

Report for:

**Vogue Assets Ltd
c/o Macniven Quays Limited**

34-38 Southampton Street, Reading
Daylight and Sunlight Assessment

Status: FINAL

Date: 19.12.2017

34-38 Southampton Street, Reading

Daylight and Sunlight Assessment

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Table of Contents

1.	INTRODUCTION	4
2.	THE NATURE AND EFFECT OF DAYLIGHT AND SUNLIGHT	5
3.	ASSESSMENT CRITERIA.....	6
3.1.	National Policy	6
3.2.	The BRE Report.....	7
3.3.	Daylight Assessment.....	7
3.4.	Sunlight Assessment.....	8
3.5.	Overshadowing of Gardens and Open Spaces	9
4.	DAYLIGHT IMPACT ASSESSMENT	10
4.1.	Identification of Receptors.....	10
4.2.	Vertical Sky Component (VSC)	10
5.	SUNLIGHT IMPACT ASSESSMENT	12
5.1.	Annual Probable Sunlight Hours	12
6.	SELF ASSESSMENT	14
7.	CONCLUSIONS	17

List of Appendices

Appendix 1 Development Site Plan with Relevant Receptors	18
Appendix 2 Window Locations	20
Appendix 3 The BRE Report	32

List of Tables

Table 3.1: Summary criteria contained within the BRE Report	7
Table 4.1: Vertical Sky Component	10
Table 5.1: Annual Probable Sunlight Hours.....	13
Table 6.1: Daylight Factor Criteria.....	14
Table 6.2: Self-Test (VSC and APSH).....	15

1. INTRODUCTION

ACCON UK Ltd has been commissioned by Macniven Quays Limited on behalf of Vogue Assets Ltd. to undertake a daylight and sunlight assessment in respect of the proposed development of 34-38 Southampton Street, Reading, to determine if the proposed development will have an impact on the daylight and sunlight received by neighbouring properties, as well as any constraints on the proposed development. The proposals are to demolish the existing Public House and adjacent building and construct 12 No. new flats.

Appendix 1 provides a plan of the proposed development site with the location of the potentially impacted buildings identified.

2. THE NATURE AND EFFECT OF DAYLIGHT AND SUNLIGHT

The provision of daylight is as important as ensuring low levels of noise or low levels of odour in maintaining the enjoyment of one's property. Adequate levels of daylight are important not only to light and heat the home, but also for an occupant's emotional wellbeing. Daylight is widely accepted to have a positive psychological effect on human beings and there is a great deal of evidence to suggest that people who are deprived of daylight are more susceptible to depression and mood swings. This is common in northern countries, such as Norway, Iceland and Canada where daylight is scarce during the winter months.

When assessing the effects of proposed building projects on the potential to cause issues relating to light, it is important to recognise the distinction between daylight and sunlight. Daylight is the combination of all direct and indirect sunlight during the daytime, whereas sunlight (for the purposes of this report) comprises only the direct elements of sunlight. For example on a cloudy or overcast day diffused daylight still shines through windows, even when sunlight is absent.

Any development within a built up area has the potential to alter the amount of daylight and direct sun received by nearby residential properties. Care should be taken when designing new buildings in built-up areas, especially when the proposed development is relatively tall or situated to the south of existing buildings, because in the northern hemisphere the majority of the sunlight comes from the south. In the UK (and other northern hemisphere countries) south-facing facades will, in general, receive most sunlight, while north facing facades will receive sunlight on only a handful of occasions, specifically early-mornings and late evenings during the summer months.

It is therefore important to ensure that buildings to the south of any development do not cause overshadowing to existing dwellings and therefore reduce their capacity to receive sunlight.

3. ASSESSMENT CRITERIA

3.1. National Policy

The Department for Communities and Local Government (DCLG) sets national planning policy. The document 'The Planning System: General Principles (2005)', published in conjunction with Planning Policy Statement 1: Delivering Sustainable Development (which has now been replaced by the National Planning Policy Framework), discusses the need to protect amenities in the public's interest, of which the need for daylight/sunlight could be considered one such amenity. However, the government does not have an adopted policy on daylight, sunlight and the effects of overshadowing, and does not have targets, criteria or relevant planning guidance in the way it has for other environmental impacts such as noise, landscape or air quality. However three guidance documents are relevant when considering daylight, sunlight and overshadowing in dwellings:

- **The Building Research Establishment (BRE) report, "Site layout planning for daylight and sunlight – a guide to good practice – Second Edition 2011" by PJ Littlefair** (referred to as the BRE Report). Although not Government guidance, this report is commonly referenced as the main guide in the UK in determining the minimum standards of daylight and sunlight and for determining the impact of a development;
- **British Standard BS 8206:2008 Lighting for buildings – Part 2: Code of practice for daylighting.** BS 8206:2008 contains guidance on the minimum recommended levels of interior daylighting and introduces some of the calculation procedures used in the BRE Report;
- **The Code for Sustainable Homes – Technical Guidance. (withdrawn 22nd April 2015)** The Code's Technical Guidance document determines its target criteria for well lit homes, building upon the calculation procedures within the BRE Report and BS 8206:2008. It should be noted that the daylighting element of the Code is not mandatory, suggesting that the targets within the Code are desirable, but not an essential planning constraint.
- **Planning Practice Guidance (2014) – Design - How should buildings and the spaces between them be considered?** – This section of the PPG summarises the considerations in respect to the layout, form, scale, detailing and the use of the materials within developments. Paragraph 26 - "Consider Size" (Reference ID26-026-20140306) in particular focuses on the impact of the scale of a development and states:

"This relates both to the overall size and mass of individual buildings and spaces in relation to their surroundings, and to the scale of their parts.

Decisions on building size and mass, and the scale of open spaces around and between them, will influence the character, functioning and efficiency of an area. In general terms too much building mass compared with open space may feel overly cramped and oppressive, with access and amenity spaces being asked to do more than they feasibly can. Too little and neither land as a resource or monetary investment will be put to best use.

