | 1.2.12 | 50.1% | 62.9% | 1.25 | Pass | | 7.2% | 15.3% | 2.12 | Pass |
| BTC1 | F2 | W20 | 1.2.20 | 59.8% | 64.8% | 1.08 | Pass | | 15.8% | 19.3% | 1.22 | Pass |
| BTC1 | F2 | W21 | 1.2.21 | 56.1% | 65.1% | 1.16 | Pass | | 13.8% | 19.7% | 1.43 | Pass |
| BTC1 | F2 | W22 | 1.2.22 | 54.7% | 72.4% | 1.32 | Pass | | 12.5% | 22.7% | 1.81 | Pass |
| BTC1 | F2 | W30 | 1.2.30 | 58.5% | 69.2% | 1.18 | Pass | | 12.6% | 17.6% | 1.40 | Pass |
| BTC1 | F2 | W31 | 1.2.31 | 66.2% | 69.5% | 1.05 | Pass | | 17.6% | 17.9% | 1.01 | Pass |
| BTC1 | F3 | W1 | 1.3.1 | 65.8% | 75.4% | 1.15 | Pass | | 17.5% | 26.0% | 1.49 | Pass |
| BTC1 | F3 | W2 | 1.3.2 | 63.6% | 77.0% | 1.21 | Pass | | 16.3% | 28.1% | 1.72 | Pass |
| BTC1 | F3 | W3 | 1.3.3 | 61.5% | 78.8% | 1.28 | Pass | | 16.9% | 28.7% | 1.70 | Pass |
| BTC1 | F3 | W10 | 1.3.10 | 55.7% | 68.8% | 1.24 | Pass | | 10.6% | 19.5% | 1.83 | Pass |
| BTC1 | F3 | W11 | 1.3.11 | 51.8% | 71.2% | 1.37 | Pass | | 5.7% | 23.7% | 4.12 | Pass |
| BTC1 | F3 | W12 | 1.3.12 | 55.2% | 69.9% | 1.27 | Pass | | 8.6% | 21.1% | 2.45 | Pass |
| BTC1 | F3 | W30 | 1.3.30 | 67.6% | 77.9% | 1.15 | Pass | | 20.5% | 25.5% | 1.24 | Pass |
| BTC1 | F3 | W31 | 1.3.31 | 73.4% | 75.8% | 1.03 | Pass | | 23.4% | 23.3% | 1.00 | Pass |
| BTC1 | F4 | W20 | 1.4.20 | 72.2% | 81.1% | 1.12 | Pass | | 20.4% | 29.1% | 1.42 | Pass |
| BTC1 | F4 | W21 | 1.4.21 | 67.6% | 80.7% | 1.19 | Pass | | 18.0% | 30.5% | 1.69 | Pass |
| BTC1 | F4 | W22 | 1.4.22 | 67.4% | 81.5% | 1.21 | Pass | | 19.5% | 30.7% | 1.57 | Pass |
| BTC1 | F4 | W30 | 1.4.30 | 77.5% | 83.8% | 1.08 | Pass | | 28.4% | 31.3% | 1.10 | Pass |
| BTC1 | F4 | W31 | 1.4.31 | 80.3% | 79.5% | 0.99 | Pass | | 29.5% | 27.0% | 0.92 | Pass |
| BTC2 | F0 | W30 | 2.0.30 | 54.7% | 43.4% | 0.79 | Pass | | 12.3% | 4.0% | 0.32 | Fail |
| BTC2 | F0 | W31 | 2.0.31 | 52.7% | 49.3% | 0.94 | Pass | | 9.2% | 4.4% | 0.47 | Fail |
| BTC2 | F0 | W32 | 2.0.32 | 54.5% | 58.5% | 1.07 | Pass | | 8.2% | 10.3% | 1.25 | Pass |
| BTC2 | F1 | W30 | 2.1.30 | 67.3% | 45.4% | 0.67 | Pass | | 23.5% | 5.0% | 0.21 | Fail |
| BTC2 | F1 | W31 | 2.1.31 | 57.6% | 54.2% | 0.94 | Pass | | 10.4% | 7.0% | 0.67 | Pass |
| BTC2 | F1 | W32 | 2.1.32 | 59.4% | 62.5% | 1.05 | Pass | | 11.1% | 13.2% | 1.19 | Pass |
| BTC2 | F2 | W10 | 2.2.10 | 63.2% | 63.6% | 1.01 | Pass | | 18.8% | 19.2% | 1.02 | Pass |
| BTC2 | F2 | W11 | 2.2.11 | 61.1% | 62.0% | 1.01 | Pass | | 16.9% | 17.7% | 1.05 | Pass |

## Sunlight on windows to living room spaces check

### Annual - 25% and Winter - 5%

| Design | | | | Check > 25% or ratio > 0.8 | | | | | Check > 5% or ratio > 0.8 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | Floor | Win | Ref | BASELINE | Proposed | Ratio | Result | | BASELINE | Proposed | Ratio | Result |
| BTC2 | F2 | W20 | 2.2.20 | 55.8% | 47.0% | 0.84 | Pass | | 19.1% | 10.6% | 0.56 | Pass |
| BTC2 | F2 | W21 | 2.2.21 | 66.9% | 51.8% | 0.77 | Pass | | 24.9% | 12.4% | 0.50 | Pass |
| BTC2 | F2 | W22 | 2.2.22 | 67.4% | 52.1% | 0.77 | Pass | | 23.8% | 12.0% | 0.50 | Pass |
| BTC2 | F2 | W30 | 2.2.30 | 71.6% | 49.6% | 0.69 | Pass | | 25.6% | 6.4% | 0.25 | Pass |
| BTC2 | F2 | W31 | 2.2.31 | 61.7% | 59.5% | 0.96 | Pass | | 12.7% | 10.6% | 0.83 | Pass |
| BTC2 | F2 | W32 | 2.2.32 | 63.6% | 67.9% | 1.07 | Pass | | 14.1% | 17.6% | 1.25 | Pass |
| BTC2 | F3 | W10 | 2.3.10 | 67.9% | 66.7% | 0.98 | Pass | | 22.3% | 21.1% | 0.94 | Pass |
| BTC2 | F3 | W11 | 2.3.11 | 64.8% | 65.1% | 1.00 | Pass | | 19.4% | 19.7% | 1.02 | Pass |
| BTC2 | F3 | W12 | 2.3.12 | 62.7% | 62.3% | 0.99 | Pass | | 17.2% | 16.6% | 0.96 | Pass |
| BTC2 | F3 | W20 | 2.3.20 | 60.4% | 51.4% | 0.85 | Pass | | 20.0% | 12.5% | 0.63 | Pass |
| BTC2 | F3 | W21 | 2.3.21 | 69.5% | 56.3% | 0.81 | Pass | | 25.9% | 15.0% | 0.58 | Pass |
| BTC2 | F3 | W22 | 2.3.22 | 70.9% | 57.3% | 0.81 | Pass | | 26.0% | 13.8% | 0.53 | Pass |
| BTC2 | F3 | W30 | 2.3.30 | 75.4% | 53.1% | 0.70 | Pass | | 27.8% | 8.5% | 0.31 | Pass |
| BTC2 | F3 | W31 | 2.3.31 | 66.2% | 63.2% | 0.95 | Pass | | 16.6% | 13.3% | 0.80 | Pass |
| BTC2 | F3 | W32 | 2.3.32 | 70.4% | 71.3% | 1.01 | Pass | | 20.1% | 20.7% | 1.03 | Pass |
| BTC2 | F4 | W10 | 2.4.10 | 70.9% | 68.6% | 0.97 | Pass | | 24.9% | 22.6% | 0.91 | Pass |
| BTC2 | F4 | W11 | 2.4.11 | 69.2% | 68.4% | 0.99 | Pass | | 23.3% | 22.5% | 0.96 | Pass |
| BTC2 | F4 | W12 | 2.4.12 | 67.1% | 65.1% | 0.97 | Pass | | 20.8% | 18.8% | 0.90 | Pass |
| BTC2 | F4 | W20 | 2.4.20 | 65.9% | 59.7% | 0.91 | Pass | | 20.6% | 15.7% | 0.76 | Pass |
| BTC2 | F4 | W21 | 2.4.21 | 70.9% | 60.9% | 0.86 | Pass | | 25.9% | 17.7% | 0.68 | Pass |
| BTC2 | F4 | W22 | 2.4.22 | 71.6% | 60.8% | 0.85 | Pass | | 26.0% | 16.2% | 0.62 | Pass |
| BTC2 | F4 | W30 | 2.4.30 | 78.6% | 57.9% | 0.74 | Pass | | 29.0% | 12.4% | 0.43 | Pass |
| BTC2 | F4 | W31 | 2.4.31 | 71.4% | 67.1% | 0.94 | Pass | | 21.4% | 16.6% | 0.77 | Pass |
| BTC2 | F5 | W1 | 2.5.1 | 70.9% | 66.8% | 0.94 | Pass | | 24.7% | 21.1% | 0.86 | Pass |
| BTC2 | F5 | W2 | 2.5.2 | 71.6% | 66.1% | 0.92 | Pass | | 26.0% | 21.5% | 0.83 | Pass |
| BTC2 | F5 | W3 | 2.5.3 | 71.7% | 64.4% | 0.90 | Pass | | 26.0% | 19.2% | 0.74 | Pass |
| BTC2 | F5 | W10 | 2.5.10 | 72.2% | 71.6% | 0.99 | Pass | | 25.9% | 25.3% | 0.98 | Pass |
| BTC2 | F5 | W11 | 2.5.11 | 72.6% | 70.8% | 0.98 | Pass | | 26.3% | 24.5% | 0.93 | Pass |
| BTC2 | F5 | W12 | 2.5.12 | 70.8% | 67.7% | 0.96 | Pass | | 24.5% | 21.4% | 0.87 | Pass |
| BTC2 | F5 | W30 | 2.5.30 | 80.5% | 60.8% | 0.75 | Pass | | 30.1% | 14.4% | 0.48 | Pass |
| BTC2 | F5 | W31 | 2.5.31 | 79.8% | 70.7% | 0.89 | Pass | | 29.2% | 20.1% | 0.69 | Pass |
| BTC4 | F0 | W10 | 4.0.10 | 6.3% | 9.4% | North | | | 0.1% | 0.1% | North | |
| BTC4 | F0 | W11 | 4.0.11 | 0.0% | 0.0% | North | | | 0.0% | 0.0% | North | |
| BTC4 | F0 | W12 | 4.0.12 | 10.2% | 7.5% | North | | | 0.0% | 0.0% | North | |
| BTC4 | F0 | W20 | 4.0.20 | 11.7% | 5.8% | North | | | 0.0% | 0.0% | North | |
| BTC4 | F0 | W42 | 4.0.42 | 33.3% | 28.7% | 0.86 | Pass | | 2.6% | 3.2% | 1.21 | Pass |
| BTC4 | F1 | W10 | 4.1.10 | 10.0% | 10.9% | North | | | 0.2% | 0.1% | North | |
| BTC4 | F1 | W11 | 4.1.11 | 0.0% | 0.5% | North | | | 0.0% | 0.0% | North | |
| BTC4 | F1 | W12 | 4.1.12 | 12.7% | 8.2% | North | | | 0.0% | 0.0% | North | |
| BTC4 | F1 | W20 | 4.1.20 | 14.2% | 8.5% | North | | | 0.0% | 0.0% | North | |
| BTC4 | F1 | W30 | 4.1.30 | 36.3% | 42.7% | 1.18 | Pass | | 10.1% | 12.4% | 1.23 | Pass |
| BTC4 | F1 | W31 | 4.1.31 | 41.5% | 45.4% | 1.09 | Pass | | 7.6% | 10.0% | 1.32 | Pass |
| BTC4 | F1 | W32 | 4.1.32 | 35.1% | 45.5% | 1.29 | Pass | | 7.9% | 10.5% | 1.32 | Pass |
| BTC4 | F1 | W40 | 4.1.40 | 36.2% | 41.8% | 1.15 | Pass | | 6.8% | 10.4% | 1.52 | Pass |
| BTC4 | F1 | W41 | 4.1.41 | 49.6% | 55.9% | 1.13 | Pass | | 5.3% | 9.7% | 1.84 | Pass |
| BTC4 | F1 | W42 | 4.1.42 | 41.6% | 32.9% | 0.79 | Pass | | 3.9% | 6.4% | 1.66 | Pass |

