BUROHAPPOLD ENGINEERING

TFL Landholdings at Northwood, London, HA6 2QB

Daylight and sunlight assessment

034233

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Glossary

Term	Definition
Annual Probable Sunlight Hours (APSH)	The long-term average of the total number of hours during a year in which direct sunlight reaches the unobstructed ground (when clouds are taken into account)
Daylight	The visible part of global solar radiation (includes sun and sky light)
Obstruction	Anything outside a building which prevents a direct view of the sky from a given reference point
Skylight	That part of the light from the sun that reaches the earth's surface as a result of scattering in the atmosphere
Sunlight	That part of the light from the sun that reaches the earth's surface as parallel rays after selective attenuation by the atmosphere
Vertical Sky Component (VSC)	Ratio, expressed as a percentage, of that part of illuminance, at a point on a given vertical plane, that is received directly from a standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky
Winter Probable Sunlight Hours (WPSH)	The probable sunlight hours between 21st September and 21st March

1 Executive Summary

This report sets out the results of an assessment of daylight and sunlight availability within and surrounding the proposed development by TFL Landholdings at Northwood, London, HA6 2QB. The methodology adopted for the assessment is in accordance with BRE Report BR209, Site layout planning for daylight and sunlight: A guide to good practice, second edition, 2011.

BR209 sets out design guidance with the aim to provide sufficient access to light from the sky and sunlight in appropriate rooms of new and existing buildings and amenity spaces.

The design criteria described in BR209 are meant to provide guidance for designers rather than a regulatory requirement. Designers are encouraged to apply the guidance so that it is sensitive to the development being assessed. The proposed development is a high density, urban environment and as such, numerical targets should be interpreted flexibly, as advised in BR209.

In the following assessment, daylight and sunlight access within the proposed development and to existing windows and amenity spaces surrounding the development site have been assessed against the criteria described in BR209.

The findings of the assessment are summarised as follows:

1.1 Existing surroundings

Light from the sky

- it is concluded that surrounding buildings will receive adequate daylight with the proposed development in place.

Direct sunlight

- it is concluded that surrounding buildings will receive adequate direct sunlight with the proposed development in place; and
- it is concluded that surrounding open spaces will receive adequate direct sunlight with the proposed development in place.

1.2 Proposed development

Light from the sky

- the proposed development receives adequate daylight access at all but six residential window locations, where adequate daylight and sunlight access could be achieved by careful consideration of room layouts and window arrangements; and
- it is recommended that as the design of townhouses develops, attention is paid to room layouts, room uses and window sizes to maximise the daylight potential of the proposed development.

Direct sunlight

- the proposed development receives adequate direct sunlight at all but six windows, all of which meet either the BR209 recommended APSH or WPSH;
- it is concluded that the proposed development generally receives adequate direct sunlight, considering its urban setting; and
- it is concluded that the proposed piazza will receive adequate direct sunlight.

2 Introduction

2.1 Background

This report has been prepared to support the hybrid planning application for comprehensive redevelopment of the site comprising full planning permission involving demolition of existing buildings to provide 93 residential units (C3) and associated car parking, 1,440m^2 retail (A1-A5), a new operational station (Sui Generis) with step free access and associated car parking for the station; new bus interchange, and a new piazza. Outline planning consent for up to 34 residential units, car parking (all matters reserved apart from access) and refurbishment works to existing retail units along Station Approach.

The report addresses the London Borough of Hillingdon's Local Plan: Part 1 Strategic Policies 2012, which requires that "*buildings should be laid out so that adequate daylight and sunlight can penetrate into and between them and the amenities of existing houses are safeguarded.* "

The aim of the report is to present results of an assessment of:

- the impact the proposed development has on daylight and sunlight access to existing adjacent buildings;
- daylight and sunlight access within the proposed development; and
- sunlight access to existing adjacent gardens and public realm space within the proposed development.

2.2 Site

Figure 2—1 illustrates the proposed development site boundary and immediate surrounding context.

Figure 2—1 Proposed development site layout

3 Assessment Methodology

BR209 sets out sensible design guidance with the aim to provide sufficient daylight and sunlight access in appropriate rooms of new and existing buildings and public amenity spaces. The massing of the proposed development and new amenity space and its effect on daylight and sunlight access to existing windows and amenity spaces were assessed in the context of BR209 guidance to determine:

i. access to light from the sky in new and existing buildings;

ii. access to direct sunlight in new and existing buildings; and

iii. access to direct sunlight in new and existing amenity spaces.

Where internal layouts were known, main window locations at living rooms/kitchens and bedrooms were applied to a 3D model of the proposed development. Where internal layouts were not known, notional window locations were applied to a 3D model of the proposed massing, in accordance with BR209 guidance of 1.6 m above floor level and no more than 5 m apart. Window locations on existing buildings were determined from photographs of the site. Where internal layouts were not known, all window locations partially overshadowed by the proposed development were assessed against BR209 guidance, but it should be noted that rooms normally considered to have a need for light from the sky are residential kitchens, living rooms and bedrooms and only residential living rooms and conservatories are considered to have a need for direct sunlight. Additional surfaces were created in the 3D model at ground level to define amenity spaces for assessment of sunlight access.

The 3D model used for the assessment was provided in Rhinoceros software format by Fletcher Priest Architects (FPA). Calculations were carried out using MBS software Daylight for Sketchup extension in Sketchup 2014 software.

3.1 Light from the sky – Existing buildings

The excerpt from BR209 below summarises the methodology for assessing access to sky light for existing buildings.

'If any part of a new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse daylight of the existing building may be adversely affected. This will be the case if either:

- *the VSC measured at the centre of an existing window is less than 27, and less than 0.8 times its former value*
- *the area of the working plane in a room which can receive direct skylight is reduced to less than 0.8 times its former value.'*

3.2 Light from the sky – New buildings

The excerpt from BR209 below summarises the methodology for assessing access to light from the sky for new buildings.

'Obstructions can limit access to light from the sky. This can be checked 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.'*

3.3 Direct sunlight – Existing Buildings

The excerpt from BR209 below summarises the methodology for assessing access to direct sunlight for existing buildings.

'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 in a vertical section perpendicular to the window, then the sunlighting of the existing window may be adversely affected. This will be the case if the centre of the window:

- *receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March and*
- *receives less than0.8 times its former sunlight hours during either period and*
- *has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.'*

3.4 Direct sunlight – New Buildings

The excerpt from BR209 below summarises the methodology for assessing access to direct sunlight for new buildings.

'In general a dwelling, or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided:

- *at least one main window wall faces within 90° of due south and*
- *the centre of at least one window to a main living room can receive 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours in the winter months between 21 September and 21 March.*

Where groups of dwellings are planned, site layout design should aim to maximise the number of dwellings with a main living room that meets the above recommendations.'