The size of individual buildings and their elements should be carefully considered, as their design will affect the: overshadowing and overlooking of others; local character; skylines; and vistas and views. The scale of building elements should be both

attractive and functional when viewed and used from neighbouring streets, gardens and parks.

The massing of development should contribute to creating distinctive skylines in cities, towns and villages, or to respecting existing skylines. Consideration needs to be given to roof space design within the wider context, with any adverse visual impact of rooftop servicing minimised.

Account should be taken of local climatic conditions, including daylight and sunlight, wind, temperature and frost pockets.”

3.2. The BRE Report

The BRE report contains guidance on how to design developments, whilst minimising the impacts on existing buildings from overshadowing and reduced levels of daylight and sunlight. As well as advice, the report contains a methodology to assess levels of daylight, sunlight and overshadowing, and contains criteria to determine the potential impacts of a new development on surrounding buildings. However, the report does state that the guidelines are not mandatory, but should be considered a guide to help rather than constrain the designer.

The BRE document looks at three separate areas when considering the impacts on lighting:

- **Daylight** – i.e. the impacts of all direct and indirect sunlight during the daytime;
- **Sunlight** – i.e. the impacts of only the direct sunlight; and
- **Overshadowing of Gardens and Open spaces.**

Appendix 3 details the BRE Report, including the methodologies and full details of the criteria.

Table 3.1 summarises the criteria used to assess the impacts from new development on the daylight and sunlight reaching existing properties.

Table 3.1: Summary criteria contained within the BRE Report

Parameter	BRE Report Ref.	Criteria	Acceptability Criteria
Daylight	Section 2.2	Angle to sky from horizontal	Maximum 25°
		Vertical Sky Component (VSC)	Greater than 27%
	Appendix C	Average Daylight Factor (ADF)	Greater than 1%-2%*
	Appendix D	Percentage of the Working Plane beyond the No-Sky Line (NSL)	“Significant Part”+
Sunlight	Section 3.1 & 3.2	Annual Probable Sunlight Hours (APSH) (Full Year)	Greater than 25%†
		Annual Probable Sunlight Hours (APSH) (Winter Months)	Greater than 5%†

*= Varies depending on room use. See **Appendix 3** for full details.

+= Whilst the BRE Report describes the methodology for determining the percentage of the Working Plane that is in full sun, it does not give an acceptability criterion, only that supplementary electric lighting will be required if a “significant part” of the working plane lies beyond the no-sky line. However, the Code for Sustainable Homes and BS 8206: 2008 suggests that each room requires a minimum of 80%.

†= Applies only to main living rooms, not to bedrooms, kitchens or other non-habitable rooms.

3.3. Daylight Assessment

The assessment of daylight is required for windows serving rooms in adjoining dwellings where daylight is required, including living rooms, kitchens and bedrooms. Windows to bathrooms, toilets, store rooms, circulation areas and garages need not be assessed. The guidelines also

apply to any room that may have a reasonable expectation of daylight, including schools, hospitals, hotels and some offices.

When assessing daylight, the numerical criteria must be viewed flexibly and should be considered against other site layout constraints. In addition, it is important to consider whether the existing building is itself a good neighbour, standing a reasonable distance from the boundary and not taking more than its fair share of light.

The assessment takes on several specific stages:

- 1) **The Distance Test:** loss of light to windows need not be analysed if the distance from the existing window to the development is three or more times its height above the centre of the existing window;
- 2) **The 25° Rule:** loss of light to windows need not be analysed if the angle to the horizontal subtended by the new development from the centre of the existing window is less than 25° (as an angle of 25° equates to a VSC of 27%);
- 3) **Daylight Assessment:** diffuse daylight of an existing building may be adversely affected by a proposed development if either:
 - a. the Vertical Sky Component (VSC) measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value; or
 - b. the area of the working plane which can receive direct skylight is reduced to less than 0.8 times its former value.

It should be noted that determining the area of the working plane which can receive direct light from the sky (which is often referred to as the No-Sky Line or NSL) is seen as an additional assessment, rather than as an alternative to VSC. However, since plotting the NSL requires knowledge of the room geometry, which is not usually available during an impact assessment, it is not always possible to calculate the NSL since the use of too many assumptions would make the results meaningless and unreliable.

3.4. Sunlight Assessment

The assessment of sunlight is required for rooms in adjoining dwellings where sunlight is required. Generally, all main living rooms and conservatories should have access to direct sunlight. Kitchens and bedrooms are less important, although care should be taken not to block too much sun.

As with daylight, the numerical criteria for sunlight should be viewed flexibly and should be considered against other site layout constraints. It is important to understand that people like and appreciate sunlight and may resent the loss of sunlight, although it is not an essential requirement of a dwelling, unlike daylight availability or access to a quiet noise environment. Therefore, larger reductions in sunlight may be acceptable, for example if new development is to match the height and proportion of existing buildings nearby.

The assessment of sunlight takes on several specific stages:

1. **Facing South:** loss of sunlight to windows only needs to be assessed if the window faces within 90° of due south;
2. **The Distance Test:** loss of sunlight to windows need not be analysed if the distance from the existing window to the development is three or more times its height above the centre of the existing window;

3. **The 25° Rule:** loss of sunlight to windows need not be analysed if the angle to the horizontal subtended by the new development from the centre of the existing window is less than 25°;
4. **Sunlight Assessment:** direct sunlight of existing windows may be adversely effected by a proposed development if at the centre of a window:
 - a. It receives less than 25% of Annual Probable Sunlight Hours (APSH), or less than 5% APSH between 21st September and 21st March; **and**
 - b. it receives less than 0.8 times its former APSH during either period; **and**
 - c. it has a reduction in sunlight over the whole year of greater than 4% APSH.

3.5. Overshadowing of Gardens and Open Spaces

The effects of overshadowing and the loss of sunlight on open spaces and gardens have not been considered as part of this assessment.

4. DAYLIGHT IMPACT ASSESSMENT

This section summarises the daylight impacts of the proposed development on surrounding properties.