## Sunlight on windows to living room spaces check

### Annual - 25% and Winter - 5%

| Design | | | | Check > 25% or ratio > 0.8 | | | | | Check > 5% or ratio > 0.8 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | Floor | Win | Ref | BASELINE | Proposed | Ratio | Result | | BASELINE | Proposed | Ratio | Result |
| BTC4 | F2 | W10 | 4.2.10 | 13.5% | 12.8% | North | | | 0.2% | 0.0% | North | |
| BTC4 | F2 | W11 | 4.2.11 | 0.0% | 1.6% | North | | | 0.0% | 0.0% | North | |
| BTC4 | F2 | W12 | 4.2.12 | 14.2% | 8.9% | North | | | 0.3% | 0.2% | North | |
| BTC4 | F2 | W20 | 4.2.20 | 15.2% | 9.6% | North | | | 0.0% | 0.0% | North | |
| BTC4 | F2 | W30 | 4.2.30 | 40.6% | 46.5% | 1.15 | Pass | | 12.0% | 14.8% | 1.24 | Pass |
| BTC4 | F2 | W31 | 4.2.31 | 43.7% | 50.1% | 1.15 | Pass | | 9.1% | 11.7% | 1.29 | Pass |
| BTC4 | F2 | W32 | 4.2.32 | 41.1% | 48.8% | 1.19 | Pass | | 9.8% | 12.0% | 1.22 | Pass |
| BTC4 | F2 | W40 | 4.2.40 | 38.7% | 46.7% | 1.21 | Pass | | 7.2% | 12.0% | 1.66 | Pass |
| BTC4 | F2 | W41 | 4.2.41 | 55.6% | 60.7% | 1.09 | Pass | | 8.1% | 11.6% | 1.43 | Pass |
| BTC4 | F2 | W42 | 4.2.42 | 49.7% | 46.5% | 0.94 | Pass | | 5.3% | 10.5% | 1.99 | Pass |
| BTC4 | F3 | W10 | 4.3.10 | 14.1% | 13.5% | North | | | 0.2% | 0.1% | North | |
| BTC4 | F3 | W11 | 4.3.11 | 3.4% | 5.0% | North | | | 0.0% | 0.0% | North | |
| BTC4 | F3 | W12 | 4.3.12 | 14.5% | 9.7% | North | | | 0.5% | 0.5% | North | |
| BTC4 | F3 | W30 | 4.3.30 | 47.6% | 49.3% | 1.03 | Pass | | 14.4% | 16.3% | 1.14 | Pass |
| BTC4 | F3 | W31 | 4.3.31 | 48.2% | 53.9% | 1.12 | Pass | | 12.3% | 14.6% | 1.19 | Pass |
| BTC4 | F3 | W32 | 4.3.32 | 46.4% | 52.6% | 1.13 | Pass | | 12.4% | 13.4% | 1.09 | Pass |
| BTC4 | F3 | W40 | 4.3.40 | 43.9% | 50.4% | 1.15 | Pass | | 8.5% | 13.6% | 1.59 | Pass |
| BTC4 | F3 | W41 | 4.3.41 | 64.4% | 66.0% | 1.02 | Pass | | 15.9% | 15.8% | 0.99 | Pass |
| BTC4 | F3 | W42 | 4.3.42 | 62.9% | 60.5% | 0.96 | Pass | | 15.2% | 15.9% | 1.05 | Pass |
| BTC4 | F4 | W30 | 4.4.30 | 53.3% | 51.4% | 0.96 | Pass | | 16.4% | 17.9% | 1.09 | Pass |
| BTC4 | F4 | W31 | 4.4.31 | 53.9% | 56.8% | 1.05 | Pass | | 15.2% | 16.9% | 1.12 | Pass |
| BTC4 | F4 | W32 | 4.4.32 | 52.9% | 55.2% | 1.04 | Pass | | 14.6% | 15.0% | 1.03 | Pass |
| BTC4 | F4 | W40 | 4.4.40 | 47.7% | 53.1% | 1.11 | Pass | | 10.3% | 14.5% | 1.41 | Pass |
| BTC4 | F4 | W41 | 4.4.41 | 75.1% | 71.7% | 0.95 | Pass | | 25.7% | 21.3% | 0.83 | Pass |
| BTC4 | F4 | W42 | 4.4.42 | 78.6% | 71.3% | 0.91 | Pass | | 29.8% | 23.1% | 0.78 | Pass |
| BTC4 | F5 | W30 | 4.5.30 | 58.1% | 52.8% | 0.91 | Pass | | 18.6% | 19.3% | 1.04 | Pass |
| BTC4 | F5 | W31 | 4.5.31 | 58.4% | 58.4% | 1.00 | Pass | | 18.3% | 18.5% | 1.01 | Pass |
| BTC4 | F5 | W32 | 4.5.32 | 57.1% | 57.0% | 1.00 | Pass | | 16.9% | 16.8% | 0.99 | Pass |
| BTC4 | F5 | W40 | 4.5.40 | 50.0% | 56.6% | 1.13 | Pass | | 11.7% | 17.1% | 1.46 | Pass |
| BTC4 | F5 | W41 | 4.5.41 | 80.4% | 82.0% | 1.02 | Pass | | 27.3% | 28.4% | 1.04 | Pass |
| BTC4 | F5 | W42 | 4.5.42 | 80.1% | 80.3% | 1.00 | Pass | | 31.3% | 31.5% | 1.01 | Pass |

Note: When the proposed value exceeds the minimum requirement the ratio check is not required, and the result is coloured grey.

## Conclusion

When tested with the proposed development in place:
**100%** of tested windows comply with the annual APSH and
**98%** *(100% with marginals)* with the winter WPSH requirements for sunlight or overall requirement.

The average change ratio for sunlight is APSH:**1.07** and WPSH: **1.48**

The proposed development complies with the BRE Guidelines in relation to both annual and winter sunlight availability to neighbours as it applies to living rooms and conservatories.

## Adjacent Properties – Sunlight on the Ground (Shadow)

## Gardens and Open spaces

Tests for the availability of sunlight in amenity areas.

*3.3.17 It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If as a result of new development an existing garden or amenity area does not meet the above, and the area that can receive two hours of sun on 21 March is less than 0.80 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March*

*3.3.3 The availability of sunlight should be checked for all open spaces where it will be required. This would normally include:*

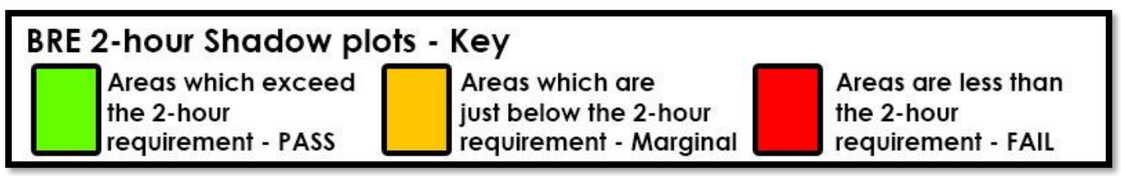
- *gardens, such as the main back garden of a house or communal gardens including courtyards and roof terraces*
- *parks and playing fields*
- *children's playgrounds*
- *outdoor swimming pools and paddling pools, and other areas of recreational water such as marinas and boating lakes*
- *sitting out areas such as those between non-domestic buildings and in public squares*
- *nature reserves (which may have special requirements for sunlight if rare plants are growing there).*

The amenities of the following properties were tested.

- Communal Amenity spaces at GFL
- Civic Spaces

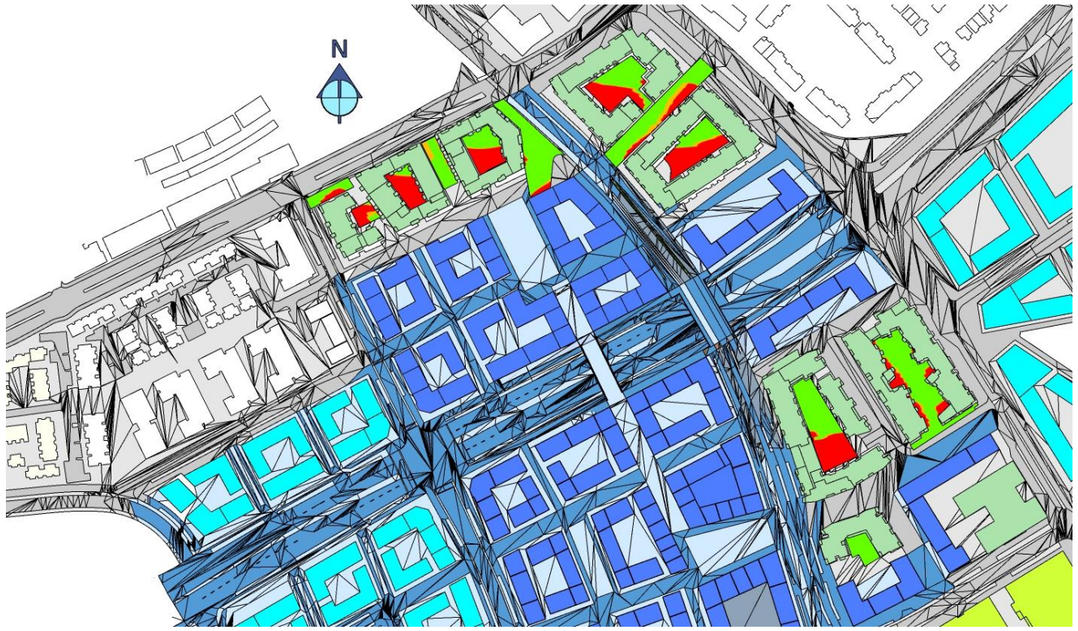
### BRE 2-hour Shadow Plots

The graphic below indicates the areas which receive 2 hours of sunlight on the 21st March in accordance with the BRE Guidelines.





Baseline




Proposed

**The results are tabulated below:**

| | | | | Shadow to amenity spaces | | | |
|---|---|---|---|---|---|---|---|
| | | | | **2-hour Sunlight - 21st March** | | | |
| **Design** | | | | *Check > 50% or ratio > 0.8* | | | |
| **Group** | **Area** | **Ref** | **Description** | **BASELINE** | **Proposed** | **Ratio** | **Result** |
| BCivic | A1 | Civic.A1 | Amenity | 91% | 91% | 1.00 | Pass |
| BCivic | A2 | Civic.A2 | Amenity | 73% | 73% | 1.00 | Pass |
| BCivic | A3 | Civic.A3 | Amenity | 60% | 71% | 1.18 | Pass |
| BTC1 | A1 | TC1.A1 | Amenity | 42% | 43% | 1.02 | Pass |
| BTC1 | A2 | TC1.A2 | Amenity | 13% | 13% | 1.00 | Pass |
| BTC1 | A3 | TC1.A3 | Amenity | 3% | 15% | 5.00 | Pass |
| BTC1 | A4 | TC1.A4 | Amenity | 71% | 81% | 1.14 | Pass |
| BTC2 | A1 | TC2.A1 | Amenity | 52% | 52% | 1.00 | Pass |
| BTC2 | A2 | TC2.A2 | Amenity | 33% | 33% | 1.00 | Pass |
| BTC4 | A1 | TC4.A1 | Amenity | 56% | 56% | 1.00 | Pass |
| BTC4 | A2 | TC4.A2 | Amenity | 78% | 75% | 0.96 | Pass |
| BTC4 | A3 | TC4.A3 | Amenity | 97% | 100% | 1.03 | Pass |

Note: When the proposed value exceeds the minimum requirement the ratio check is not required, and the result is coloured grey.

*Please note that passing the BRE requirements does not imply that shadows will not be cast over an amenity space at all. Shadows which are transient by nature may not impact on the percentage of the space which receives 2 hours of sunlight on the 21st of March.*

## Conclusion

**100%** of tested amenity spaces pass the BRE 2-hours of sunlight on the 21st of March or 0.8 ratio requirement.

The average change ratio for the tested amenity spaces **1.36**

The proposed development complies with the requirements of the BRE guidelines for impact on amenity Sunlight/Shadow.

# Summary - Adjacent Properties

Neighbouring properties will generally not be affected by the proposed development and the impacts on Skylight, Sunlight and Shadow have been tested in accordance with the best practice guidelines.

***Change/Impact to neighbouring buildings vs the UFDF Baseline in the adjoining now constructed elements.***

- **Skylight- VSC**
  - **96%** *(98% including marginals)* of the tested façade locations comply with the VSC requirements for habitable rooms.
  - The average change ratio for VSC is **1.09**
- **Sunlight APSH & WPSH**
  - **100%** of tested windows comply with the annual APSH and
  - **98%** *(100% including marginals)* with the winter WPSH requirements for sunlight or overall requirement.
  - The average change ratio for sunlight is APSH: **1.07** and WPSH: **1.48**
- **Sunlight on the Ground SOG (Shadow)**
  - **100%** of tested amenity spaces pass the 2-hour test requirements for the 21st March.
  - The average change ratio for shadow/sunlight is **1.36**

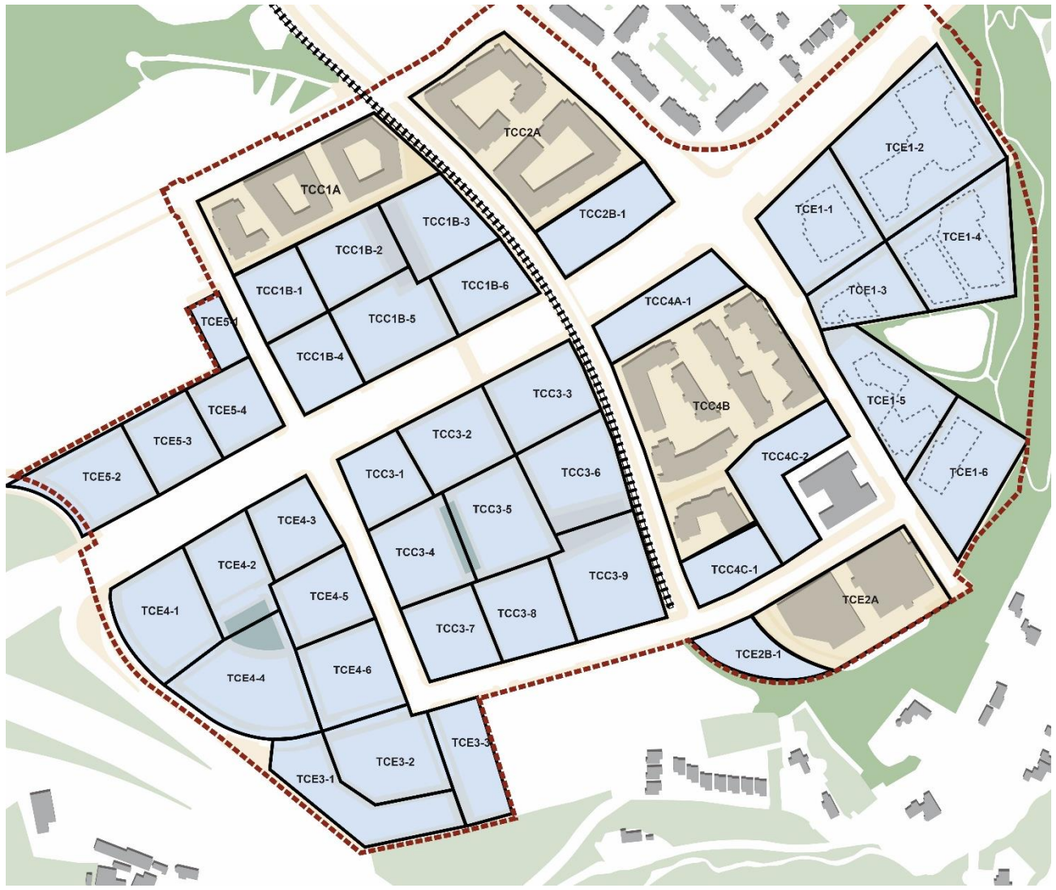
**The potential impact of the proposed development on neighbours generally complies with the requirements of "Site layout planning for daylight and sunlight a guide to good practice " (BR209 – 2022)**