3.5 Direct sunlight – Open spaces

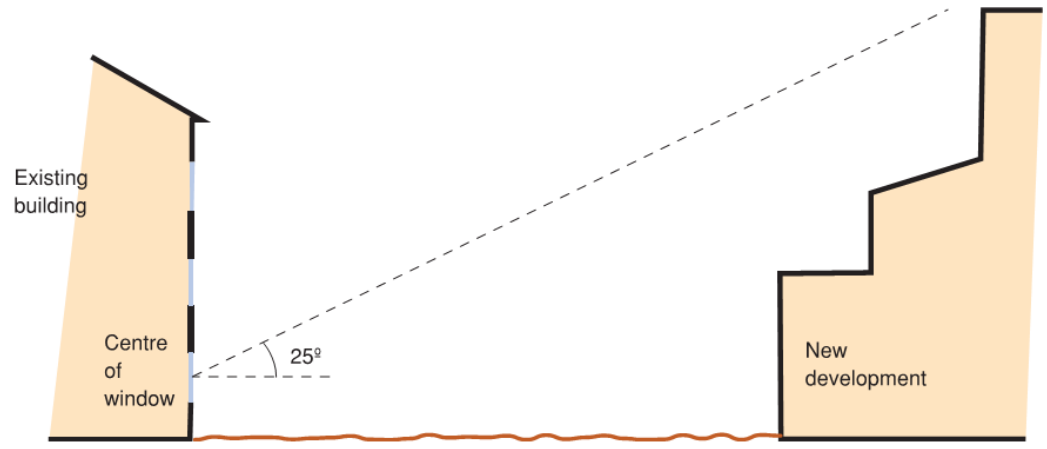
The excerpt from BR209 below summarises the methodology for assessing access to direct sunlight for gardens and open spaces.

'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 a new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 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.'

3.6 Identification of assessment locations

An initial assessment of daylight and sunlight access to existing buildings and within the proposed development was made by identifying facade locations which were deemed to meet the guidance of BR209 by having an obstruction angle less than 25° (see Figure 3—1 for an illustration of this principle). Only façade locations having an obstruction angle greater than 25° were assessed in detail to determine their Vertical Sky Component and of these locations only those facing within 90° of south were assessed in detail to determine the Annual Probable Sunlight Hours (APSH) and Winter Probable Sunlight Hours (WPSH). Where internal layouts were known, only living room/kitchen, and bedroom windows were assessed in detail, in accordance with BR209.

Figure 3—1 BR209 obstruction angle corresponding to a VSC of 27%



3.7 Impact assessment of the proposed development on its surroundings

BR209 Appendix I describes the impact of a development on its surroundings as *'Beneficial'*, *'Negligible'* or *'Adverse'* in terms of the change in the amount of skylight and sunlight reaching an existing building where it is required, or the amount of sunlight reaching an open space. It also states that, *'The assessment of impact will depend on a combination of factors, and there is no simple rule of thumb that can be applied'*, however guidance is provided on quantifying the significance of relative adverse changes as minor, moderate or major, as follows:

3.7.1 Impact significance

Factors tending towards a minor adverse impact include:

- only a small number of windows or limited area of open space are affected;
- the loss of light is only marginally outside the guidelines;
- an affected room has other sources of skylight or sunlight; and
- the affected building or open space only has a low level of requirement for skylight or sunlight

Factors tending towards a major adverse impact include:

- a large number of windows or large area of open space are affected;
- the loss of light is substantially outside the guidelines;
- all the windows in a particular property are affected; and
- the affected indoor or outdoor spaces have a particular strong requirement for skylight or sunlight, e.g. a living room in a dwelling or a children's playground.

The impact is considered to be negligible if the guidance of BR209 is met. Windows or open spaces that do not fall into major, minor or negligible categories are assigned a moderate impact significance.

An element of professional judgement is required to establish threshold values for the level of impact. Based on relevant numerical values provided in BR209 and industry-accepted typical values, the significance criteria adopted for this assessment are detailed in Table 3—1. Where an impact is identified as *'Beneficial'*, the same significance criteria are adopted as recommended in BR209 Appendix I.

Table 3—1 Impact assessment significance criteria

Significance	Criterion: change in Vertical Sky Component or Probable Sunlight Hours
Negligible	≤20%
Minor	>20% and ≤30%
Moderate	>30% and ≤40%
Major	>40%

3.8 Assessment of daylight and sunlight access within the proposed development

Categorising daylight and sunlight access within new developments is based on numerical guidance contained in BR209. With reference to BRE209 guidance reproduced in section 3.2, daylight access at windows within the proposed development is categorised as shown in Table 3—2 and sunlight access is assessed on a pass or fail basis.

Table 3—2 Daylight access criteria

Daylight access	Criterion: Vertical Sky Component
BR209 guidance met	≥27%
Acceptable daylight in urban setting	≥15% and <27%
Poor daylight	≥5% and <15%
Inadequate daylight	<5%

4 Results

Please refer to the keyplans in Figure 4—1 and Figure 4—2 for locations of windows within and around the proposed development assessed for daylight and sunlight access. Views of the 3D model in Figure 4—3 show each window's position on its elevation.