4.1. Identification of Receptors

The windows at proposed residential properties have been assessed in accordance with the BRE 2011 guidance document, which states *'The guidelines are intended for use with adjoining dwellings and any existing non-domestic buildings where occupants have a reasonable expectation of daylight; this would include schools, hospitals, hotels, workshops and offices... For dwellings this would include living rooms, dining rooms and kitchens. Bedrooms should also be analysed but are less important'*.

The assessment will consider the following buildings detailed below and identified in **Appendix 1**:

- **Receptor 1:** Solent Court; and
- **Receptor 2:** St Giles Court.

The window reference numbers for the receptor are shown in **Appendix 2**

4.2. Vertical Sky Component (VSC)

The Vertical Sky Component (VSC) has been calculated for all the habitable rooms within the proposed development (living rooms, kitchens, dining rooms and bedrooms).

When undertaking a daylight assessment, the BRE Report suggests a VSC of 27% or more should be achieved if a room is to be adequately daylight. However, this level need not be applied to rooms which do not require high levels of natural light such as garages, storage rooms, hallways etc.

Table 4.1 identifies Vertical Sky Component (VSC) and the extent to which it would change as a result of the proposed development. Window No. 5 will only be very marginally below the recommended 0.8 ratio and therefore are not considered to be significantly affected by the proposed development. Daylight impacts at window No. 1, 2 and 3 could result in a perceptible difference in natural light and may result in additional electric lighting being required.

None of the other assessed windows will be impacted by the proposed development such that there would be a significant reduction in daylight.

Table 4.1: Vertical Sky Component

Rec. No	Aspect	Floor	Window	VSC		Ratio
				Existing	Proposed	
1	N	G	1	25.06	12.70	0.51
1	N	G	2	23.40	16.41	0.70
1	N	1	3	31.32	19.44	0.62
1	N	1	4	33.33	26.79	0.80
1	N	2	5	34.64	27.52	0.79
1	N	2	6	39.15	35.74	0.91

Rec. No	Aspect	Floor	Window	VSC		Ratio
				Existing	Proposed	
2	NE	G	8	26.70	21.83	0.82
2	NE	G	9	26.71	23.00	0.86
2	NE	G	10	22.83	21.15	0.93
2	NE	G	11	28.30	27.73	0.98
2	NE	1	12	35.16	29.58	0.84
2	NE	1	13	35.60	31.91	0.90
2	NE	1	14	35.78	34.48	0.96
2	NE	1	15	36.24	35.82	0.99

5. SUNLIGHT IMPACT ASSESSMENT

This section summarises the sunlight impacts of the proposed development on surrounding properties.

5.1. Annual Probable Sunlight Hours

When designing a new development or an extension to an existing building, the impact on the amount of sunlight received in the living areas of residential properties must be assessed, as residents are particularly likely to notice a loss of sunlight entering their homes.

The BRE report provides guidelines for when the obstruction to sunlight may become an issue;

- If the proposed development affects a window that faces within 90° of due south; and
- If in the section drawn perpendicular to this existing window wall, the new development subtends an angle greater than 25° to the horizontal measured from a point 2m above the ground.

The sunlight assessment uses the Sunlight Availability Indicators method as detailed within the BRE guidance.

Table 5.1 below details the results of the Annual Probable Sunlight Hours (APSH) calculations for all of the windows affected by the proposed development using the London latitude reference data, as given in the BRE guidance.

Below are the criteria required for a window to fail in respect of sunlight.

- a. It receives less than 25% of Annual Probable Sunlight Hours (APSH), or less than 5% APSH between 21st September and 21st March; **and**
- b. it receives less than 0.8 times its former APSH during either period; **and**
- c. it has a reduction in sunlight over the whole year of greater than 4% APSH.

The windows which were not included in the assessment due to their aspect are noted N/A in **Table 5.1**.

None of the assessed windows faces within 90° of south. Therefore there will be no impact on sunlight as a result of the proposed development.

Table 5.1: Annual Probable Sunlight Hours

Rec. No	Aspect	Floor	Window	APSH Annual		Ratio	APSH Winter		Ratio
				Existing	Proposed		Existing	Proposed	
1	N	G	1	N/A	N/A	N/A	N/A	N/A	N/A
1	N	G	2	N/A	N/A	N/A	N/A	N/A	N/A
1	N	1	3	N/A	N/A	N/A	N/A	N/A	N/A
1	N	1	4	N/A	N/A	N/A	N/A	N/A	N/A
1	N	2	5	N/A	N/A	N/A	N/A	N/A	N/A
1	N	2	6	N/A	N/A	N/A	N/A	N/A	N/A
2	NE	G	8	N/A	N/A	N/A	N/A	N/A	N/A
2	NE	G	9	N/A	N/A	N/A	N/A	N/A	N/A
2	NE	G	10	N/A	N/A	N/A	N/A	N/A	N/A
2	NE	G	11	N/A	N/A	N/A	N/A	N/A	N/A
2	NE	1	12	N/A	N/A	N/A	N/A	N/A	N/A
2	NE	1	13	N/A	N/A	N/A	N/A	N/A	N/A
2	NE	1	14	N/A	N/A	N/A	N/A	N/A	N/A
2	NE	1	15	N/A	N/A	N/A	N/A	N/A	N/A

6. SELF ASSESSMENT

For the proposed development, ACCON have carried out a 'self-assessment'. The windows which have the lowest levels of daylight and do not meet the recommended 27% VSC value as set out in the BRE guidance are the windows on the southern façade due to the close proximity of Solent Court, and the two windows on the ground floor windows in the north-western façade due to the close proximity of the boundary fence.

The actual interior daylighting of the building can however be determined by using the Average Daylight Factor (ADF) introduced in BS 8206: 2008. The ADF is used to determine if the overall light levels will be acceptable based on the use of the room. This assessment utilises the size and location of the windows, the size of the room, internal finishes, glass transmissivity etc.