# Performance of the Proposed Development
# Proposed Shared & Civic Amenity

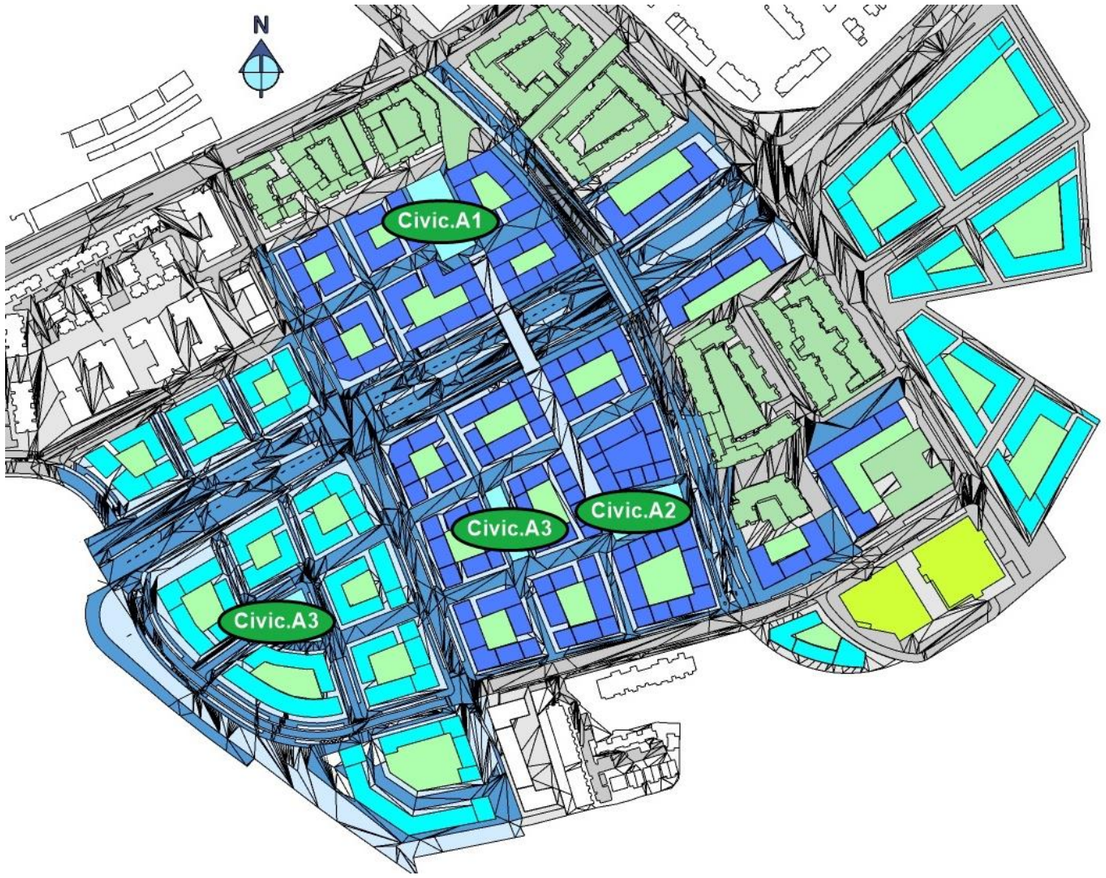
- Initial tests are in relation to the penetration of sunlight to the proposed amenity spaces (aka Shadow).
- Once the Building form is finetuned we propose to assess access to skylight using a modified version of the VSC metric.
- Skylight is the driving factor in Target Illuminance (old money ADF) and sunlight availability.

# The proposed Design

The layout and naming of block/parcels in the proposed design is detailed below:




Civic naming is detailed below:



## Adjacent Properties – Sunlight on the Ground (Shadow)
## Gardens and Open spaces

Tests for the availability of sunlight in amenity areas.

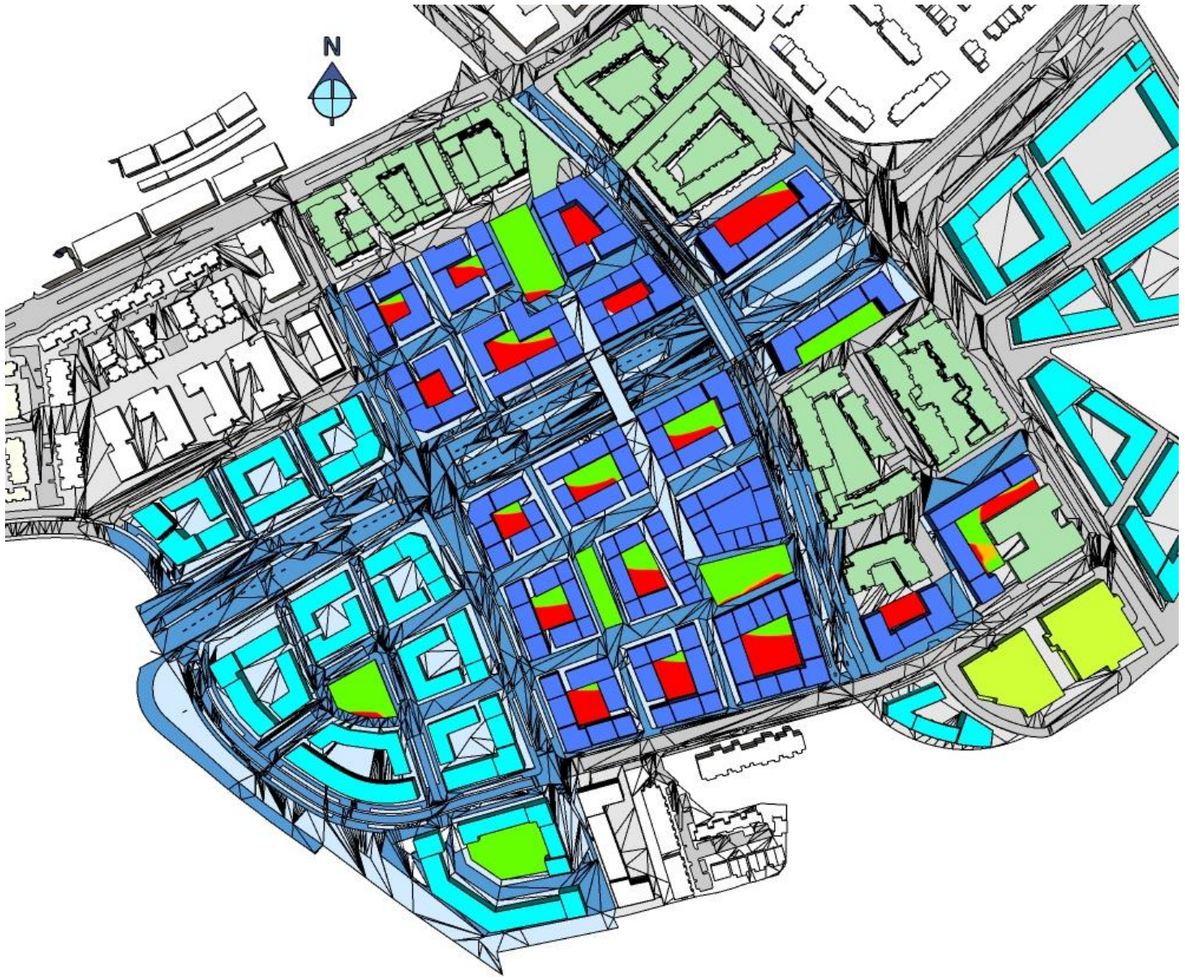
> ***3.3.17 It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If as a result of new development an existing garden or amenity area does not meet the above, and the area that can receive two hours of sun on 21 March is less than 0.80 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March***
>
> ***3.3.3 The availability of sunlight should be checked for all open spaces where it will be required. This would normally include:***
> ***• gardens, such as the main back garden of a house or communal gardens including courtyards and roof terraces***
> ***• parks and playing fields***
> ***• children's playgrounds***
> ***• outdoor swimming pools and paddling pools, and other areas of recreational water such as marinas and boating lakes***
> ***• sitting out areas such as those between non-domestic buildings and in public squares***
> ***• nature reserves (which may have special requirements for sunlight if rare plants are growing there).***

The amenities of the following properties were tested.

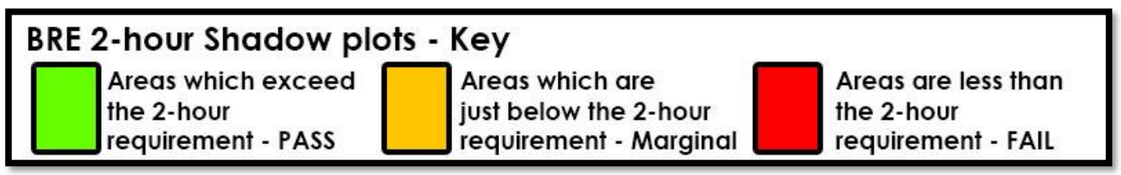
- Residential Communal Amenity spaces at GFL
- Civic Spaces as noted.
- Note: No testing of commercial courtyard spaces at this time.

### BRE 2-hour Shadow Plots

The graphic below indicates the areas which receive 2 hours of sunlight on the 21st March in accordance with the BRE Guidelines.




Proposed



The results are tabulated below:

| | | Shadow / Sunlight Amenity | | | |
|---|---|---|---|---|---|
| | | >50% receives 2 hours of sunlight on 21st March) | | | |
| Group | Floor | Ref | Ref | % 2hr Sunlight | Check |
| BCivic | F0 | A1 | Civic.A1 | 95% | Pass |
| BCivic | F0 | A2 | Civic.A2 | 89% | Pass |
| BCivic | F0 | A3 | Civic.A3 | 100% | Pass |
| BCivic | F0 | A4 | Civic.A4 | 94% | Pass |
| BTC1 | F0 | B1 | TC1.B1 | 20% | Fail |
| BTC1 | F0 | B2 | TC1.B2 | 24% | Fail |
| BTC1 | F0 | B3 | TC1.B3 | 0% | Fail |
| BTC1 | F0 | B4 | TC1.B4 | 0% | Fail |
| BTC1 | F0 | B5 | TC1.B5 | 19% | Fail |
| BTC1 | F0 | B6 | TC1.B6 | 0% | Fail |
| BTC2 | F0 | B1 | TC2.B1 | 6% | Fail |
| BTC3 | F0 | A1 | TC3.A1 | 20% | Fail |
| BTC3 | F0 | A2 | TC3.A2 | 68% | Pass |
| BTC3 | F0 | A3 | TC3.A3 | 61% | Pass |
| BTC3 | F0 | A4 | TC3.A4 | 41% | Marginal |
| BTC3 | F0 | A5 | TC3.A5 | 48% | Marginal |
| BTC3 | F0 | A7 | TC3.A7 | 10% | Fail |
| BTC3 | F0 | A8 | TC3.A8 | 13% | Fail |
| BTC3 | F0 | A9 | TC3.A9 | 24% | Fail |
| BTC4 | F0 | A1 | TC4.A1 | 99% | Pass |
| BTC4 | F0 | C1 | TC4.C1 | 0% | Fail |
| BTC4 | F0 | C2 | TC4.C2 | 47% | Marginal |
| BTCE | F0 | 31 | TCE.31 | 99% | Pass |

*Please note that passing the BRE requirements does not imply that shadows will not be cast over an amenity space at all. Shadows which are transient by nature may not impact on the percentage of the space which receives 2 hours of sunlight on the 21st of March.*

We can see that several spaces at Ground level won't get much sunlight.
The preference here is to provide sunlight at GFL level rather than at roof level.

## Conclusion

**35%** of tested amenity spaces pass the BRE 2-hours of sunlight on the 21st of March or 0.8 ratio requirement. (48% including marginals).

## Alternative check

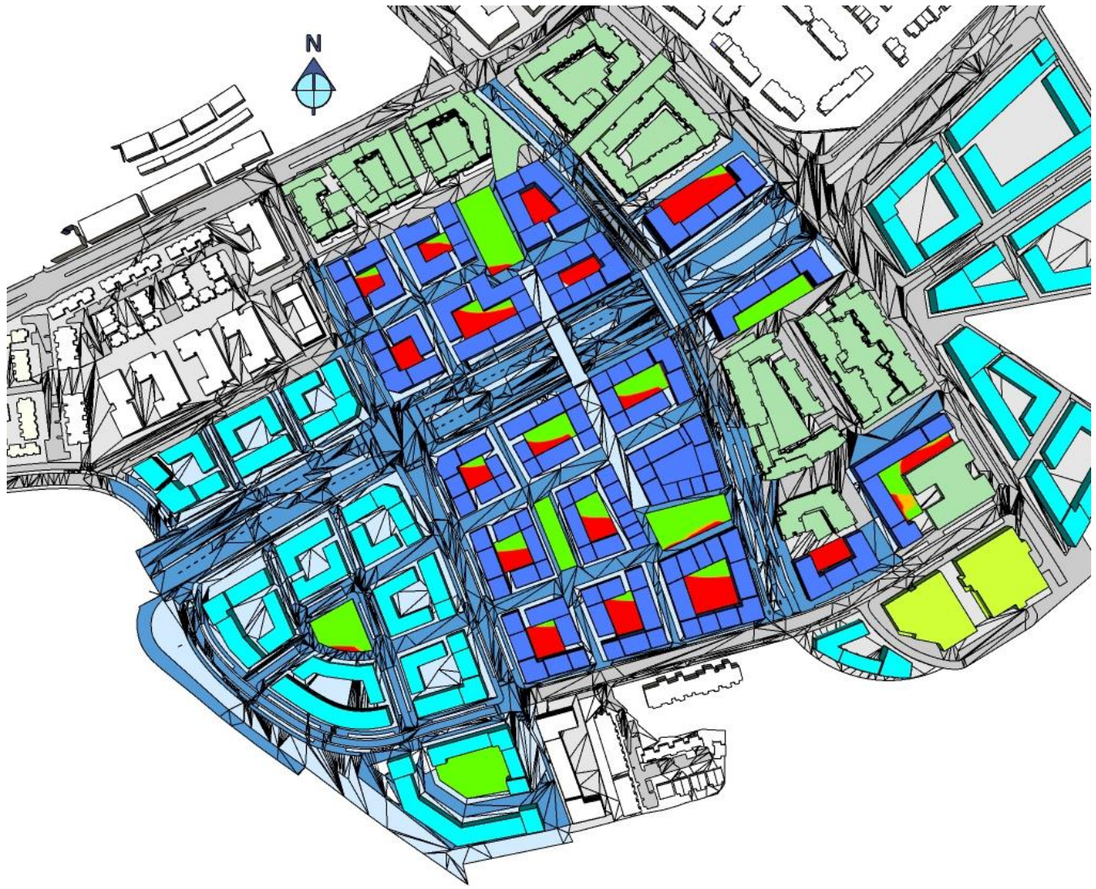
We have also examined how these spaces perform when the sun is a little higher in the sky.