Figure 4—1 Window locations keyplan - north

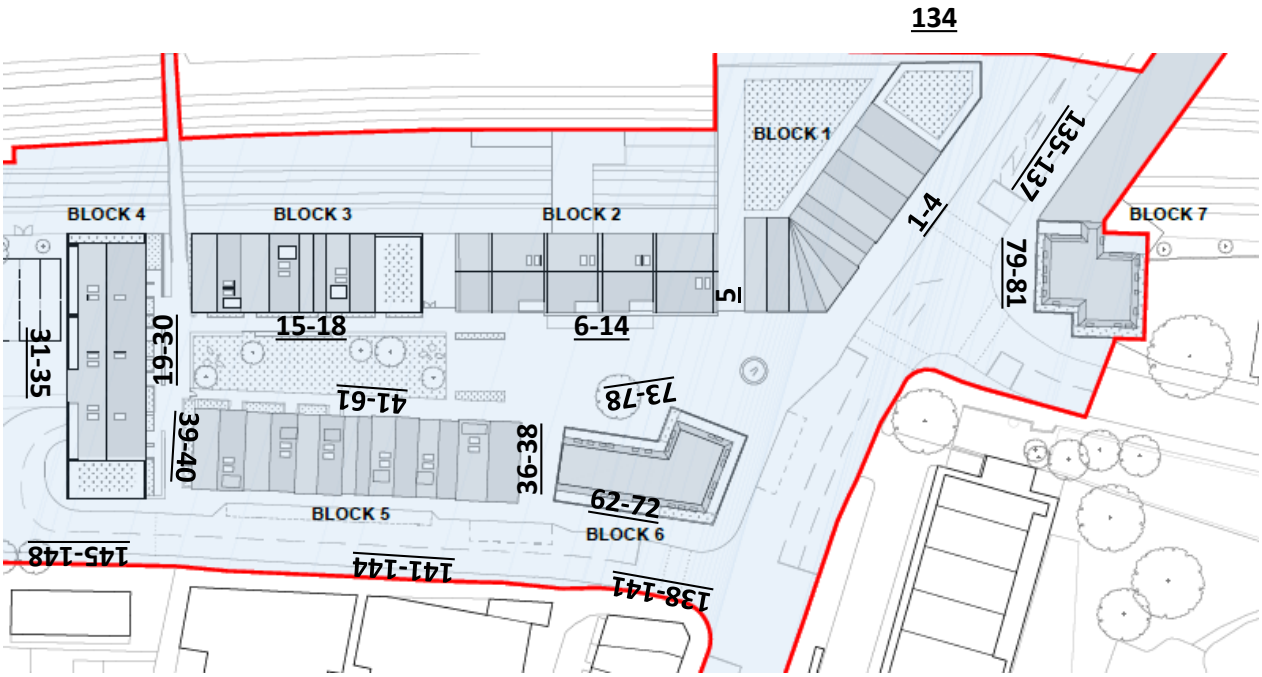
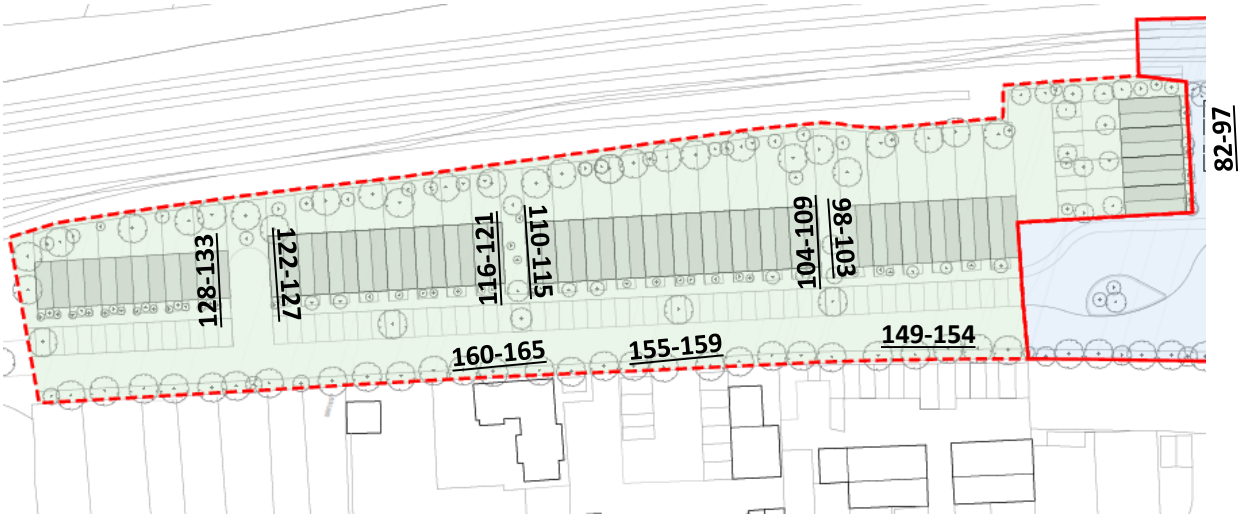


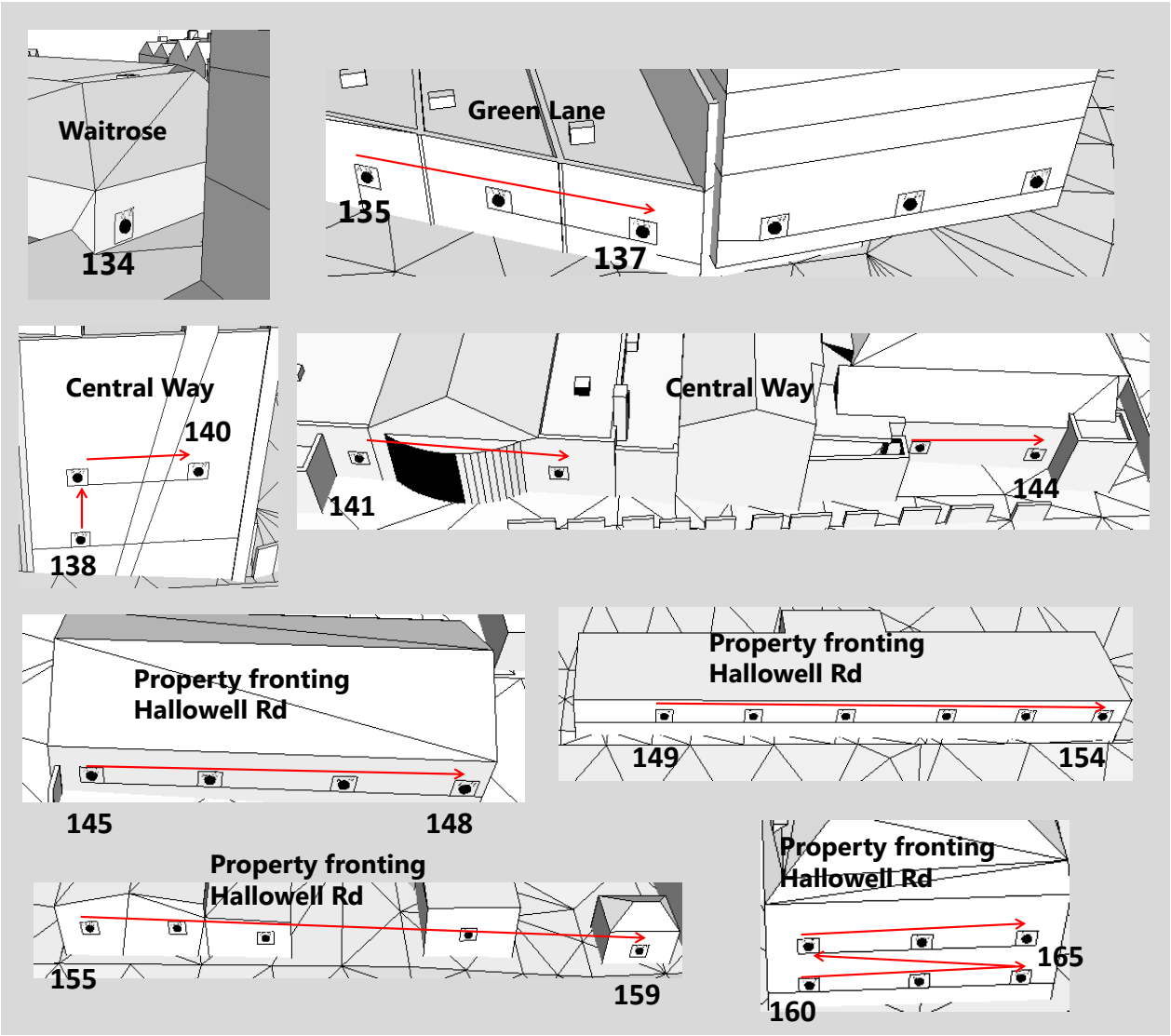
Figure 4—2 Window locations keyplan - south



4.1 Existing surroundings

Assessment results are presented below for daylight and sunlight availability surrounding the proposed development at the window locations shown in Figure 4—3 and open spaces shown in Figure 4—4.