The ADF is a very common and easy to understand measure for expressing the daylight availability in a room. It describes the ratio of outside illuminance over inside illuminance, expressed as a percentage. The higher the DF then the more that natural light is available in a room.

Rooms with an average DF of 2% give us a feeling of daylight. However, it is only when the ADF rises above 5% that we perceive it as well day lit. Different types of rooms have different minimum requirements for daylighting. **Table 6.1** details the acceptable criteria for average daylight factor for habitable rooms.

Table 6.1: Daylight Factor Criteria

Criteria	Minimum Daylight Factor
Predominantly daylight without the need for supplementary electric lighting	5%
With supplementary electric lighting:	
Suitable for Kitchens	2%
Suitable for Living rooms	1.5%
Suitable for Bedrooms	1%

An assessment of the ADF has been carried out for the development and the assessment results with the VSC and APSH values are identified in **Table 6.2**. Figures shown in **green** within **Table 6.2** for the ADF denote where the ADF levels just fail to achieve the recommended criteria and as such this difference would be imperceptible. Figures shown in **red** within **Table 6.2** for the ADF denote where the ADF levels fail to achieve the recommended criteria and an impact would occur. Where multiple windows let into the same room, a total ADF has been calculated for those rooms. The locations of the room numbers utilised in **Table 6.2** are identified in **Appendix 2**.

Table 6.2: Self-Test (VSC and APSH)

Room	Floor	Window	Aspect	VSC	APSH		Average Daylight Factor		
					Annual	Winter	Room Use	Required Level	Actual Level
1	B	50	E	34.22	N/A	N/A	LKD	2	1.7
		52*	E	26.12	N/A	N/A	LKD	2	0.4
									2.1
2	G	2	N	26.00	N/A	N/A	LKD	2	0.8
		53	N	22.52	N/A	N/A	LKD	2	0.5
		54	N	26.01	N/A	N/A	LKD	2	0.5
									1.8
3	G	1	N	24.66	N/A	N/A	Bedroom	1	2.0
4	G	51	N	25.97	N/A	N/A	Bedroom	1	1.4
5	G	12	E	33.08	N/A	N/A	Bedroom	1	1.2
		13	E	33.06	N/A	N/A	Bedroom	1	1.2
									2.4
6	G	14	E	29.57	N/A	N/A	LKD	2	1.2
		15	E	34.96	N/A	N/A	LKD	2	0.9
									2.1
7	G	16	E	23.34	N/A	N/A	Bedroom	1	0.9
		17	E	23.41	N/A	N/A	Bedroom	1	1.6
									2.5
8	1	3	N	30.13	N/A	N/A	Bedroom	1	2.6
9	1	4	N	33.42	N/A	N/A	LKD	2	1.7
		5	N	30.47	N/A	N/A	LKD	2	0.9
		38	S	14.53	40	6	LKD	2	0.3
									2.9
10	1	18	E	33.66	N/A	N/A	Bedroom	1	1.5
		40	S	26.57	56	15	Bedroom	1	1.2
									2.7
11	1	19	E	34.07	N/A	N/A	LKD	2	0.9
		20	E	33.99	N/A	N/A	LKD	2	0.9
		21	E	30.82	N/A	N/A	LKD	2	1.1
									2.9
12	1	22	E	35.88	N/A	N/A	Bedroom	1	2.1
13	1	23	E	36.47	N/A	N/A	LKD	2	1.0
		24	E	36.95	N/A	N/A	LKD	2	1.0
									2.0
14	1	39	S	8.68	24	5	Bedroom	1	0.7
		46	W	20.36	N/A	N/A	Bedroom	1	1.4
									2.1
15	2	6	N	31.98	N/A	N/A	Bedroom	1	2.8
16	2	7	N	37.09	N/A	N/A	LKD	2	2.0
		8	N	36.26	N/A	N/A	LKD	2	1.0
		41	S	21.62	51	15	LKD	2	0.4
									3.4
17	2	25	E	34.65	N/A	N/A	Bedroom	1	1.5
		43	S	31.05	70	21	Bedroom	1	1.4
									2.9

18	2	26	E	35.19	N/A	N/A	LKD	2	0.9
		27	E	34.88	N/A	N/A	LKD	2	0.9
		28	E	31.64	N/A	N/A	LKD	2	1.0
									2.8
19	2	29	E	36.71	N/A	N/A	Bedroom	1	2.3
20	2	30	E	37.23	N/A	N/A	LKD	2	1.4
		31	E	37.64	N/A	N/A	LKD	2	1.4
									2.8
21	2	42	S	13.21	38	5	Bedroom	1	0.9
		48	W	28.28	N/A	N/A	Bedroom	1	1.6
									2.5
22	3	9	N	39.35	N/A	N/A	Bedroom	1	2.3
		37	E	37.74	N/A	N/A	Bedroom	1	1.8
									4.1
23	3	10	N	39.32	N/A	N/A	Kitchen	2	2.8
24	3	11	N	39.09	N/A	N/A	LKD	2	3.0
25	3	32	E	33.34	N/A	N/A	LKD	2	1.2
		33	E	35.83	N/A	N/A	LKD	2	1.2
		34	E	36.06	N/A	N/A	LKD	2	1.2
									3.6
26	3	35	E	34.20	N/A	N/A	Bedroom	1	1.2
27	3	36	E	37.33	N/A	N/A	Living	1.5	2.5
28	3	44	S	25.44	79	26	Bedroom	1	0.8
			Skylight	39.51	N/A	N/A	Bedroom	1	1.2
									2.0

* - As this window does not let directly into room 1, the calculated ADF has been halved to provide a conservative estimate.

7. CONCLUSIONS

Calculations were conducted in accordance with the BRE guidelines to determine if the proposed redevelopment of 34-38 Southampton Street, Reading would impact the surrounding properties, as well as determining if the proposed development would receive acceptable levels of daylight and sunlight.

Overall, there will be a small impact on the daylight received by three of the windows on the northern façade of Solent Court.

One of the rooms in the proposed development will receive marginally less than the recommended levels of average daylight factor this is unlikely to be perceptible.