The BRE test was done with the target date of the **21st April.**
This has been done to examine if the current layout will allow any sunlight penetration.
more positive results may lead to:

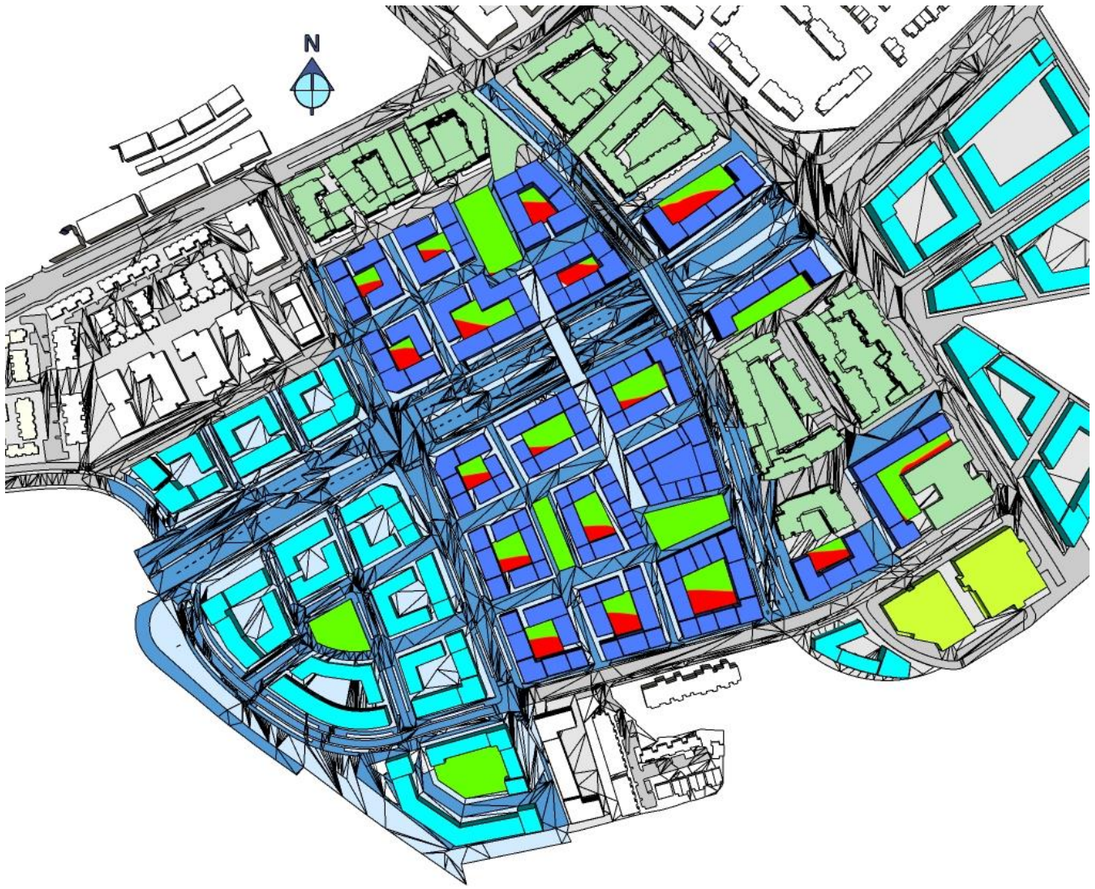
- A design revision to change the building height consistent with the revised sun angle or to punch gaps in the building profile at sensitive angles.
- Provides the option to allow a consideration of an alternative metric to be met, with additional space to the roof levels.

I'll present these below on Facing Pages, repeating the results for the standard 21st March Date:

## BRE – 21st March




## Alternative– 21st April



# BRE – 21st March

| | | Shadow / Sunlight Amenity | | | |
|---|---|---|---|---|---|
| | | >50% receives 2 hours of sunlight on 21st March) | | | |
| Group | Floor | Ref | Ref | % 2hr Sunlight | Check |
| BCivic | F0 | A1 | Civic.A1 | 95% | Pass |
| BCivic | F0 | A2 | Civic.A2 | 89% | Pass |
| BCivic | F0 | A3 | Civic.A3 | 100% | Pass |
| BCivic | F0 | A4 | Civic.A4 | 94% | Pass |
| BTC1 | F0 | B1 | TC1.B1 | 20% | Fail |
| BTC1 | F0 | B2 | TC1.B2 | 24% | Fail |
| BTC1 | F0 | B3 | TC1.B3 | 0% | Fail |
| BTC1 | F0 | B4 | TC1.B4 | 0% | Fail |
| BTC1 | F0 | B5 | TC1.B5 | 19% | Fail |
| BTC1 | F0 | B6 | TC1.B6 | 0% | Fail |
| BTC2 | F0 | B1 | TC2.B1 | 6% | Fail |
| BTC3 | F0 | A1 | TC3.A1 | 20% | Fail |
| BTC3 | F0 | A2 | TC3.A2 | 68% | Pass |
| BTC3 | F0 | A3 | TC3.A3 | 61% | Pass |
| BTC3 | F0 | A4 | TC3.A4 | 41% | Marginal |
| BTC3 | F0 | A5 | TC3.A5 | 48% | Marginal |
| BTC3 | F0 | A7 | TC3.A7 | 10% | Fail |
| BTC3 | F0 | A8 | TC3.A8 | 13% | Fail |
| BTC3 | F0 | A9 | TC3.A9 | 24% | Fail |
| BTC4 | F0 | A1 | TC4.A1 | 99% | Pass |
| BTC4 | F0 | C1 | TC4.C1 | 0% | Fail |
| BTC4 | F0 | C2 | TC4.C2 | 47% | Marginal |
| BTCE | F0 | 31 | TCE.31 | 99% | Pass |
| | | | | | |
| | | | | Count | 23 |
| | | | | Pass | 8 |
| | | | | Pass Rate | 35% |
| | | | | | |
| | | | | Marginal Pass | 3 |
| | | | | Marginal Pass Rate | 48% |

# Alternative– 21st April

| | | Shadow / Sunlight Amenity | | | |
|---|---|---|---|---|---|
| | | >50% receives 2 hours of sunlight on 21st APRIL) | | | |
| Group | Floor | Ref | Ref | % 2hr Sunlight | Check |
| BCivic | F0 | A1 | Civic.A1 | 99% | Pass |
| BCivic | F0 | A2 | Civic.A2 | 100% | Pass |
| BCivic | F0 | A3 | Civic.A3 | 100% | Pass |
| BCivic | F0 | A4 | Civic.A4 | 100% | Pass |
| BTC1 | F0 | B1 | TC1.B1 | 53% | Pass |
| BTC1 | F0 | B2 | TC1.B2 | 61% | Pass |
| BTC1 | F0 | B3 | TC1.B3 | 28% | Fail |
| BTC1 | F0 | B4 | TC1.B4 | 23% | Fail |
| BTC1 | F0 | B5 | TC1.B5 | 70% | Pass |
| BTC1 | F0 | B6 | TC1.B6 | 10% | Fail |
| BTC2 | F0 | B1 | TC2.B1 | 47% | Marginal |
| BTC3 | F0 | A1 | TC3.A1 | 54% | Pass |
| BTC3 | F0 | A2 | TC3.A2 | 87% | Pass |
| BTC3 | F0 | A3 | TC3.A3 | 76% | Pass |
| BTC3 | F0 | A4 | TC3.A4 | 65% | Pass |
| BTC3 | F0 | A5 | TC3.A5 | 70% | Pass |
| BTC3 | F0 | A7 | TC3.A7 | 46% | Marginal |
| BTC3 | F0 | A8 | TC3.A8 | 49% | Marginal |
| BTC3 | F0 | A9 | TC3.A9 | 56% | Pass |
| BTC4 | F0 | A1 | TC4.A1 | 100% | Pass |
| BTC4 | F0 | C1 | TC4.C1 | 29% | Fail |
| BTC4 | F0 | C2 | TC4.C2 | 81% | Pass |
| BTCE | F0 | 31 | TCE.31 | 100% | Pass |
| | | | | | |
| | | | | Count | 23 |
| | | | | Pass | 16 |
| | | | | Pass Rate | 70% |
| | | | | | |
| | | | | Marginal Pass | 3 |
| | | | | Marginal Pass Rate | 83% |

The change in date lifts compliance from **35%** *(48% with marginals)* to **70%** *(83% with marginals).*

It is fair to conclude that the proposed layout has considered sunlight but that additional work is required to fine tune the design.

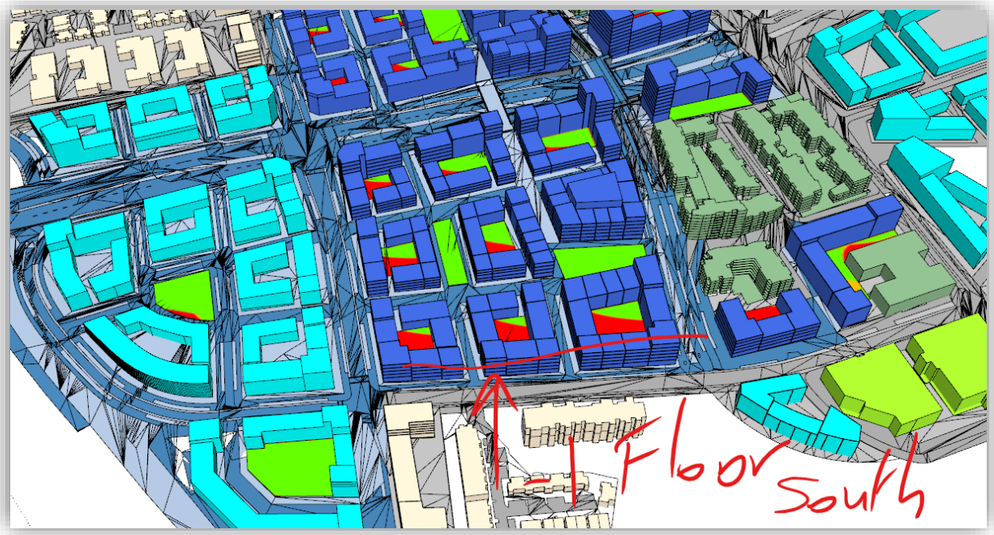
# Variant 1

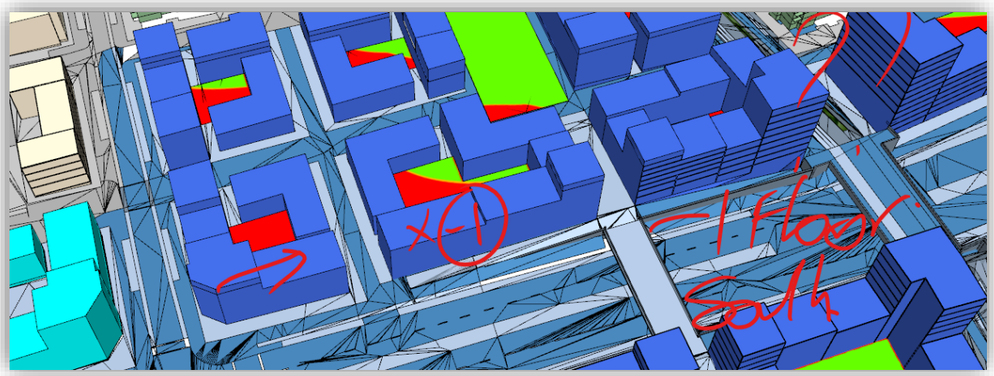
Variant design as per workshop discussions and document

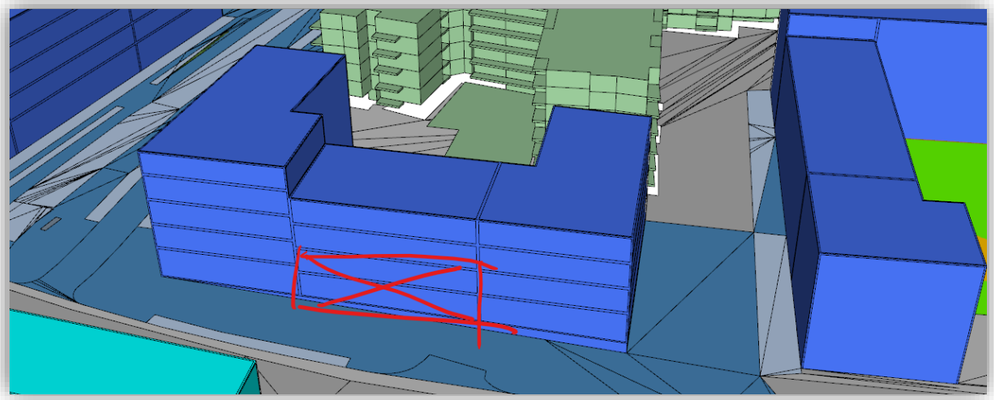
ref:“1649-Changes-20241108”