Figure 4—3 Existing window locations3D view



4.1.1 Light from the sky – Existing buildings

Vertical Sky Components (VSC) were calculated for 32 window locations of the surrounding buildings that were identified as being likely to be partially obstructed by the proposed development based on the BR209 25° rule.

In order meet BR209 guidance on access to light from the sky, the Vertical Sky Component (VSC) at the centre of a main window should not be less than 27% and should not reduce to less than 0.8 times its former value with the proposed development in place. Table 4—1 below show the calculated VSCs for the existing pre-development condition and proposed post-development condition and the relative impact of the proposed development on existing buildings.

Table 4—1 Impact of proposed development on existing buildings - VSC

Window Position	Existing VSC %	Proposed VSC %	Ratio Proposed / Existing	BR209 guidance met	BR209 Impact of Proposed Development on Existing Buildings
134	**35.81**	**11.97**	**0.33**	**NO**	Major Adverse
135	**33.92**	**26.84**	**0.79**	**NO**	Minor Adverse
136	**35.29**	**26.11**	**0.74**	**NO**	Minor Adverse
137	**35.69**	**24.34**	**0.68**	**NO**	Moderate Adverse
138	**24.34**	**24.14**	**0.99**	**YES**	Negligible
139	**37.46**	**28.80**	**0.77**	**YES**	Negligible
140	**38.61**	**26.94**	**0.70**	**NO**	Moderate Adverse
141	**18.33**	**18.21**	**0.99**	**YES**	Negligible
142	**16.53**	**19.13**	**1.16**	**YES**	Negligible
143	**22.69**	**15.76**	**0.69**	**NO**	Moderate Adverse
144	**23.95**	**15.43**	**0.64**	**NO**	Moderate Adverse
145	**35.17**	**20.21**	**0.57**	**NO**	Major Adverse
146	**35.89**	**21.93**	**0.61**	**NO**	Moderate Adverse
147	**34.26**	**24.80**	**0.72**	**NO**	Minor Adverse
148	**35.93**	**27.25**	**0.76**	**YES**	Negligible
149	**38.30**	**30.32**	**0.79**	**YES**	Negligible
150	**38.34**	**29.59**	**0.77**	**YES**	Negligible
151	**38.38**	**29.02**	**0.76**	**YES**	Negligible
152	**38.39**	**28.85**	**0.75**	**YES**	Negligible
153	**38.42**	**29.04**	**0.76**	**YES**	Negligible
154	**38.43**	**29.42**	**0.77**	**YES**	Negligible
155	**38.48**	**28.90**	**0.75**	**YES**	Negligible
156	**38.48**	**28.61**	**0.74**	**YES**	Negligible
157	**38.31**	**27.16**	**0.71**	**YES**	Negligible
158	**38.28**	**26.80**	**0.70**	**NO**	Minor Adverse
159	**38.07**	**24.84**	**0.65**	**NO**	Moderate Adverse
160	**38.20**	**26.42**	**0.69**	**NO**	Moderate Adverse
161	**38.20**	**26.76**	**0.70**	**NO**	Minor Adverse
162	**38.21**	**26.14**	**0.68**	**NO**	Moderate Adverse
163	**38.73**	**30.27**	**0.78**	**YES**	Negligible
164	**38.73**	**30.54**	**0.79**	**YES**	Negligible
165	**38.74**	**30.08**	**0.78**	**YES**	Negligible

4.1.2 Direct sunlight – Existing buildings

Annual Probable Sunlight Hours (APSH) and Winter Probable Sunlight Hours (WPSH) were calculated for 31 of 32 existing window locations of the surrounding buildings that were identified as being likely to be partially obstructed by the proposed development based on the BR209 25° rule and that face within 90° of south.

Sunlight access will be adversely affected if the centre of a main window receives less than 25% of APSH **or** less than 5% of APSH between 21 September and 21 Marsh (WPSH) **and** less than 0.8 times its former value during either period **and** has a reduction in APSH of more than 4%.

Table 4—2 and Table 4—3 show the calculated APSHs and WPSHs for the existing pre-development condition and proposed post-development condition and the relative impact of the proposed development on existing buildings.

Table 4—2 Impact of proposed development on existing buildings - APSH

Window Position	Existing APSH %	Proposed APSH %	Ratio Proposed / Existing	Change from existing APSH %	BR209 guidance met	BR209 Impact of Proposed Development on Existing Buildings
135	71	60	**0.85**	**-11.00**	**YES**	Negligible
136	78	65	**0.83**	**-13.00**	**YES**	Negligible
137	80	60	**0.75**	**-20.00**	**YES**	Negligible
138	37	33	**0.89**	**-4.00**	**YES**	Negligible
139	52	37	**0.71**	**-15.00**	**YES**	Negligible
140	51	33	**0.65**	**-18.00**	**YES**	Negligible
141	27	28	**1.04**	**1.00**	**YES**	Negligible
142	**23**	27	**1.17**	**4.00**	**YES**	Negligible
143	40	27	**0.68**	**-13.00**	**YES**	Negligible
144	**18**	8	**0.44**	**-10.00**	**NO**	Major Adverse
145	57	34	**0.60**	**-23.00**	**YES**	Negligible
146	56	37	**0.66**	**-19.00**	**YES**	Negligible
147	54	46	**0.85**	**-8.00**	**YES**	Negligible
148	56	49	**0.88**	**-7.00**	**YES**	Negligible
149	58	49	**0.84**	**-9.00**	**YES**	Negligible
150	58	49	**0.84**	**-9.00**	**YES**	Negligible
151	58	48	**0.83**	**-10.00**	**YES**	Negligible
152	58	48	**0.83**	**-10.00**	**YES**	Negligible
153	58	47	**0.81**	**-11.00**	**YES**	Negligible
154	58	48	**0.83**	**-10.00**	**YES**	Negligible
155	59	47	**0.80**	**-12.00**	**YES**	Negligible
156	59	47	**0.80**	**-12.00**	**YES**	Negligible
157	59	42	**0.71**	**-17.00**	**YES**	Negligible
158	59	44	**0.75**	**-15.00**	**YES**	Negligible
159	58	39	**0.67**	**-19.00**	**YES**	Negligible
160	60	42	**0.70**	**-18.00**	**YES**	Negligible

Window Position	Existing APSH %	Proposed APSH %	Ratio Proposed / Existing	Change from existing APSH %	BR209 guidance met	BR209 Impact of Proposed Development on Existing Buildings
161	60	44	**0.73**	**-16.00**	**YES**	Negligible
162	60	42	**0.70**	**-18.00**	**YES**	Negligible
163	60	48	**0.80**	**-12.00**	**YES**	Negligible
164	60	51	**0.85**	**-9.00**	**YES**	Negligible
165	60	50	**0.83**	**-10.00**	**YES**	Negligible