Appendix 1

Development Site Plan with Relevant Receptors

Appendix 1.1: Development Site Plan with Relevant Receptors



Appendix 2 Window Locations

Appendix 2: Proposed Development Receptors – Northern Façade



Appendix 2: Proposed Development Receptors – Front Façade

							LEGEND	
Client: Vogue Assets Ltd		Description: Site Plan with Existing Receptors		Design	ML	30.11.2017		
				Drawn	ML	30.11.2017		
Rev: A	Description: FINAL	Project: 34-36 Southampton Street, Reading		Checked	GP	30.11.2017	Appendix One	
				Approved	GP	30.11.2017	Scale	Not to Scale

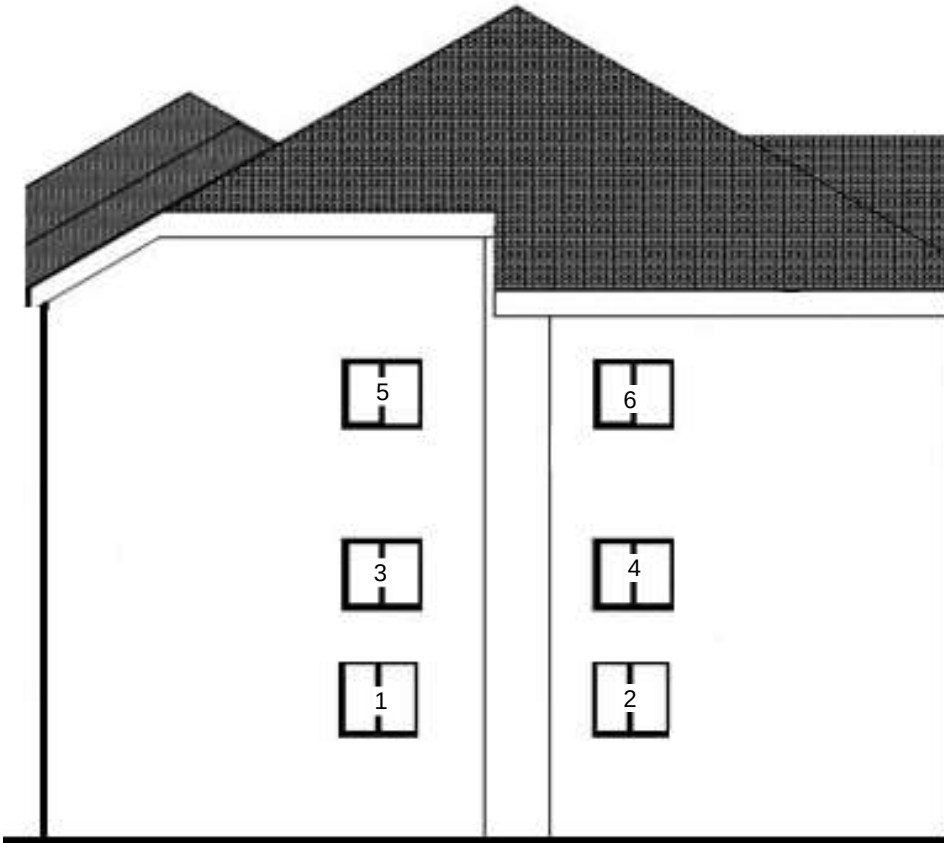
Appendix 2: Proposed Development Receptors – Southern Façade



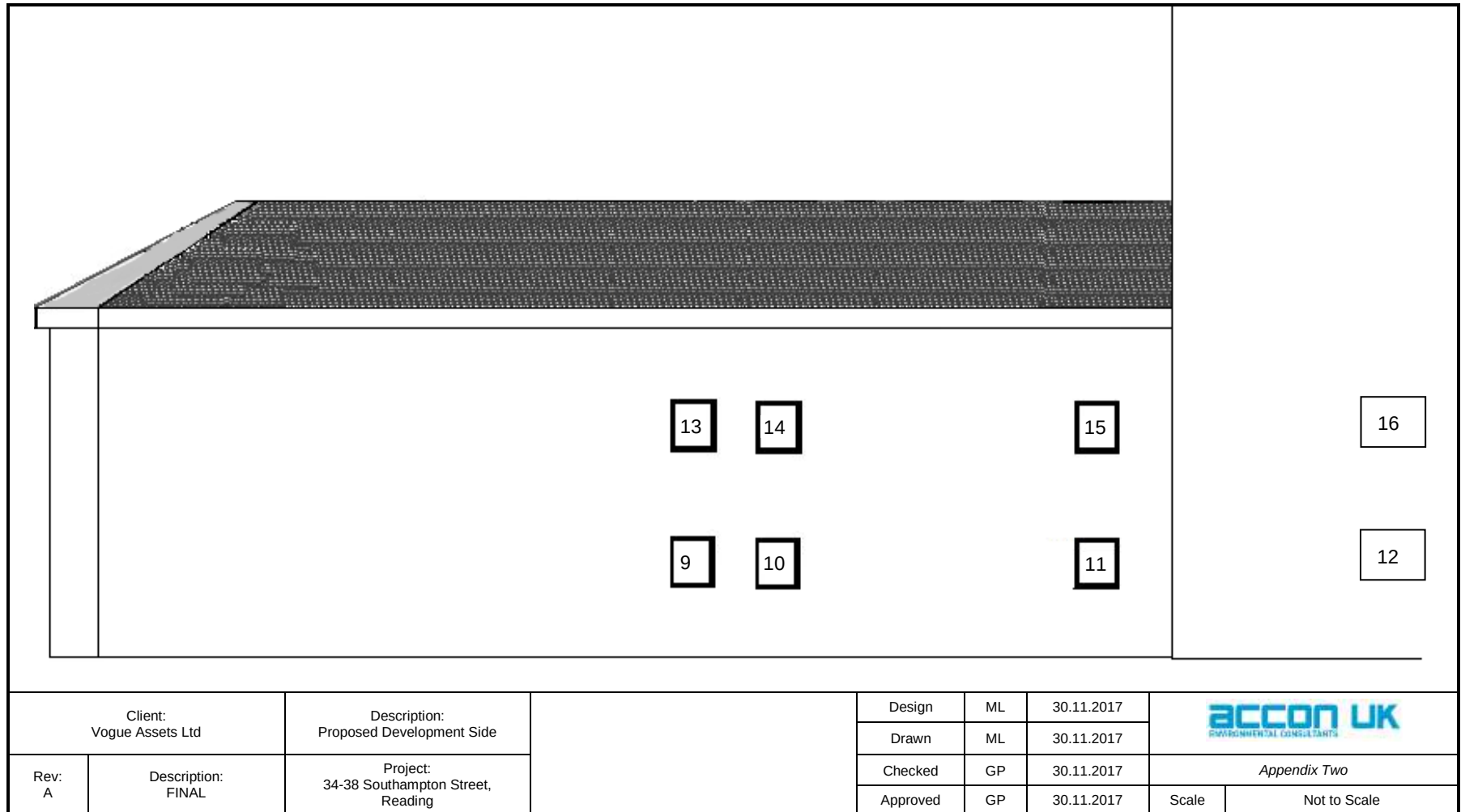
Appendix 2: Proposed Development Receptors – Western Façade