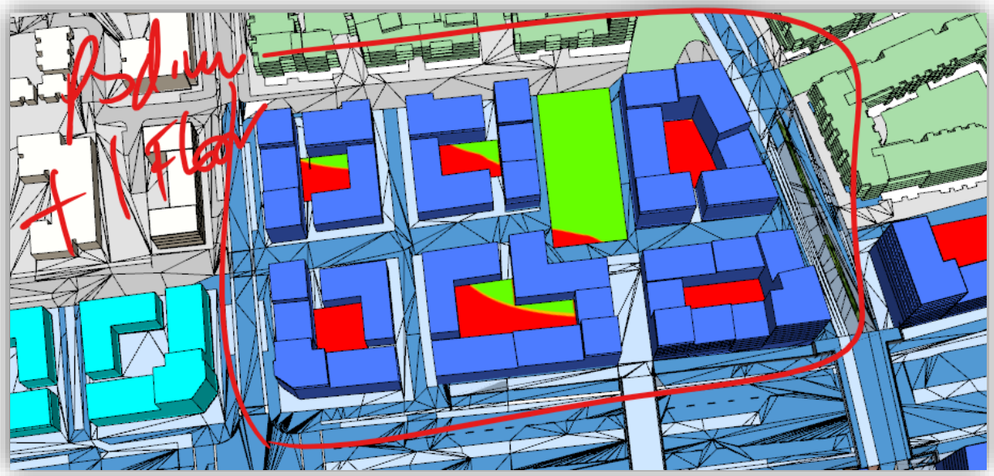
Summarised below

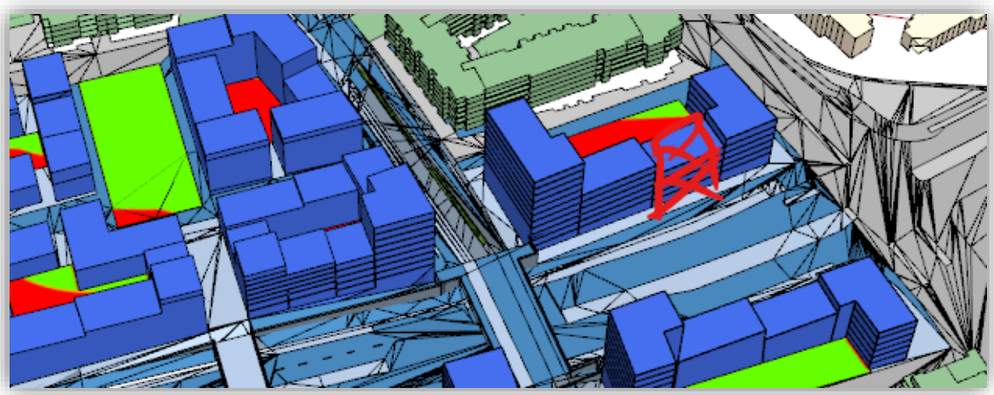
# Revisions suggested and tested



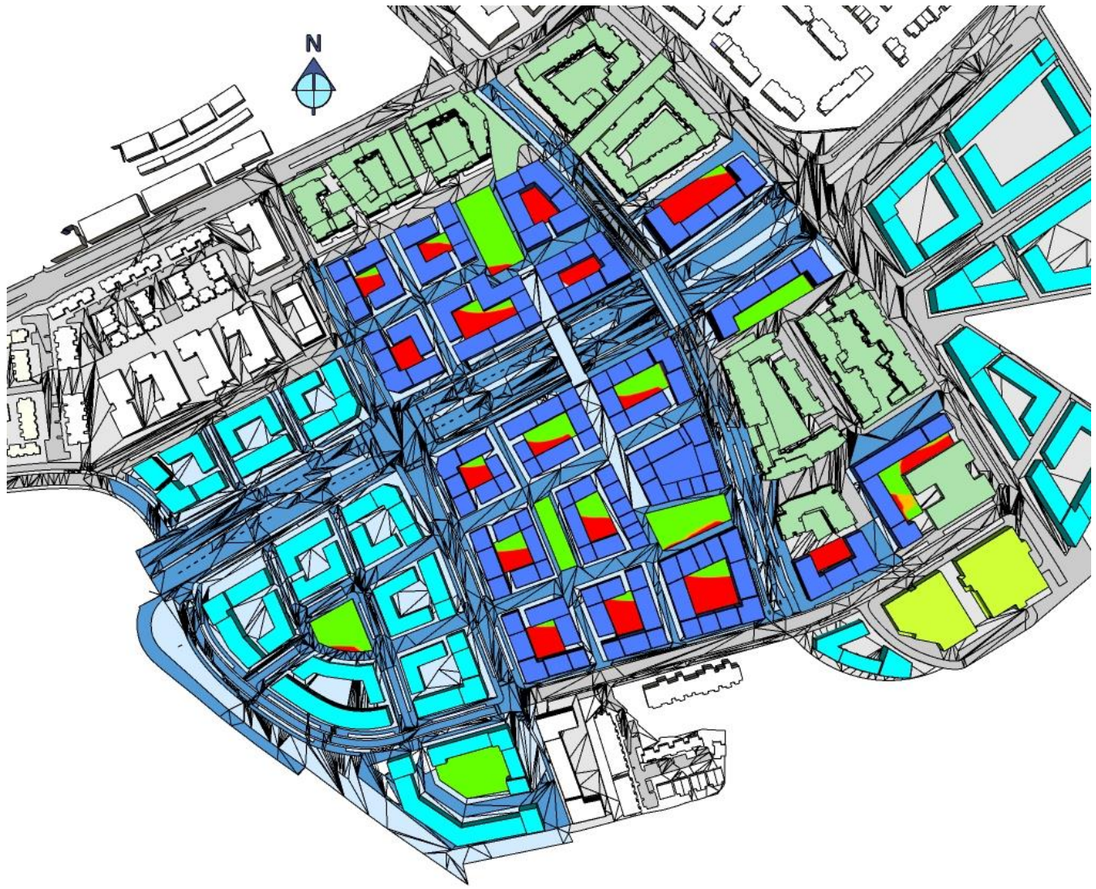



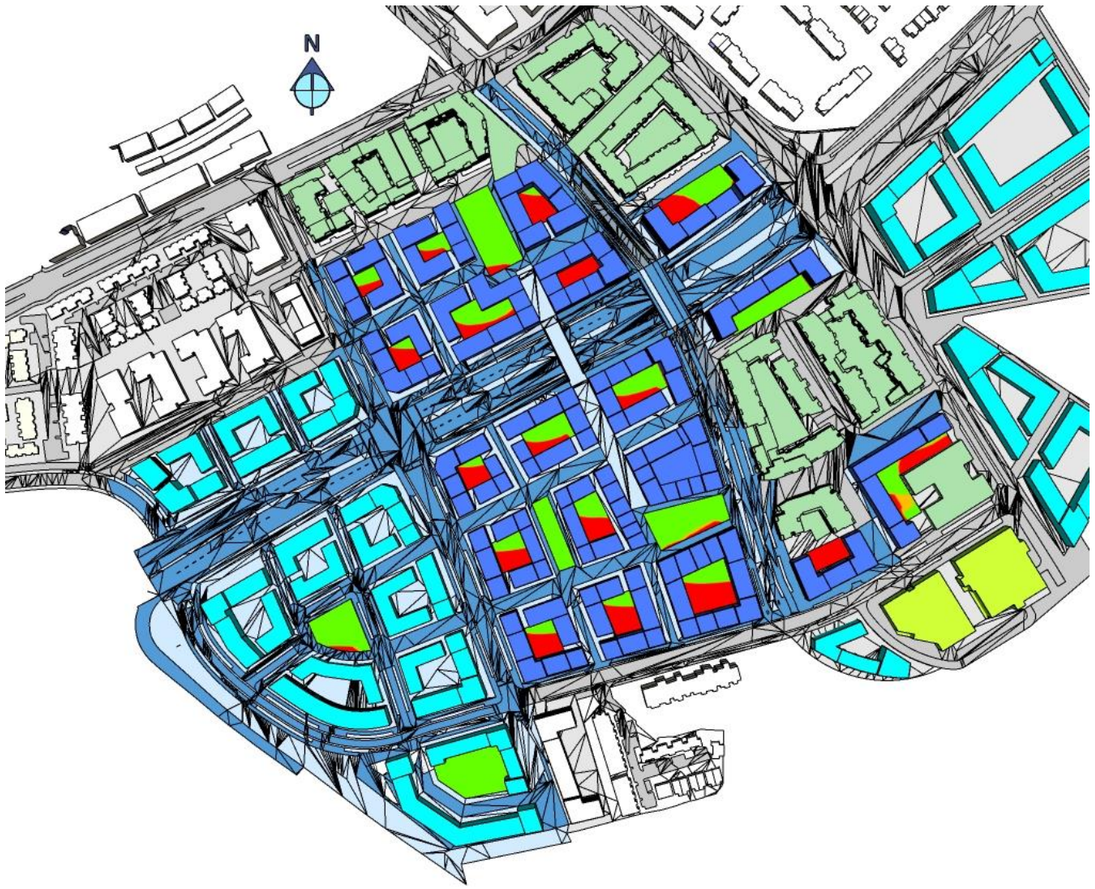


# BRE – 21st March - Original




# BRE – 21st March – Variant 1



# BRE – 21st March - Original

| | | Shadow / Sunlight Amenity | | | |
|---|---|---|---|---|---|
| | | >50% receives 2 hours of sunlight on 21st March) | | | |
| Group | Floor | Ref | Ref | % 2hr Sunlight | Check |
| BCivic | F0 | A1 | Civic.A1 | 95% | Pass |
| BCivic | F0 | A2 | Civic.A2 | 89% | Pass |
| BCivic | F0 | A3 | Civic.A3 | 100% | Pass |
| BCivic | F0 | A4 | Civic.A4 | 94% | Pass |
| BTC1 | F0 | B1 | TC1.B1 | 20% | Fail |
| BTC1 | F0 | B2 | TC1.B2 | 24% | Fail |
| BTC1 | F0 | B3 | TC1.B3 | 0% | Fail |
| BTC1 | F0 | B4 | TC1.B4 | 0% | Fail |
| BTC1 | F0 | B5 | TC1.B5 | 19% | Fail |
| BTC1 | F0 | B6 | TC1.B6 | 0% | Fail |
| BTC2 | F0 | B1 | TC2.B1 | 6% | Fail |
| BTC3 | F0 | A1 | TC3.A1 | 20% | Fail |
| BTC3 | F0 | A2 | TC3.A2 | 68% | Pass |
| BTC3 | F0 | A3 | TC3.A3 | 61% | Pass |
| BTC3 | F0 | A4 | TC3.A4 | 41% | Marginal |
| BTC3 | F0 | A5 | TC3.A5 | 48% | Marginal |
| BTC3 | F0 | A7 | TC3.A7 | 10% | Fail |
| BTC3 | F0 | A8 | TC3.A8 | 13% | Fail |
| BTC3 | F0 | A9 | TC3.A9 | 24% | Fail |
| BTC4 | F0 | A1 | TC4.A1 | 99% | Pass |
| BTC4 | F0 | C1 | TC4.C1 | 0% | Fail |
| BTC4 | F0 | C2 | TC4.C2 | 47% | Marginal |
| BTCE | F0 | 31 | TCE.31 | 99% | Pass |
| | | | | | |
| | | | | Count | 23 |
| | | | | Pass | 8 |
| | | | | Pass Rate | 35% |
| | | | | | |
| | | | | Marginal Pass | 3 |
| | | | | Marginal Pass Rate | 48% |

# BRE – 21st March – Variant 1

| | | Shadow / Sunlight Amenity | | | |
|---|---|---|---|---|---|
| Variant 1 | | >50% receives 2 hours of sunlight on 21st March) | | | |
| Group | Floor | Ref | Ref | % 2hr Sunlight | Check |
| BCivic | F0 | A1 | Civic.A1 | 95% | Pass |
| BCivic | F0 | A2 | Civic.A2 | 90% | Pass |
| BCivic | F0 | A3 | Civic.A3 | 100% | Pass |
| BCivic | F0 | A4 | Civic.A4 | 94% | Pass |
| BTC1 | F0 | B1 | TC1.B1 | 58% | Pass |
| BTC1 | F0 | B2 | TC1.B2 | 62% | Pass |
| BTC1 | F0 | B3 | TC1.B3 | 9% | Fail |
| BTC1 | F0 | B4 | TC1.B4 | 23% | Fail |
| BTC1 | F0 | B5 | TC1.B5 | 62% | Pass |
| BTC1 | F0 | B6 | TC1.B6 | 0% | Fail |
| BTC2 | F0 | B1 | TC2.B1 | 53% | Pass |
| BTC3 | F0 | A1 | TC3.A1 | 20% | Fail |
| BTC3 | F0 | A2 | TC3.A2 | 68% | Pass |
| BTC3 | F0 | A3 | TC3.A3 | 61% | Pass |
| BTC3 | F0 | A4 | TC3.A4 | 41% | Marginal |
| BTC3 | F0 | A5 | TC3.A5 | 48% | Marginal |
| BTC3 | F0 | A7 | TC3.A7 | 31% | Fail |
| BTC3 | F0 | A8 | TC3.A8 | 29% | Fail |
| BTC3 | F0 | A9 | TC3.A9 | 38% | Fail |
| BTC4 | F0 | A1 | TC4.A1 | 99% | Pass |
| BTC4 | F0 | C1 | TC4.C1 | 0% | Fail |
| BTC4 | F0 | C2 | TC4.C2 | 47% | Marginal |
| BTCE | F0 | 31 | TCE.31 | 99% | Pass |
| | | | | | |
| | | | | Count | 23 |
| | | | | Pass | 12 |
| | | | | Pass Rate | 52% |
| | | | | | |
| | | | | Marginal Pass | 3 |
| | | | | Marginal Pass Rate | 65% |