Table 4—3 Impact of proposed development on existing buildings - WPSH

Window Position	Existing WPSH %	Proposed WPSH %	Ratio Proposed / Existing	BR209 guidance met	BR209 Impact of Proposed Development on Existing Buildings
135	24	13	**0.54**	**YES**	Negligible
136	25	12	**0.48**	**YES**	Negligible
137	25	8	**0.32**	**YES**	Negligible
138	13	9	**0.69**	**YES**	Negligible
139	16	9	**0.56**	**YES**	Negligible
140	16	9	**0.56**	**YES**	Negligible
141	5	5	**1.00**	**YES**	Negligible
142	9	7	**0.78**	**YES**	Negligible
143	15	7	**0.47**	**YES**	Negligible
144	5	0	**0.00**	**NO**	Major Adverse
145	20	13	**0.65**	**YES**	Negligible
146	19	15	**0.79**	**YES**	Negligible
147	18	17	**0.94**	**YES**	Negligible
148	19	18	**0.95**	**YES**	Negligible
149	20	14	**0.70**	**YES**	Negligible
150	20	14	**0.70**	**YES**	Negligible
151	20	14	**0.70**	**YES**	Negligible
152	20	16	**0.80**	**YES**	Negligible
153	20	15	**0.75**	**YES**	Negligible
154	20	15	**0.75**	**YES**	Negligible
155	20	13	**0.65**	**YES**	Negligible
156	20	14	**0.70**	**YES**	Negligible
157	20	11	**0.55**	**YES**	Negligible
158	20	13	**0.65**	**YES**	Negligible
159	20	12	**0.60**	**YES**	Negligible
160	21	12	**0.57**	**YES**	Negligible
161	21	13	**0.62**	**YES**	Negligible
162	21	12	**0.57**	**YES**	Negligible
163	21	15	**0.71**	**YES**	Negligible

Window Position	Existing WPSH %	Proposed WPSH %	Ratio Proposed / Existing	BR209 guidance met	BR209 Impact of Proposed Development on Existing Buildings
164	21	16	**0.76**	**YES**	Negligible
165	21	15	**0.71**	**YES**	Negligible

4.1.3 Direct sunlight – Existing open spaces

Sunlight access has been calculated for existing gardens adjacent to the proposed development, shown in Figure 4—4.

To meet BR209 guidance on sunlight access to existing open spaces, at least half of an open space should receive at least two hours of sunlight on 21 March and should not be reduce to less than 0.8 times its former value with the proposed development in place.

Table 4—4 shows the calculated percentage of area of existing open spaces receiving at least two hours of sunlight on 21 March with the proposed development in place. As all areas meet BR209 guidance, no assessment of the ratio of existing to proposed values is required.

Figure 4—4 Existing open spaces – hours of sunlight on March equinox

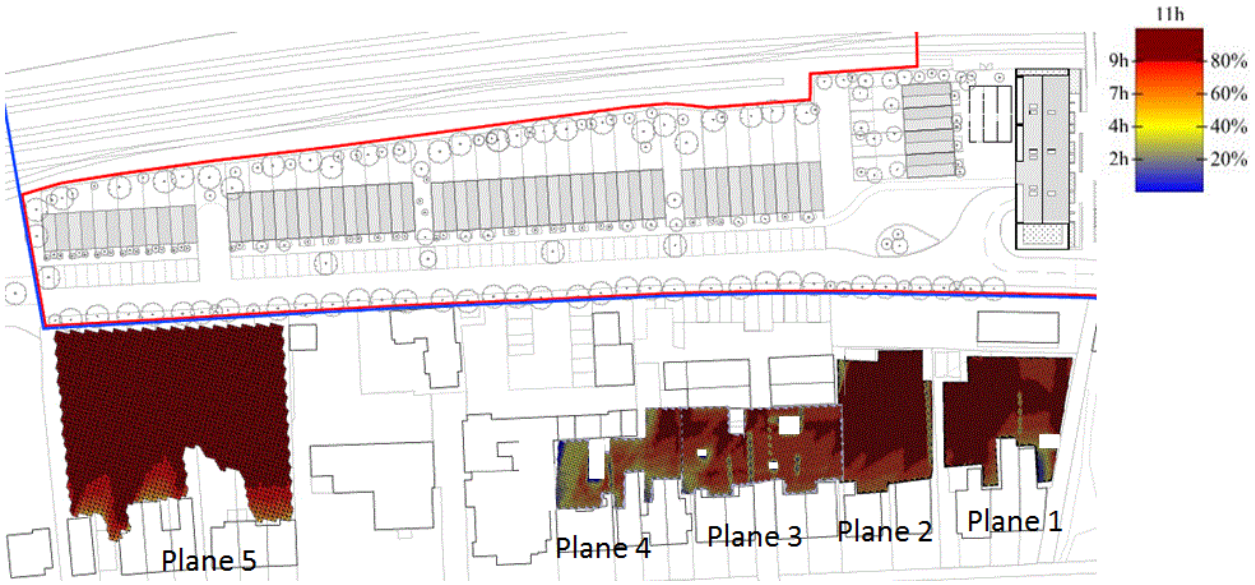


Table 4—4 Existing open spaces – percentage of area receiving at least 2 hours of sunlight on March equinox

Plane	Area receiving at least 2 hours of sunlight on March equinox (%)
Plane 1	98.3%
Plane 2	99.8%
Plane 3	98.5%
Plane 4	96.2%
Plane 5	100%

4.2 Proposed development

Assessment results are presented below for daylight and sunlight availability within the proposed development at the window locations shown in Figure 4—5 and Figure 4—6 and open space shown in Figure 4—7.