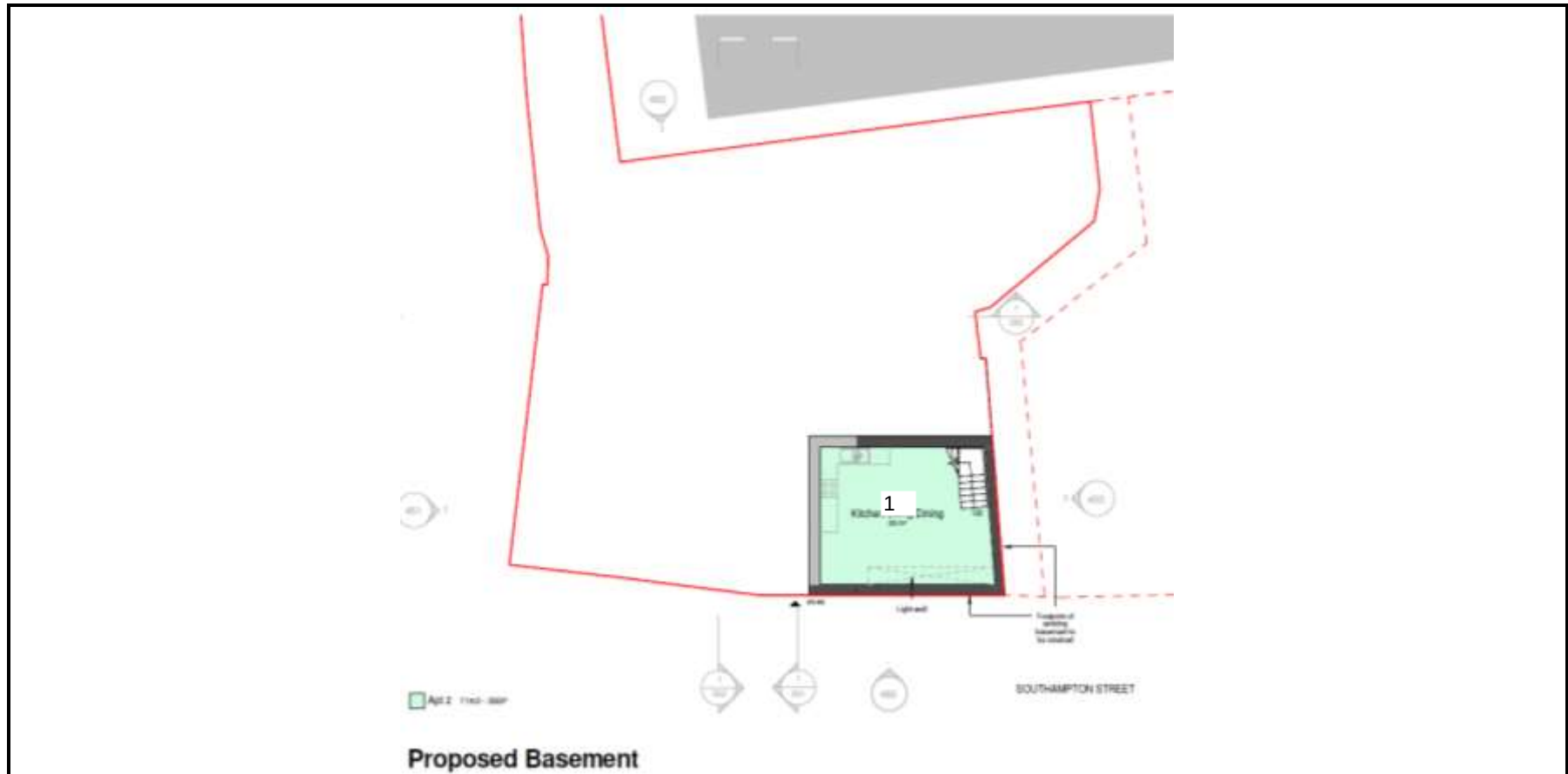
Appendix 2: Receptor 1 (Northern Façade)

										
Client: Vogue Assets Ltd		Description: Receptor 1 – Northern Façade		Design		ML	30.11.2017			
				Drawn		ML	30.11.2017			
Rev: A	Description: FINAL	Project: 34-38 Southampton Street, Reading			Checked		GP	30.11.2017	Appendix Two	
					Approved		GP	30.11.2017	Scale	Not to Scale

Appendix 2: Receptor 2 (North-Eastern Façade)