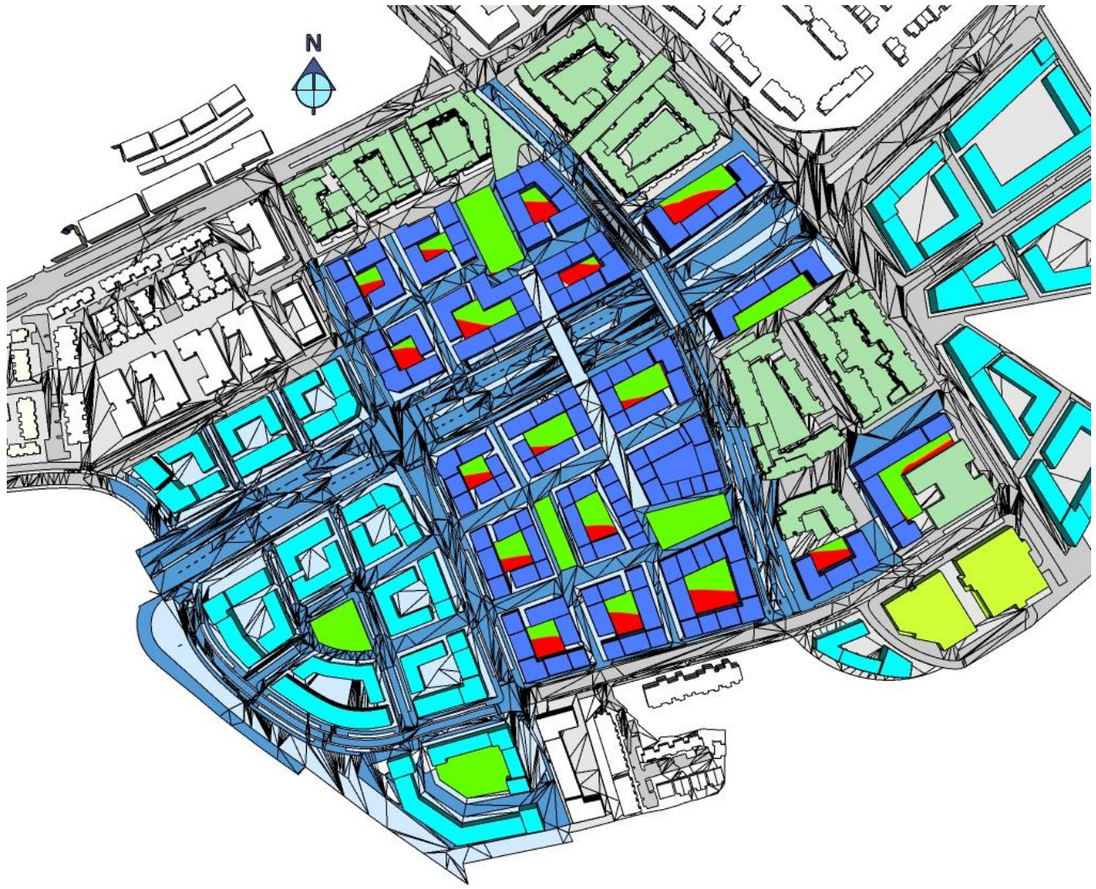
## Summary

Generally improved results 52% complaint vs 35% or including marginals 65% vs 48%

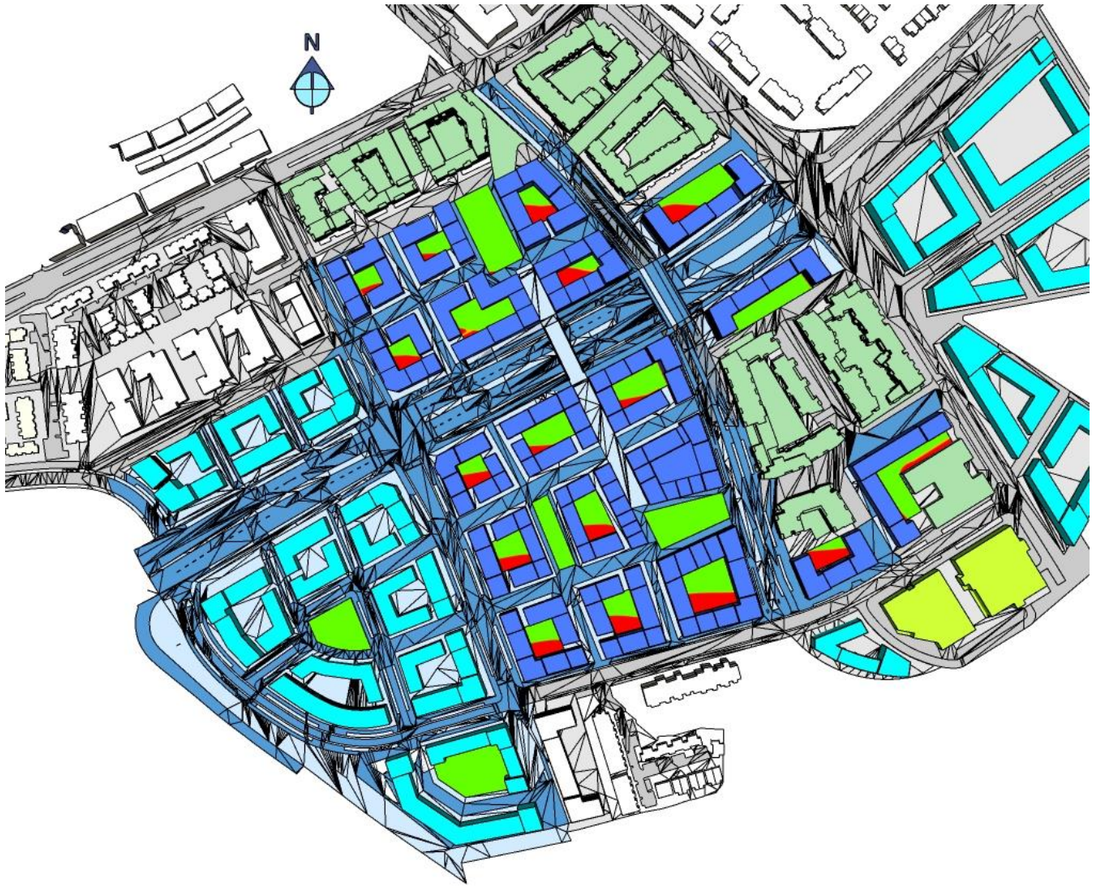
All spaces even those which fail show significant improvement.

**As previously we have also examined the light available on the 21st April, while this is NOT a BRE check it provides some comfort that the spaces will receive a level of sunlight.**

## Alternative– 21st April - Original




## Alternative– 21st April – Variant 1



# Alternative– 21st April – Original

| | | Shadow / Sunlight Amenity | | | |
|---|---|---|---|---|---|
| | | >50% receives 2 hours of sunlight on 21st APRIL) | | | |
| Group | Floor | Ref | Ref | % 2hr Sunlight | Check |
| BCivic | F0 | A1 | Civic.A1 | 99% | Pass |
| BCivic | F0 | A2 | Civic.A2 | 100% | Pass |
| BCivic | F0 | A3 | Civic.A3 | 100% | Pass |
| BCivic | F0 | A4 | Civic.A4 | 100% | Pass |
| BTC1 | F0 | B1 | TC1.B1 | 53% | Pass |
| BTC1 | F0 | B2 | TC1.B2 | 61% | Pass |
| BTC1 | F0 | B3 | TC1.B3 | 28% | Fail |
| BTC1 | F0 | B4 | TC1.B4 | 23% | Fail |
| BTC1 | F0 | B5 | TC1.B5 | 70% | Pass |
| BTC1 | F0 | B6 | TC1.B6 | 10% | Fail |
| BTC2 | F0 | B1 | TC2.B1 | 47% | Marginal |
| BTC3 | F0 | A1 | TC3.A1 | 54% | Pass |
| BTC3 | F0 | A2 | TC3.A2 | 87% | Pass |
| BTC3 | F0 | A3 | TC3.A3 | 76% | Pass |
| BTC3 | F0 | A4 | TC3.A4 | 65% | Pass |
| BTC3 | F0 | A5 | TC3.A5 | 70% | Pass |
| BTC3 | F0 | A7 | TC3.A7 | 46% | Marginal |
| BTC3 | F0 | A8 | TC3.A8 | 49% | Marginal |
| BTC3 | F0 | A9 | TC3.A9 | 56% | Pass |
| BTC4 | F0 | A1 | TC4.A1 | 100% | Pass |
| BTC4 | F0 | C1 | TC4.C1 | 29% | Fail |
| BTC4 | F0 | C2 | TC4.C2 | 81% | Pass |
| BTCE | F0 | 31 | TCE.31 | 100% | Pass |
| | | | | | |
| | | | | Count | 23 |
| | | | | Pass | 16 |
| | | | | Pass Rate | 70% |
| | | | | | |
| | | | | Marginal Pass | 3 |
| | | | | Marginal Pass Rate | 83% |

# Alternative– 21st April – Variant

| | | Shadow / Sunlight Amenity | | | |
|---|---|---|---|---|---|
| Variant 1 | | >50% receives 2 hours of sunlight on 21st APRIL) | | | |
| Group | Floor | Ref | Ref | % 2hr Sunlight | Check |
| BCivic | F0 | A1 | Civic.A1 | 99% | Pass |
| BCivic | F0 | A2 | Civic.A2 | 100% | Pass |
| BCivic | F0 | A3 | Civic.A3 | 100% | Pass |
| BCivic | F0 | A4 | Civic.A4 | 100% | Pass |
| BTC1 | F0 | B1 | TC1.B1 | 76% | Pass |
| BTC1 | F0 | B2 | TC1.B2 | 83% | Pass |
| BTC1 | F0 | B3 | TC1.B3 | 46% | Marginal |
| BTC1 | F0 | B4 | TC1.B4 | 56% | Pass |
| BTC1 | F0 | B5 | TC1.B5 | 89% | Pass |
| BTC1 | F0 | B6 | TC1.B6 | 33% | Fail |
| BTC2 | F0 | B1 | TC2.B1 | 70% | Pass |
| BTC3 | F0 | A1 | TC3.A1 | 54% | Pass |
| BTC3 | F0 | A2 | TC3.A2 | 87% | Pass |
| BTC3 | F0 | A3 | TC3.A3 | 76% | Pass |
| BTC3 | F0 | A4 | TC3.A4 | 65% | Pass |
| BTC3 | F0 | A5 | TC3.A5 | 70% | Pass |
| BTC3 | F0 | A7 | TC3.A7 | 60% | Pass |
| BTC3 | F0 | A8 | TC3.A8 | 60% | Pass |
| BTC3 | F0 | A9 | TC3.A9 | 64% | Pass |
| BTC4 | F0 | A1 | TC4.A1 | 100% | Pass |
| BTC4 | F0 | C1 | TC4.C1 | 29% | Fail |
| BTC4 | F0 | C2 | TC4.C2 | 81% | Pass |
| BTCE | F0 | 31 | TCE.31 | 100% | Pass |
| | | | | | |
| | | | | Count | 23 |
| | | | | Pass | 20 |
| | | | | Pass Rate | 87% |
| | | | | | |
| | | | | Marginal Pass | 1 |
| | | | | Marginal Pass Rate | 91% |

## Summary

Significantly improved results 87% complaint vs 70% or including marginals 91% vs 83%

All spaces even those which fail show significant improvement.

To allow for other competing objectives consideration for the later date test should be considered.

# Variant 2

Variant design for as revised usage of TCE5

Namely TCE5-2, TCE5-2 & TCE5-3

Where parts of the same, to the Northwest have been reallocated to residential use and an additional floor added.

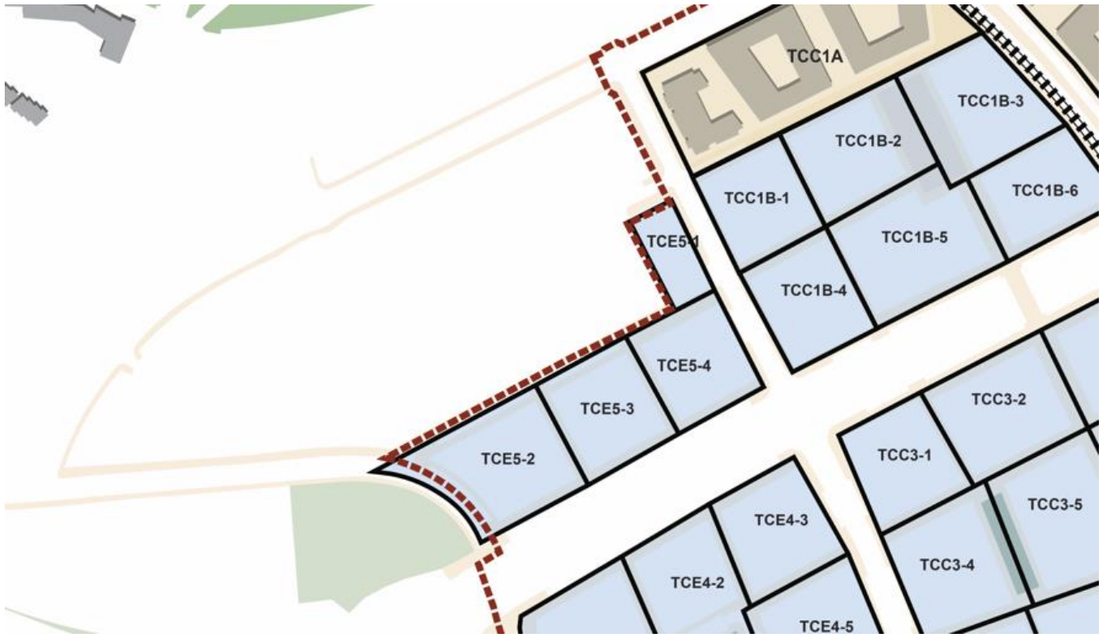
Analysis of the amenity spaces relating to these are detailed below against the standard BRE target of 21st March and the alternative target of 21st April.

# Introduction

CSC have been asked to run a sub-set analysis for TCE5 parcels 2, 3 & 4 to see if the courtyards of these blocks would receive sufficient sunlight if the Northwest blocks of these elements were changed to residential use and the increased by one floor.