Figure 4—5 Proposed development window locations3D view - north

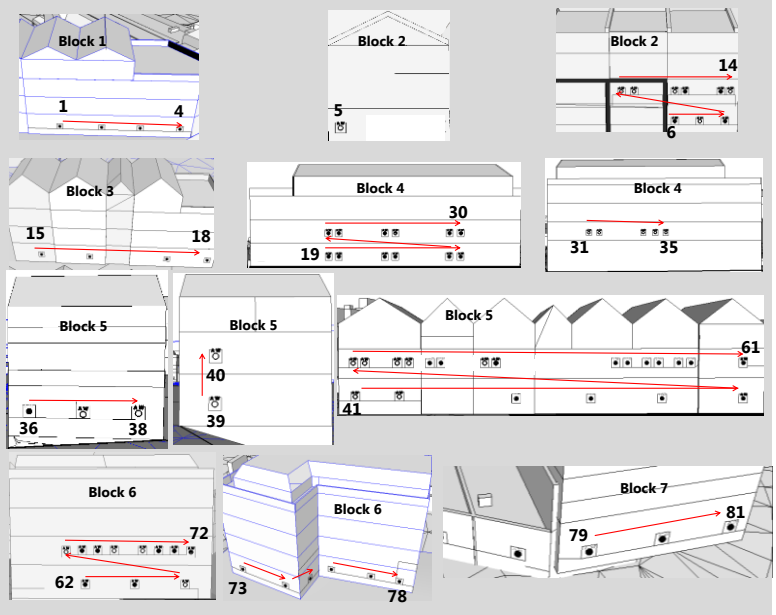
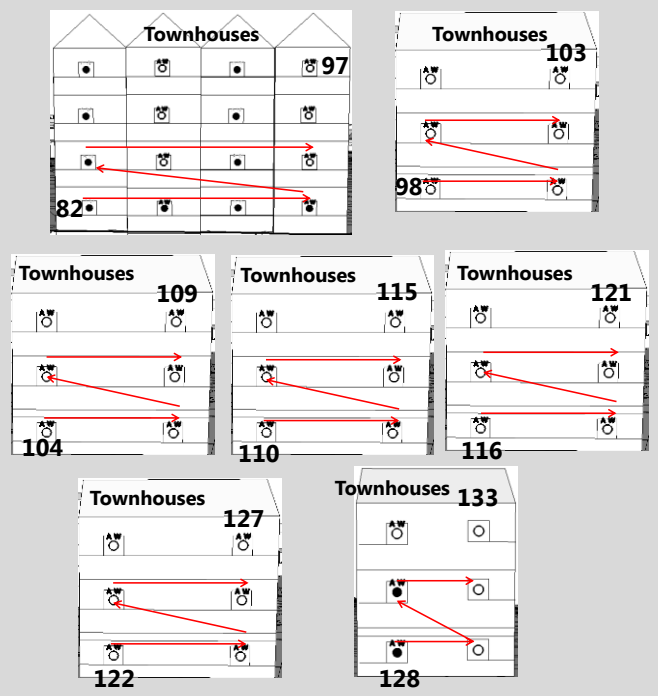


Figure 4—6 Proposed development window locations3D view - south



4.2.1 Light from the sky – Proposed development

Vertical Sky Components (VSC) were calculated for living room/kitchen and bedroom window locations within the proposed development that were identified as being likely to be partially obstructed by the proposed development based on the BR209 25° rule.

In order to meet BR209 guidance on access to light from the sky, the Vertical Sky Component (VSC) at the centre of a main window within a new development should not be less than 27%.

Table 4—5 shows the calculated VSCs at the assessed locations within the proposed development and the corresponding levels of daylight availability, as defined in section 3.8.

Table 4—5 VSC values and level of daylight access within the proposed development

Window Position	Existing VSC %	Proposed VSC %	Ratio Proposed / Existing	BR209 guidance met	Daylight access within the proposed development	Proposed development use
1	**N.A.**	**31.84**	**N.A.**	**YES**	BR209 guidance met	Non-residential
2	**N.A.**	**31.32**	**N.A.**	**YES**	BR209 guidance met	Non-residential
3	**N.A.**	**31.45**	**N.A.**	**YES**	BR209 guidance met	Non-residential
4	**N.A.**	**32.20**	**N.A.**	**YES**	BR209 guidance met	Non-residential
5	**N.A.**	**16.08**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
6	**N.A.**	**18.15**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
7	**N.A.**	**22.63**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
8	**N.A.**	**24.04**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
9	**N.A.**	**25.85**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
10	**N.A.**	**25.65**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
11	**N.A.**	**26.49**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
12	**N.A.**	**27.09**	**N.A.**	**YES**	BR209 guidance met	Residential bed
13	**N.A.**	**28.07**	**N.A.**	**YES**	BR209 guidance met	Residential bed
14	**N.A.**	**28.43**	**N.A.**	**YES**	BR209 guidance met	Residential bed
15	**N.A.**	**20.98**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
16	**N.A.**	**21.43**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
17	**N.A.**	**22.30**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
18	**N.A.**	**22.41**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
19	**N.A.**	**16.39**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
20	**N.A.**	**18.31**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
21	**N.A.**	**20.96**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
22	**N.A.**	**20.91**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
23	**N.A.**	**16.93**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
24	**N.A.**	**14.88**	**N.A.**	**NO**	Poor daylight	Residential bed
25	**N.A.**	**22.52**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
26	**N.A.**	**23.96**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
27	**N.A.**	**25.61**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
28	**N.A.**	**25.38**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed

Window Position	Existing VSC %	Proposed VSC %	Ratio Proposed/ Existing	BR209 Guidance met	Daylight access within the Proposed development	Proposed Development use
29	**N.A.**	**20.49**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
30	**N.A.**	**18.39**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
31	**N.A.**	**30.48**	**N.A.**	**YES**	BR209 guidance met	Residential living
32	**N.A.**	**29.82**	**N.A.**	**YES**	BR209 guidance met	Residential living
33	**N.A.**	**30.02**	**N.A.**	**YES**	BR209 guidance met	Residential living
34	**N.A.**	**30.98**	**N.A.**	**YES**	BR209 guidance met	Residential living
35	**N.A.**	**32.08**	**N.A.**	**YES**	BR209 guidance met	Residential living
36	**N.A.**	**12.04**	**N.A.**	**NO**	Poor daylight	Non-residential
37	**N.A.**	**8.20**	**N.A.**	**NO**	Poor daylight	Non-residential
38	**N.A.**	**13.65**	**N.A.**	**NO**	Poor daylight	Non-residential
39	**N.A.**	**10.29**	**N.A.**	**NO**	Poor daylight	Residential living
40	**N.A.**	**16.09**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
41	**N.A.**	**21.55**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
42	**N.A.**	**22.49**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
43	**N.A.**	**19.83**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
44	**N.A.**	**18.58**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
45	**N.A.**	**17.74**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
46	**N.A.**	**17.92**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
47	**N.A.**	**26.96**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
48	**N.A.**	**27.07**	**N.A.**	**YES**	BR209 guidance met	Residential bed
49	**N.A.**	**27.64**	**N.A.**	**YES**	BR209 guidance met	Residential bed
50	**N.A.**	**27.89**	**N.A.**	**YES**	BR209 guidance met	Residential bed
51	**N.A.**	**28.08**	**N.A.**	**YES**	BR209 guidance met	Residential living
52	**N.A.**	**28.20**	**N.A.**	**YES**	BR209 guidance met	Residential living
53	**N.A.**	**27.27**	**N.A.**	**YES**	BR209 guidance met	Residential living
54	**N.A.**	**26.87**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
55	**N.A.**	**24.17**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
56	**N.A.**	**24.01**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
57	**N.A.**	**23.82**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
58	**N.A.**	**23.71**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
59	**N.A.**	**23.62**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
60	**N.A.**	**23.47**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential bed
61	**N.A.**	**23.87**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential living
62	**N.A.**	**28.19**	**N.A.**	**YES**	BR209 guidance met	Non-residential
63	**N.A.**	**26.17**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
64	**N.A.**	**26.18**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
65	**N.A.**	**31.98**	**N.A.**	**YES**	BR209 guidance met	Residential living
66	**N.A.**	**31.58**	**N.A.**	**YES**	BR209 guidance met	Residential living