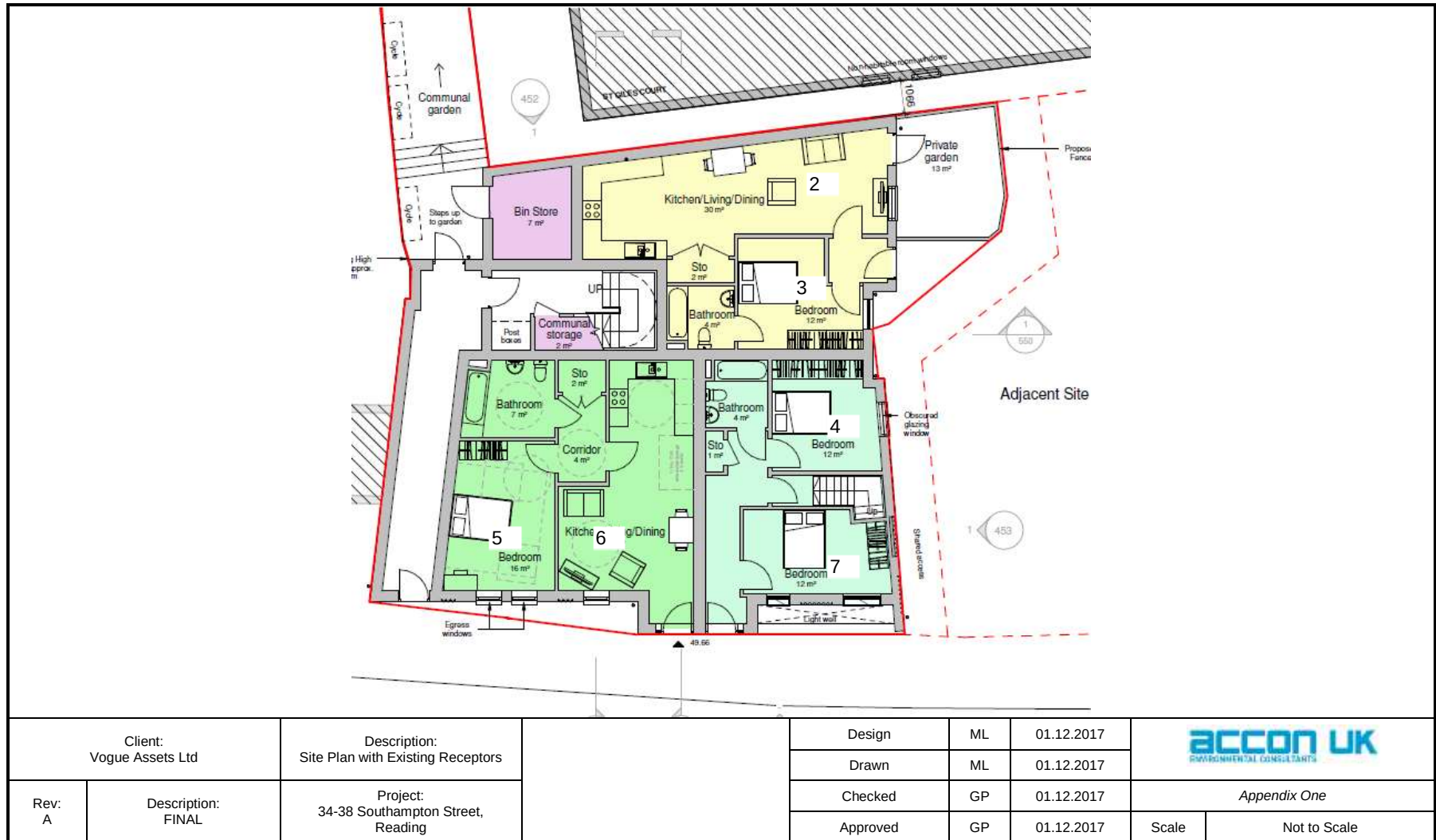


Appendix 2: Proposed Receptor Room Locations - Basement



Client: Vogue Assets Ltd		Description: Site Plan with Existing Receptors		Design	ML	01.12.2017		
				Drawn	ML	01.12.2017		
Rev: A	Description: FINAL	Project: 34-38 Southampton Street, Reading		Checked	GP	01.12.2017	Appendix One	
				Approved	GP	01.12.2017	Scale	Not to Scale