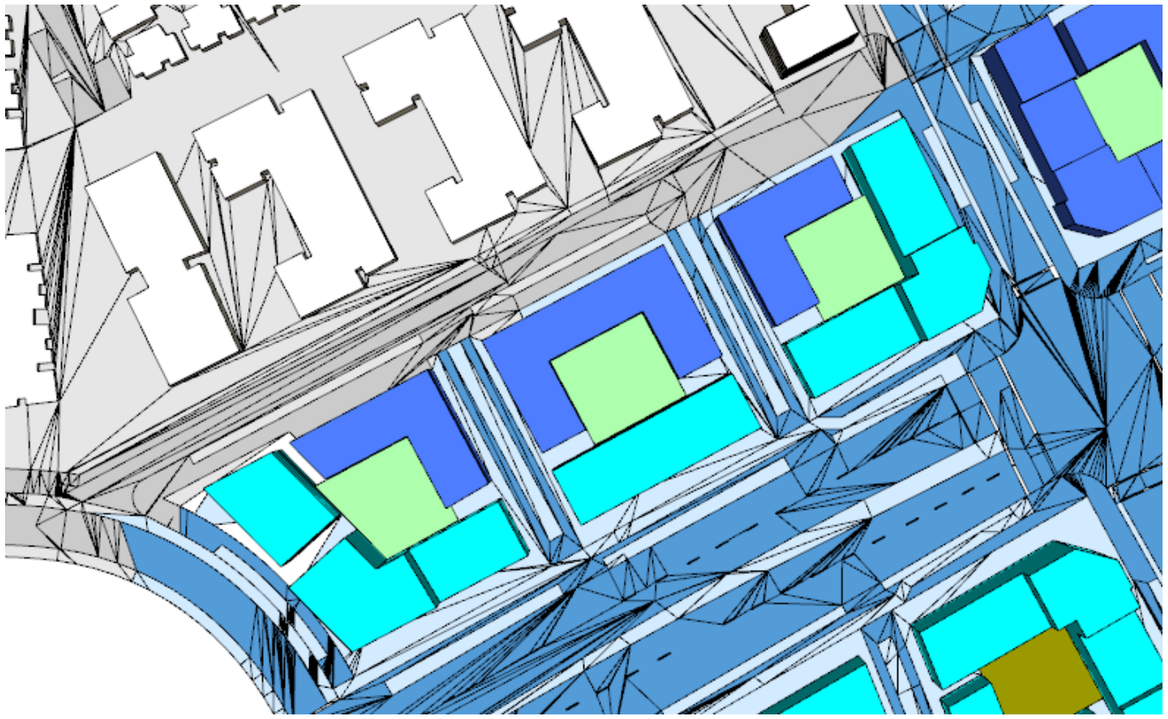
The analysis was run using the BRE Check which examines the amount of the amenity space that can receive at least 2hrs of sunlight on the 21st March. Because these blocks have similar geometry to that of the proposed TC1 & TC2 we have been also asked to examine the metric on the 21st April.

## Parcel naming for TCE5




Updated Analysis Model for TCE5

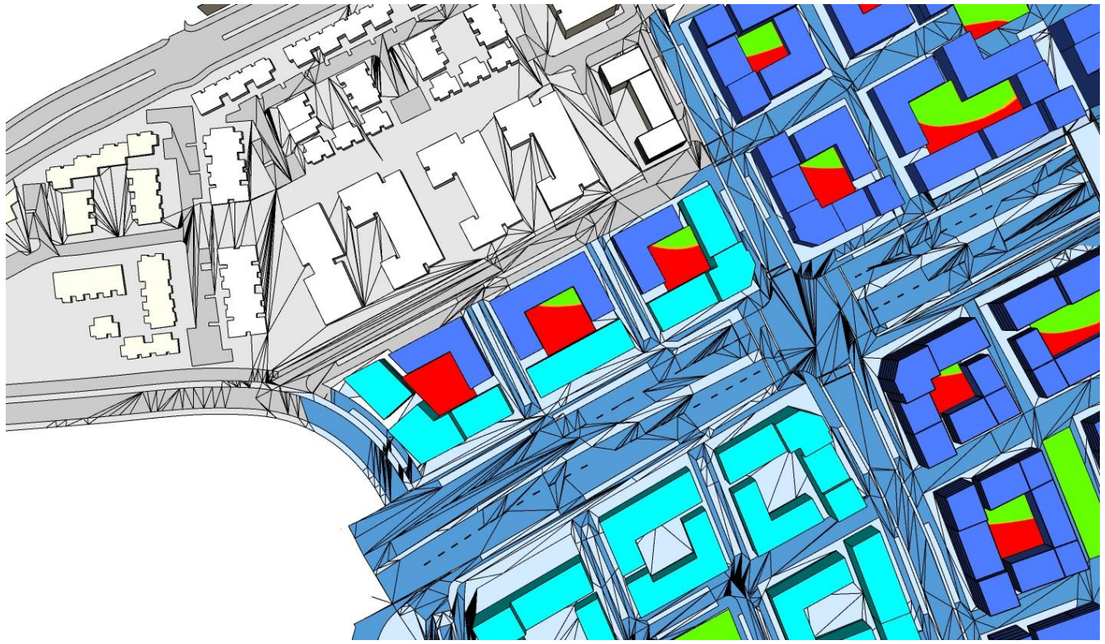
Where Blue = Residential use and Cyan = commercial/mixed.



# BRE – 21st March – Variant 2

| | | Shadow / Sunlight Amenity | | | |
|---|---|---|---|---|---|
| Variant 2 | | >50% receives 2 hours of sunlight on 21st March) | | | |
| Group | Floor | Ref | Ref | % 2hr Sunlight | Check |
| BTCE | F0 | A2 | TCE.A2 | 0% | Fail |
| BTCE | F0 | A3 | TCE.A3 | 14% | Fail |
| BTCE | F0 | A4 | TCE.A4 | 22% | Fail |

As before for these smaller blocks in March do not receive much sunlight.



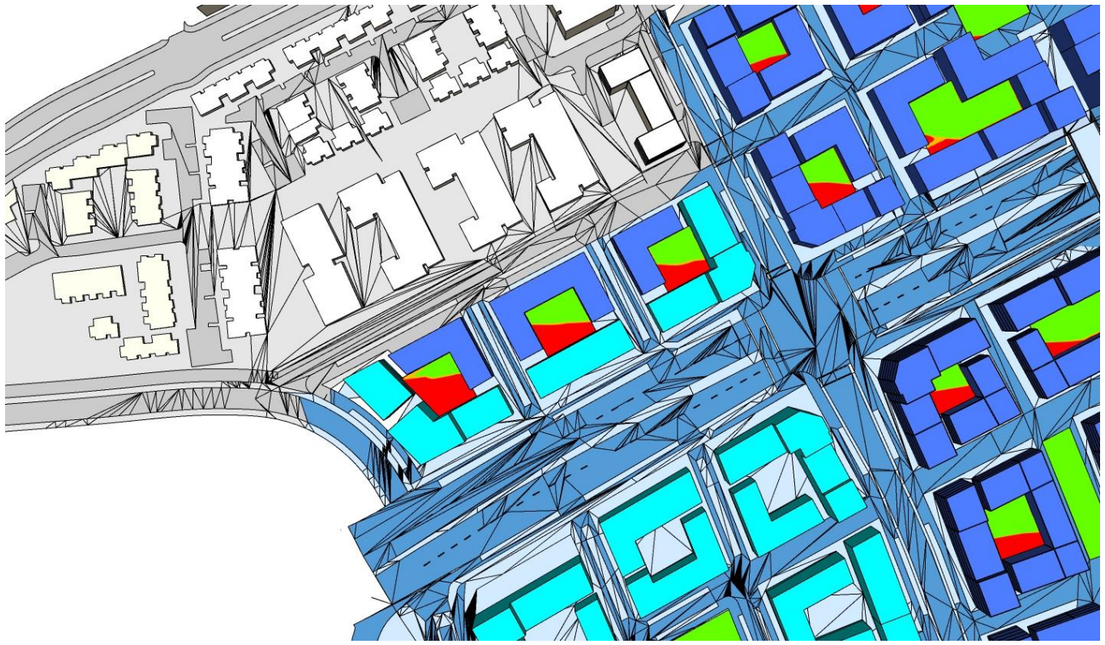
# BRE – 21st March – Variant 2

| | | Shadow / Sunlight Amenity | | | |
|---|---|---|---|---|---|
| Variant 2 | | >50% receives 2 hours of sunlight on 21st APRIL) | | | |
| Group | Floor | Ref | Ref | % 2hr Sunlight | Check |
| BTCE | F0 | A2 | TCE.A2 | 26% | Fail |
| BTCE | F0 | A3 | TCE.A3 | 51% | Pass |
| BTCE | F0 | A4 | TCE.A4 | 54% | Pass |

Tested for the alternative date of 21st April we see that the results are consistent with those previously tested variant 1 for the standard BRE test date 21st March the alternative test date of 21st April.

We can see that after March there is significant light penetration.

The taller element on TCE.A2 sitting on the Southwest corner has significant impact but overall, the results are good later in the year.



# Potential for Daylight Performance

A high-level analysis of the potential for light penetration to façades given the obstruction to skylight defined by the by the Proposed TC&E Review/Amendment and additional height.

# Introduction

To ensure that the there is potential for daylight to reach the façades of the proposed blocks/heights without detailed assessment of internal design we have looked to the BRE guidelines. These guidelines provide a way of assessing light in terms of the availability of skylight normally used for the assessment of light to the windows of neighbours we can also use this for Potential performance. To provide some sort of average result and to exclude lower floors which may have commercial or other non-residential use we have assessed at approx. 1st floor level.

## Adjacent Properties - Light from the Sky impact on neighbouring properties

Tests were carried out to establish the quantity and quality of skylight (daylight) available to a room's windows. Locations tested are based on guideline recommendations for the closest facades which have windows with potential for impact.

We have investigated this impact under clause 2.2.7

> ***2.2.7 If this VSC is greater than 27% then enough skylight should still be reaching the window of the existing building. This value of VSC typically supplies enough daylight to a standard room when combined with a window of normal dimensions, with glass area around 10% or more of the floor area. Any reduction below this level should be kept to a minimum. If the VSC, with the new development in place, is both less than 27% and less than 0.80 times its former value, occupants of the existing building will notice the reduction in the amount of skylight. The area lit by the window is likely to appear gloomier, and electric lighting will be needed more of the time. . . .***

***2.2.6 Any reduction in the total amount of skylight can be calculated by finding the VSC at the centre of each main window. In the case of a floor-to-ceiling window such as a patio door, a point 1.6 m above ground (or balcony level for an upper storey) on the centre line of the window may be used. For a bay window, the centre window facing directly outwards can be taken as the main window. If a room has two or more windows of equal size, the mean of their VSCs may be taken. The reference point is in the external plane of the window wall. Windows to bathrooms, toilets, storerooms, circulation areas, and garages need not be analysed. . . .***

## Obstruction angle/VSC

However, there is also a section which considered light in terms of obstruction angle which can be directly related to VSC. The summary to section 2.1 refers:

> ***2.1.21 Obstructions can limit access to light from the sky. This can be checked at an early design stage by measuring or calculating the angle of visible sky ϑ, angle of obstruction or vertical sky component (VSC) at the centre of the lowest window where daylight is required. If VSC is:***
>
> - ***at least 27% (ϑ is greater than 65°, obstruction angle less than 25°) conventional window design will usually give reasonable results.***
> - ***between 15% and 27% (ϑ is between 45° and 65°, obstruction angle between 25° and 45°) special measures (larger windows, changes to room layout) are usually needed to provide adequate daylight.***
> - ***between 5% and 15% (ϑ is between 25° and 45°, obstruction angle between 45° and 65°) it is very difficult to provide adequate daylight unless very large windows are used.***
> - ***less than 5% (ϑ less than 25°, obstruction angle more than 65°) it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed.***

The target of >27% applied to conventional window design which is for normal housing with smaller windows. Apartment design in developments such as those suggested here would utilise much larger full height windows stretching across the majority of the LKD façade internal layouts would be designed to achieve targets.

**It is not unreasonable therefore to drop the VSC target of >15% as base for preliminary testing.**

Any analysis excludes balconies and layout but that is a requirement of detail design.

The Analysis presented here looks at daylight/skylight penetration to the outer facing façades of each of the blocks at a nominal 1st floor level. Block are numbered as per the parcel numbering with an additional digit 1..4 for the orientation 1=NW, 2= NE, 3=SE and 4= SW

e.g. TCC1B.2.2 = Block Zone = CC1B and Block = 2 and Façade = 2(NE)

## Parcel Naming.


## Results are tabulated below:

| | Skylight to habitable rooms | | | | | |
|---|---|---|---|---|---|---|
| | **VSC** | | | | | |
| **Design** | *Check VSC against targets of <27% and also <15%* | | | | | |
| | | | | | **Conventional Windows** | **Larger Windows** |
| **Group** | **Floor** | **Win** | **Ref** | **VSC Proposed** | **>27%** | **>15%** |
| BTCC1B | F1 | W11 | **TCC1B.1.1** | 28.0% | Pass | Pass |
| BTCC1B | F1 | W12 | **TCC1B.1.2** | 27.2% | Pass | Pass |
| BTCC1B | F1 | W13 | **TCC1B.1.3** | 30.5% | Pass | Pass |
| BTCC1B | F1 | W14 | **TCC1B.1.4** | 28.5% | Pass | Pass |
| BTCC1B | F1 | W21 | **TCC1B.2.1** | 26.6% | Marginal | Pass |
| BTCC1B | F1 | W22 | **TCC1B.2.2** | 29.2% | Pass | Pass |
| BTCC1B | F1 | W23 | **TCC1B.2.3** | 29.9% | Pass | Pass |
| BTCC1B | F1 | W24 | **TCC1B.2.4** | 26.9% | Marginal | Pass |
| BTCC1B | F1 | W31 | **TCC1B.3.1** | 31.4% | Pass | Pass |
| BTCC1B | F1 | W32 | **TCC1B.3.2** | 33.5% | Pass | Pass |
| BTCC1B | F1 | W33 | **TCC1B.3.3** | 14.6% | Fail | Marginal |
| BTCC1B | F1 | W34 | **TCC1B.3.4** | 34.0% | Pass | Pass |
| BTCC1B | F1 | W41 | **TCC1B.4.1** | 31.0% | Pass | Pass |
| BTCC1B | F1 | W42 | **TCC1B.4.2** | 29.8% | Pass | Pass |
| BTCC1B | F1 | W43 | **TCC1B.4.3** | 33.6% | Pass | Pass |
| BTCC1B | F1 | W44 | **TCC1B.4.4** | 25.5% | Fail | Pass |
| BTCC1B | F1 | W51 | **TCC1B.5.1** | 30.9% | Pass | Pass |
| BTCC1B | F1 | W52 | **TCC1B.5.2** | 17.0% | Fail | Pass |
| BTCC1B | F1 | W53 | **TCC1B.5.3** | 32.9% | Pass | Pass |
| BTCC1B | F1 | W54 | **TCC1B.5.4** | 26.6% | Marginal | Pass |
| BTCC1B | F1 | W61 | **TCC1B.6.1** | 16.3% | Fail | Pass |
| BTCC1B | F1 | W62 | **TCC1B.6.2** | 26.2% | Marginal | Pass |
| BTCC1B | F1 | W63 | **TCC1B.6.3** | 31.6% | Pass | Pass |
| BTCC1B | F1 | W64 | **TCC1B.6.4** | 15.5% | Fail | Pass |
| BTCC1B | F1 | W11 | **TCC1B.1.1** | 26.6% | Marginal | Pass |
| BTCC1B | F1 | W12 | **TCC1B.1.2** | 38.5% | Pass | Pass |
| BTCC1B | F1 | W13 | **TCC1B.1.3** | 31.3% | Pass | Pass |
| BTCC1B | F1 | W14 | **TCC1B.1.4** | 23.2% | Fail | Pass |