Window Position	Existing VSC %	Proposed VSC %	Ratio Proposed/ Existing	BR209 Guidance met	Daylight access within the Proposed development	Proposed Development use
67	**N.A.**	**31.12**	**N.A.**	**YES**	BR209 guidance met	Residential living
68	**N.A.**	**30.61**	**N.A.**	**YES**	BR209 guidance met	Residential living
69	**N.A.**	**29.54**	**N.A.**	**YES**	BR209 guidance met	Residential living
70	**N.A.**	**29.33**	**N.A.**	**YES**	BR209 guidance met	Residential living
71	**N.A.**	**29.48**	**N.A.**	**YES**	BR209 guidance met	Residential living
72	**N.A.**	**29.80**	**N.A.**	**YES**	BR209 guidance met	Residential living
73	**N.A.**	**25.83**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
74	**N.A.**	**21.68**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
75	**N.A.**	**18.11**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
76	**N.A.**	**16.57**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
77	**N.A.**	**20.89**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
78	**N.A.**	**21.40**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
79	**N.A.**	**25.44**	**N.A.**	**NO**	Acceptable daylight in urban setting	Non-residential
80	**N.A.**	**27.12**	**N.A.**	**YES**	BR209 guidance met	Non-residential
81	**N.A.**	**28.60**	**N.A.**	**YES**	BR209 guidance met	Non-residential
82	**N.A.**	**12.86**	**N.A.**	**NO**	Poor daylight	Residential outline massing
83	**N.A.**	**13.39**	**N.A.**	**NO**	Poor daylight	Residential outline massing
84	**N.A.**	**15.38**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
85	**N.A.**	**18.74**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
86	**N.A.**	**15.76**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
87	**N.A.**	**16.22**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
88	**N.A.**	**18.14**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
89	**N.A.**	**21.43**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
90	**N.A.**	**19.64**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
91	**N.A.**	**19.96**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
92	**N.A.**	**21.65**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
93	**N.A.**	**24.51**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
94	**N.A.**	**24.69**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
95	**N.A.**	**24.85**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing

Window Position	Existing VSC %	Proposed VSC %	Ratio Proposed/ Existing	BR209 Guidance met	Daylight access within the Proposed development	Proposed Development use
96	**N.A.**	**26.31**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
97	**N.A.**	**28.43**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
98	**N.A.**	**14.86**	**N.A.**	**NO**	Poor daylight	Residential outline massing
99	**N.A.**	**17.59**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
100	**N.A.**	**19.99**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
101	**N.A.**	**22.38**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
102	**N.A.**	**27.99**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
103	**N.A.**	**29.44**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
104	**N.A.**	**14.13**	**N.A.**	**NO**	Poor daylight	Residential outline massing
105	**N.A.**	**18.03**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
106	**N.A.**	**19.41**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
107	**N.A.**	**22.74**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
108	**N.A.**	**27.55**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
109	**N.A.**	**29.58**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
110	**N.A.**	**14.89**	**N.A.**	**NO**	Poor daylight	Residential outline massing
111	**N.A.**	**17.40**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
112	**N.A.**	**20.06**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
113	**N.A.**	**22.20**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
114	**N.A.**	**28.07**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
115	**N.A.**	**29.39**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
116	**N.A.**	**14.32**	**N.A.**	**NO**	Poor daylight	Residential outline massing
117	**N.A.**	**18.08**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
118	**N.A.**	**19.59**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing

Window Position	Existing VSC %	Proposed VSC %	Ratio Proposed/ Existing	BR209 Guidance met	Daylight access within the Proposed development	Proposed Development use
119	**N.A.**	**22.63**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
120	**N.A.**	**27.70**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
121	**N.A.**	**29.53**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
122	**N.A.**	**29.07**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
123	**N.A.**	**26.61**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
124	**N.A.**	**32.18**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
125	**N.A.**	**30.38**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
126	**N.A.**	**35.50**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
127	**N.A.**	**34.52**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
128	**N.A.**	**23.48**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
129	**N.A.**	**22.58**	**N.A.**	**NO**	Acceptable daylight in urban setting	Residential outline massing
130	**N.A.**	**27.85**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
131	**N.A.**	**27.17**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
132	**N.A.**	**32.98**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing
133	**N.A.**	**32.79**	**N.A.**	**YES**	BR209 guidance met	Residential outline massing

4.2.2 Direct sunlight – Proposed development

Annual Probable Sunlight Hours (APSH) and Winter Probable Sunlight Hours (WPSH) were calculated for window locations within the proposed development that were identified as being likely to be partially obstructed by the proposed development based on the BR209 25° rule and that face within 90° of south.

Main windows will appear reasonably sunlit provided they can receive at least 25% of APSH and 5% of APSH between 21 September and 21 March. Table 4—6 shows calculated APSHs and WPSHs for assessed window locations within the proposed development.

Table 4—6 APSH and WPSH values for assessed window locations within the proposed development

Window Position	Proposed APSH %	Proposed WPSH %	BR209 guidance met
31	78	19	**YES**
32	80	21	**YES**
33	78	19	**YES**
34	80	21	**YES**
35	80	21	**YES**
39	30	2	**NO**
40	52	3	**NO**
41	36	12	**YES**
42	34	9	**YES**
43	27	6	**YES**
44	24	5	**NO**
45	22	5	**NO**
46	19	0	**NO**
47	43	13	**YES**
48	44	14	**YES**
49	42	13	**YES**
50	43	13	**YES**
51	42	13	**YES**
52	43	13	**YES**
53	40	11	**YES**
54	40	11	**YES**
55	35	9	**YES**
56	34	9	**YES**
57	35	9	**YES**
58	33	8	**YES**
59	31	7	**YES**
60	28	6	**YES**
61	29	3	**NO**
75	37	10	**YES**
76	32	8	**YES**
77	31	7	**YES**
78	29	6	**YES**
79	69	11	**YES**
80	72	14	**YES**
81	75	19	**YES**
98	37	12	**YES**
99	48	10	**YES**
100	54	12	**YES**

Window Position	Proposed APSH %	Proposed WPSH %	BR209 guidance met
101	61	10	**YES**
102	74	17	**YES**
103	76	19	**YES**
110	36	12	**YES**
111	46	9	**YES**
112	54	12	**YES**
113	60	9	**YES**
114	73	17	**YES**
115	75	18	**YES**
122	70	21	**YES**
123	68	15	**YES**
124	78	21	**YES**
125	74	17	**YES**
126	83	26	**YES**
127	82	25	**YES**

4.2.3 Direct sunlight – proposed development open space

Sunlight access has been calculated for the proposed piazza located within the proposed development, shown in Figure 4—7.

To meet BR209 guidance on sunlight access to proposed open spaces, at least half of an open space should receive at least two hours of sunlight on 21 March with the proposed development in place.

Table 4—7 shows the calculated percentage of area of the proposed open space receiving at least two hours of sunlight on 21 March with the proposed development in place. The vast majority of the site receives more than two hours of sunlight.

Figure 4—7 Proposed open space – hours of sunlight on March equinox

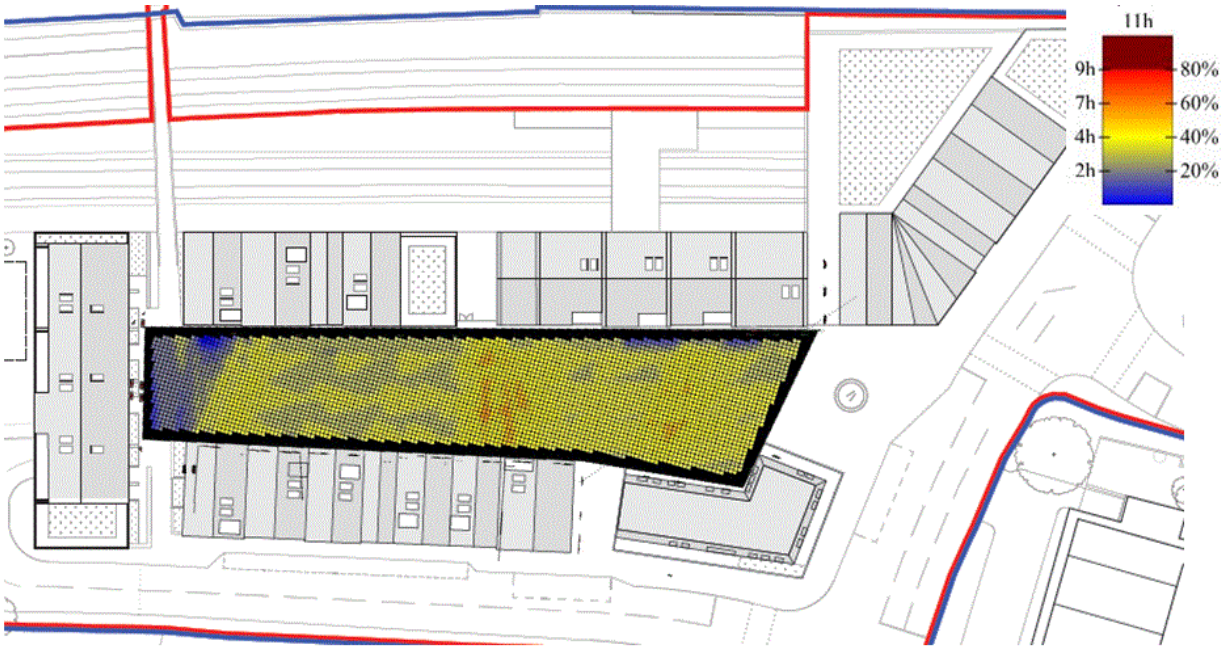


Table 4—7 Proposed open spaces – percentage of area receiving at least 2 hours of sunlight on March equinox

Plane	Area receiving at least 2 hours of sunlight on March equinox (%)
Piazza	90.1

5 Conclusions

5.1 Existing surroundings

5.1.1 Light from the sky – Existing buildings

Of the 32 window locations assessed for daylight access, 17 were found to meet BR209 guidance by experiencing a negligible or beneficial impact from the proposed development.

Of the remaining 15 window locations, 13 were found to experience a minor to moderate adverse impact from the proposed development.

Two windows, at locations 134 and 145, see Figure 5—1, were found to experience a major adverse impact from the proposed development due to the ratio of proposed to existing VSC, Window 145 had a VSC greater than 15% and is considered to receive adequate daylight within an urban setting. Window 134 has been identified as a part of the Waitrose site, which as a retail setting has a lower requirement for daylight than residential use.

It is concluded that surrounding buildings will receive adequate daylight with the proposed development in place.

Figure 5—1 Window locations

5.1.2 Direct sunlight – Existing buildings

Of the 31 window locations assessed for direct sunlight access, 30 were found to meet BR209 guidance by experiencing a negligible or beneficial impact from the proposed development.

One window, at location 144, see Figure 5—1,was found to experience a major adverse impact from the proposed development due to the reduction in APSH and WPSH, however this window location was found to not meet BR209 recommendations in the pre-development condition, due to self-shading from the existing building, and is one of two windows on the same frontage where the other window receives APSH of greater than 25% and WPSH greater than 5% of APSH. BR209 guidance states that where there are multiple windows on the same wall, the highest value of APSH can be used. The accommodation behind this frontage has been identified as a single room (St Johns United Reformed Church Hall) and is therefore deemed to receive adequate access to direct sunlight.

It is concluded that surrounding buildings will receive adequate direct sunlight with the proposed development in place.

5.1.3 Direct sunlight – Existing open spaces

All existing gardens surrounding the development were found to receive more than 2 hours of direct sunlight on more than 50% of their area with the proposed development in place.

It is concluded that surrounding open spaces will receive adequate direct sunlight with the proposed development in place.

5.2 Proposed development

5.2.1 Light from the sky – Proposed development

Of the 133 window locations assessed for daylight access, 47 were found to fully meet BR209 guidance by achieving a VSC of at least 27% and a further 75 achieved a VSC between 15% and 27%, resulting in 122 out of 133 window locations being considered to receive adequate daylight within an urban setting.

Of the remaining 11 window locations, 5 (windows 24, 36, 37, 38 and 39) serve the same rooms as other windows achieving a VSC of more than 15%, 3 of which are identified as non-residential use, having a lesser requirement for daylight than dwellings. The remaining 6 window locations (windows 82, 83, 98, 104, 110 and 116) are at ground floor level on gable elevations of townhouses subject to an outline planning application, see Figure 5—1, where the opportunity exists to achieve adequate daylight behind these frontages by making main living rooms dual aspect with carefully sized windows or by siting rooms with a lesser requirement for daylight, e.g. bedrooms and bathrooms at these locations.

The proposed development receives adequate daylight access at all but six window locations, where adequate daylight and sunlight access could be achieved by careful consideration of room layouts and window arrangements.

It is concluded that the proposed development generally receives adequate daylight and it is recommended that as the design of townhouses develops, attention is paid to room layouts, room uses and window sizes to maximise the daylight potential of the proposed development.

5.2.2 Direct sunlight – Proposed development

Of the 53 window locations within the proposed development assessed for direct sunlight access, 47 were found to meet BR209 guidance by receiving greater than 25% of APSH and WPSH greater than 5% of APSH.

Of the remaining 6 windows, locations 39 and 46 and locations 40 and 61 are dual aspect windows on adjacent walls of the same rooms where the higher value of APSH met the BR209 recommended 25% of APSH. The remaining 2 windows at locations 44 and 45, see Figure 5—1, met the BR209 recommended 5% of WPSH and received at least 22% of APSH, close to the BR209 recommended 25% of APSH.

The proposed development receives adequate direct sunlight at all but six windows, all of which meet either the BR209 recommended APSH or WPSH.

It is concluded that the proposed development generally receives adequate direct sunlight, considering its urban setting.

5.2.3 Direct sunlight – Proposed open space

The proposed piazza within the proposed development was found to receive more than 2 hours of direct sunlight on more than 50% of its area.

It is concluded that the proposed piazza will receive adequate direct sunlight.

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