| | Skylight to habitable rooms | | | | | |
|---|---|---|---|---|---|---|
| | **VSC** | | | | | |
| **Design** | *Check VSC against targets of <27% and also <15%* | | | | | |
| | | | | | **Conventional Windows** | **Larger Windows** |
| **Group** | **Floor** | **Win** | **Ref** | **VSC Proposed** | **>27%** | **>15%** |
| BTCC3 | F1 | W11 | **TCC3.1.1** | 33.9% | Pass | Pass |
| BTCC3 | F1 | W12 | **TCC3.1.2** | 27.9% | Pass | Pass |
| BTCC3 | F1 | W13 | **TCC3.1.3** | 28.5% | Pass | Pass |
| BTCC3 | F1 | W14 | **TCC3.1.4** | 28.8% | Pass | Pass |
| BTCC3 | F1 | W21 | **TCC3.2.1** | 33.5% | Pass | Pass |
| BTCC3 | F1 | W22 | **TCC3.2.2** | 24.3% | Fail | Pass |
| BTCC3 | F1 | W23 | **TCC3.2.3** | 29.1% | Pass | Pass |
| BTCC3 | F1 | W24 | **TCC3.2.4** | 24.8% | Fail | Pass |
| BTCC3 | F1 | W31 | **TCC3.3.1** | 32.5% | Pass | Pass |
| BTCC3 | F1 | W32 | **TCC3.3.2** | 29.0% | Pass | Pass |
| BTCC3 | F1 | W33 | **TCC3.3.3** | 22.6% | Fail | Pass |
| BTCC3 | F1 | W34 | **TCC3.3.4** | 19.2% | Fail | Pass |
| BTCC3 | F1 | W41 | **TCC3.4.1** | 26.7% | Marginal | Pass |
| BTCC3 | F1 | W42 | **TCC3.4.2** | 30.9% | Pass | Pass |
| BTCC3 | F1 | W43 | **TCC3.4.3** | 29.1% | Pass | Pass |
| BTCC3 | F1 | W44 | **TCC3.4.4** | 29.9% | Pass | Pass |
| BTCC3 | F1 | W51 | **TCC3.5.1** | 31.1% | Pass | Pass |
| BTCC3 | F1 | W52 | **TCC3.5.2** | 20.1% | Fail | Pass |
| BTCC3 | F1 | W53 | **TCC3.5.3** | 30.6% | Pass | Pass |
| BTCC3 | F1 | W54 | **TCC3.5.4** | 33.5% | Pass | Pass |
| BTCC3 | F1 | W61 | **TCC3.6.1** | 29.1% | Pass | Pass |
| BTCC3 | F1 | W62 | **TCC3.6.2** | 31.6% | Pass | Pass |
| BTCC3 | F1 | W63 | **TCC3.6.3** | 32.6% | Pass | Pass |
| BTCC3 | F1 | W64 | **TCC3.6.4** | 24.4% | Fail | Pass |
| BTCC3 | F1 | W71 | **TCC3.7.1** | 25.7% | Fail | Pass |
| BTCC3 | F1 | W72 | **TCC3.7.2** | 25.4% | Fail | Pass |
| BTCC3 | F1 | W73 | **TCC3.7.3** | 28.3% | Pass | Pass |
| BTCC3 | F1 | W74 | **TCC3.7.4** | 29.0% | Pass | Pass |
| BTCC3 | F1 | W81 | **TCC3.8.1** | 26.6% | Marginal | Pass |
| BTCC3 | F1 | W82 | **TCC3.8.2** | 22.1% | Fail | Pass |
| BTCC3 | F1 | W83 | **TCC3.8.3** | 37.1% | Pass | Pass |
| BTCC3 | F1 | W84 | **TCC3.8.4** | 26.5% | Marginal | Pass |
| BTCC3 | F1 | W91 | **TCC3.9.1** | 29.9% | Pass | Pass |
| BTCC3 | F1 | W92 | **TCC3.9.2** | 33.9% | Pass | Pass |
| BTCC3 | F1 | W93 | **TCC3.9.3** | 38.3% | Pass | Pass |
| BTCC3 | F1 | W94 | **TCC3.9.4** | 23.3% | Fail | Pass |

| | Skylight to habitable rooms | | | | | |
|---|---|---|---|---|---|---|
| | **VSC** | | | | | |
| **Design** | *Check VSC against targets of <27% and also <15%* | | | | | |
| | | | | | **Conventional Windows** | **Larger Windows** |
| **Group** | **Floor** | **Win** | **Ref** | **VSC Proposed** | **>27%** | **>15%** |
| BTCC4A | F1 | W11 | **TCC4A.1.1** | 31.1% | Pass | Pass |
| BTCC4A | F1 | W12 | **TCC4A.1.2** | 35.6% | Pass | Pass |
| BTCC4A | F1 | W13 | **TCC4A.1.3** | 31.6% | Pass | Pass |
| BTCC4A | F1 | W14 | **TCC4A.1.4** | 26.3% | Marginal | Pass |
| BTCC4C | F1 | W21 | **TCC4C.2.1** | 32.8% | Pass | Pass |
| BTCC4C | F1 | W22 | **TCC4C.2.2** | 27.3% | Pass | Pass |
| BTCC4C | F1 | W23 | **TCC4C.2.3** | 31.6% | Pass | Pass |
| BTCC4C | F1 | W24 | **TCC4C.2.4** | 22.8% | Fail | Pass |
| BTCC4C | F1 | W11 | **TCC4C.1.1** | 25.1% | Fail | Pass |
| BTCC4C | F1 | W12 | **TCC4C.1.2** | 30.1% | Pass | Pass |
| BTCC4C | F1 | W13 | **TCC4C.1.3** | 33.7% | Pass | Pass |
| BTCC4C | F1 | W14 | **TCC4C.1.4** | 30.8% | Pass | Pass |
| BTCE5 | F1 | W21 | **TCE5.2.1** | 38.9% | Pass | Pass |
| BTCE5 | F1 | W22 | **TCE5.2.2** | 23.7% | Fail | Pass |
| BTCE5 | F1 | W31 | **TCE5.3.1** | 38.1% | Pass | Pass |
| BTCE5 | F1 | W32 | **TCE5.3.2** | 23.0% | Fail | Pass |
| BTCE5 | F1 | W34 | **TCE5.3.4** | 22.0% | Fail | Pass |
| BTCE5 | F1 | W41 | **TCE5.4.1** | 36.1% | Pass | Pass |
| BTCE5 | F1 | W44 | **TCE5.4.4** | 21.6% | Fail | Pass |
| | | | | **Count** | 83 | 83 |
| | | | | **Pass** | 52 | 82 |
| | | | | **Pass Rate** | **63%** | **99%** |
| | | | | | | |
| | | | | **Marginal** | 9 | 1 |
| | | | | **Pass Marginal** | **73%** | **100%** |

## Conclusion

We can see from these results that:

* 63% of façades or 73% if we include marginals would achieve a VSC of >27% (conventional widows)
* 98% of façades or 100% if we include marginals would achieve a VSC of >15% (larger windows)

It may be concluded that the proposed layout should allow enough skylight to penetrate to enable applicants to design apartments which will achieve the necessary light as per Department apartment and BRE best practice guidelines.

# Overall Summary

This is a working document which has been used to examine design iterations on the Proposed Town Centre and Environs (TCE) Height Review and is an analysis of the Built Form of the Loci model and its variants. This micro-climate assessment has been undertaken at a masterplan level to inform the urban design framework for the Cherrywood Town Centre Review. It is an iterative process with a focus on daylight and sunlight penetration to the public realm, namely streets and civic spaces, and also communal residential spaces, as well as impacts on neighbours. In addition, a high-level assessment comprising of a sample check, has been undertaken for light penetration to the future urban blocks to ensure adequate light penetration at 1st floor level higher levels will typically exhibit better results and GFL often has non-residential use.

The iterative nature of the process and its assessment is evident from the version assessments in the report, which in turn have informed the urban design approach, with resultant changes. Thus, in this regard, the report may be considered as an interim report for this stage of the amendment process (plan preparation), noting that design or framework parameters may be subject to change as part of any statutory amendment process. Further micro-climate assessment and analysis may be undertaken at later stages to inform the urban design approach at a masterplan level.

Chris Shackleton Consulting (CSC) have assessed the proposed emerging schemes for the following:

- Impact on development blocks already constructed standard BRE check.
- Access to sunlight for proposed amenity spaces (Sunlight on the Ground aka shadow).
- Access to skylight for proposed 1st floor levels (potential for daylight performance).

## Impact on exiting blocks using the UFDF as a Baseline.

**Change/Impact to neighbouring buildings vs the UFDF Baseline in the adjoining now constructed elements.**

- **Skylight- VSC**
  - **96%** *(98% including marginals)* of the tested façade locations comply with the VSC requirements for habitable rooms.
  - The average change ratio for VSC is **1.09**
- **Sunlight APSH & WPSH**
  - **100%** of tested windows comply with the annual APSH and
  - **98%** *(100% including marginals)* with the winter WPSH requirements for sunlight or overall requirement.
  - The average change ratio for sunlight is APSH: **1.07** and WPSH: **1.48**
- **Sunlight on the Ground SOG (Shadow)**
  - **100%** of tested amenity spaces pass the 2-hour test requirements for the 21st March.
  - The average change ratio for shadow/sunlight is **1.36**

**Overall, the scale of the proposed Loci layout balances design scale and the skyline profile with impact against the original UFDF baseline.**
**Overall the impact is neutral (change ratios around 1.00)**

## Performance of proposed new Amenity

The performance of amenity spaces was assessed.

- **Civic Spaces**
  - Civic spaces showed excellent access to sunlight
  - These well-defined spaces were substantially better quality than the original zones designated for similar use.
- **Communal courtyards**
  - The central courtyard spaces in the proposed design showed lower compliance based in the 2hr or the 21st March metric.
  - Shortfalls were identified.
  - Runing iterative designs and shifting the profiles, and reducing height to better allow sunlight to enter the courtyard provided us with improved.
  - These design revisions to change the building height consistent with the revised sun angle or to punch gaps in the building profile at sensitive angles.
  - Reducing height and reprofiling allowed us to achieve better but not fully compliant results.

## Competing Objectives

- There are numerous objectives to be considered in the development of a town centre and Sunlight/Daylight is just one of these.
- The department guidelines and Compact Settlement both provide some leniency in this regard: *"… planning authorities must weigh up the overall quality of the design and layout of the scheme and the measures proposed to maximise daylight provision, against the location of the site and the general presumption in favour of increased scales of urban residential development. Poor performance may arise due to design constraints associated with the site or location and there is a need to balance that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution."*
- This is the case in this proposed revision to the urban framework.
- It is desirable to maintain the amenity spaces on the ground level rather than shifting space to the roof. Previous experience has shown that while there is potential in such spaces their access longevity is often reduced by insurance or management concerns.

The iterative process was used, and several design variants were examined. When assessing the amenity quality, we used the BRE metric as follows:

- The standard BRE metric which check the amount of a space that receives 2hr sunlight on 21st March
- We also applied this metric on the alternative date 21st April

The final variants of the Amenity test results shown in our main report are summarised below:

- It is difficult get sunlight to enter the central courtyards (especially smaller ones) while being conscious of the competing objectives in relation to town planning and densities.
- The design currently put forward is a balance of objectives.
- Our results for the 21st of March even for the iterated design show a less-than-ideal set of results.
    - Variant 1 - 52% compliant or 65% including marginal.
- However, this is a town centre, and some consideration should be given to the objective to increase scale and density and so a supplementary analysis is suggested run on the same metric but on the 21st April when the sun is higher in the sky. This will clarify if the amenity spaces are poorly lit or if the overshadowing might be a date-based or geometric problem.
- This would be consistent with the balancing suggested in both the Department apartment and Compact Settlement Guidelines.
- The results against the metric but on an alternative date 21st April are much better and show that the spaces can receive a reasonable quality of sunlight if not on the 21st March.
    - Variant 1 - 87% compliant or 91% including marginals.

***It would appear that we can't achieve the target results without conflicting with most of the other objectives and reducing scale. We therefore suggest that the standard BRE results 21st March be primarily presented but in the interests of balancing light with other objectives that the DLR are also cognisant of results for 21st April. Additional space to sunlit rooftop gardens may need to be also considered.***

Variant 2 looked at a Variant design for as revised usage of blocks TCE5-2, TCE5-2 & TCE5-3

- The Amenity results for these blocks followed the same pattern we have seen for the rest of the town centre. The internal courtyards don't receive much sunlight on the 21st March but the results are much better when the results later in the year 21st April are examined using the same metric.

## Potential for Daylight Performance

The target of >27% applied to conventional window design which is for normal housing with smaller windows. Apartment design in developments such as those suggested here would utilise much larger full height windows stretching across the majority of the LKD façade internal layouts would be designed to achieve targets.

It is not unreasonable therefore to drop the VSC target of >15% as base for preliminary testing.

**A VSC analysis was performed on outward facing facades generally at 1st floor level**

*** 63% of façades or 73% if we included marginals would achieve a VSC of >27% (conventional widows)**
*** 98% of façades or 100% if we included marginals would achieve a VSC of >15% (larger windows)**

**Higher levels will have more potential daylight and conversely GFL ones less.**

**It may be concluded that the proposed layout should allow enough skylight to penetrate to enable applicants to design apartments which will achieve the necessary light as per Department apartment and BRE best practice guidelines.**

**Considered detail design will be necessary.**

## Consideration of additional scale

- Results shown are based on layouts provided by Loci and iterations on the same.
- Typically, we have had to reduce scale to achieve even the compliance levels detailed above.
- At this time, we would not recommend additional height above what has been proposed and indeed modified.
- Increased height might also impact negatively on light to the already built or permitted blocks as tested.