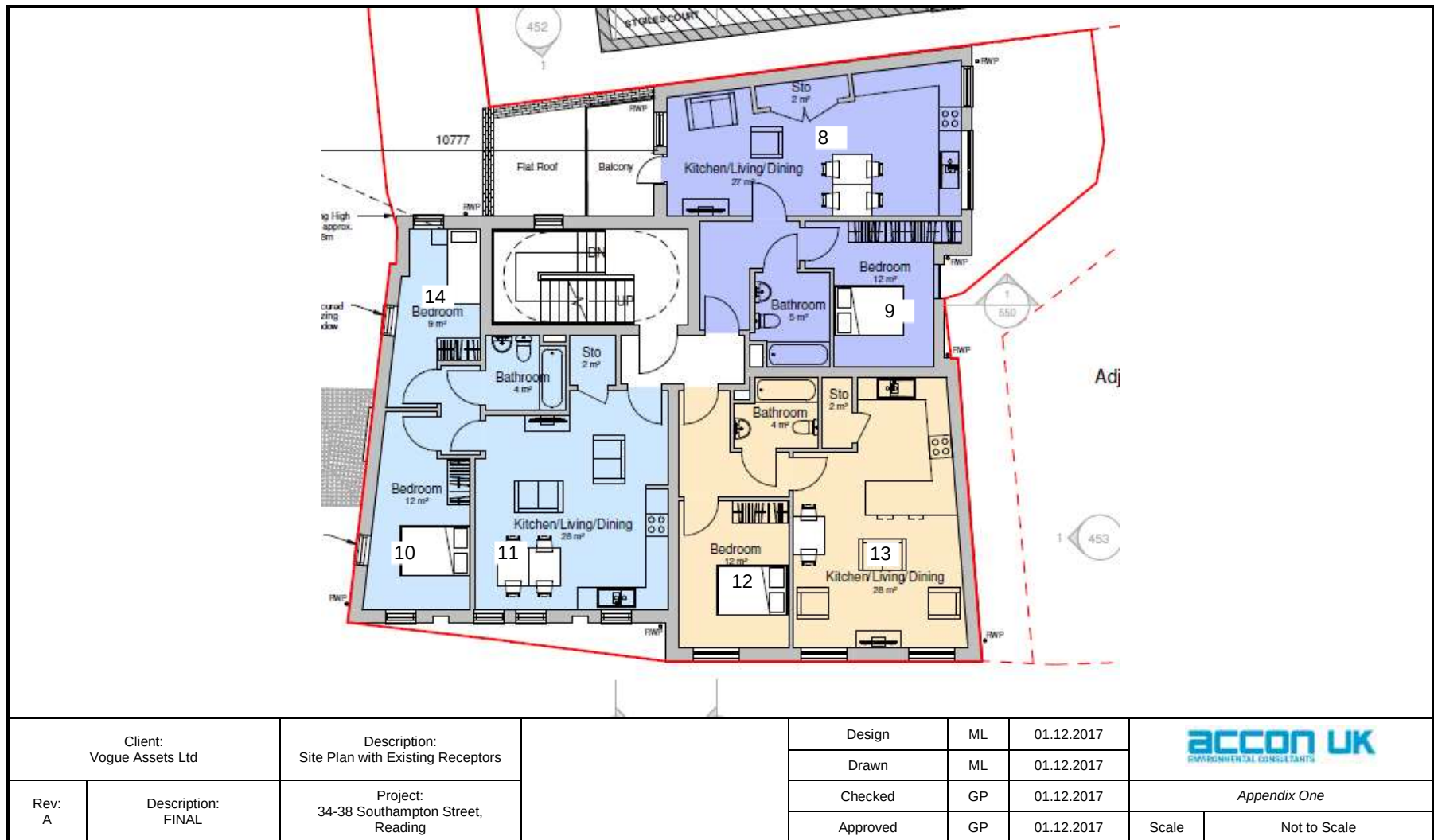
Appendix 2: Proposed Receptor Room Locations – Ground Floor



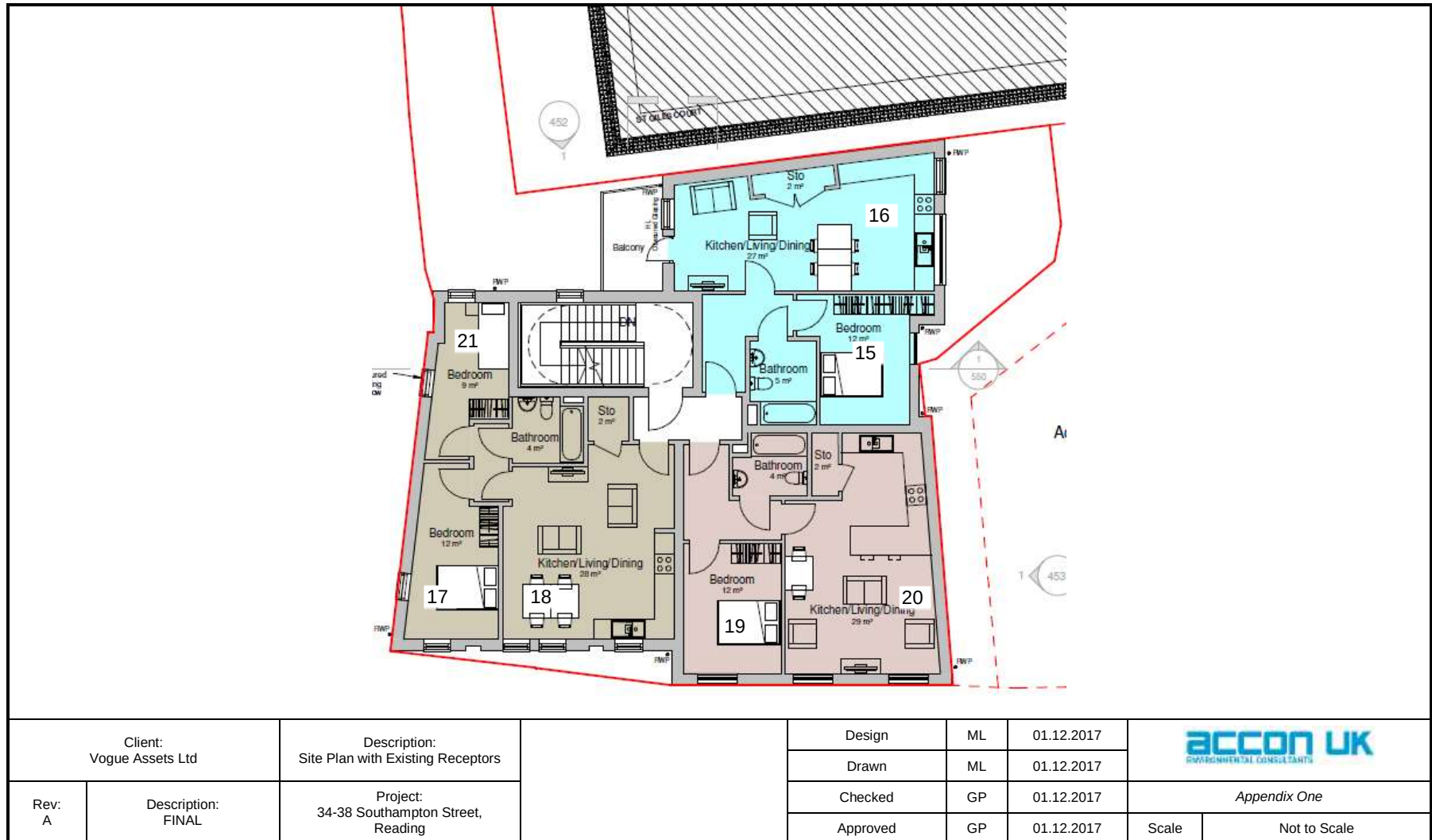
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Page | 28

Appendix 2: Proposed Receptor Room Locations – First Floor



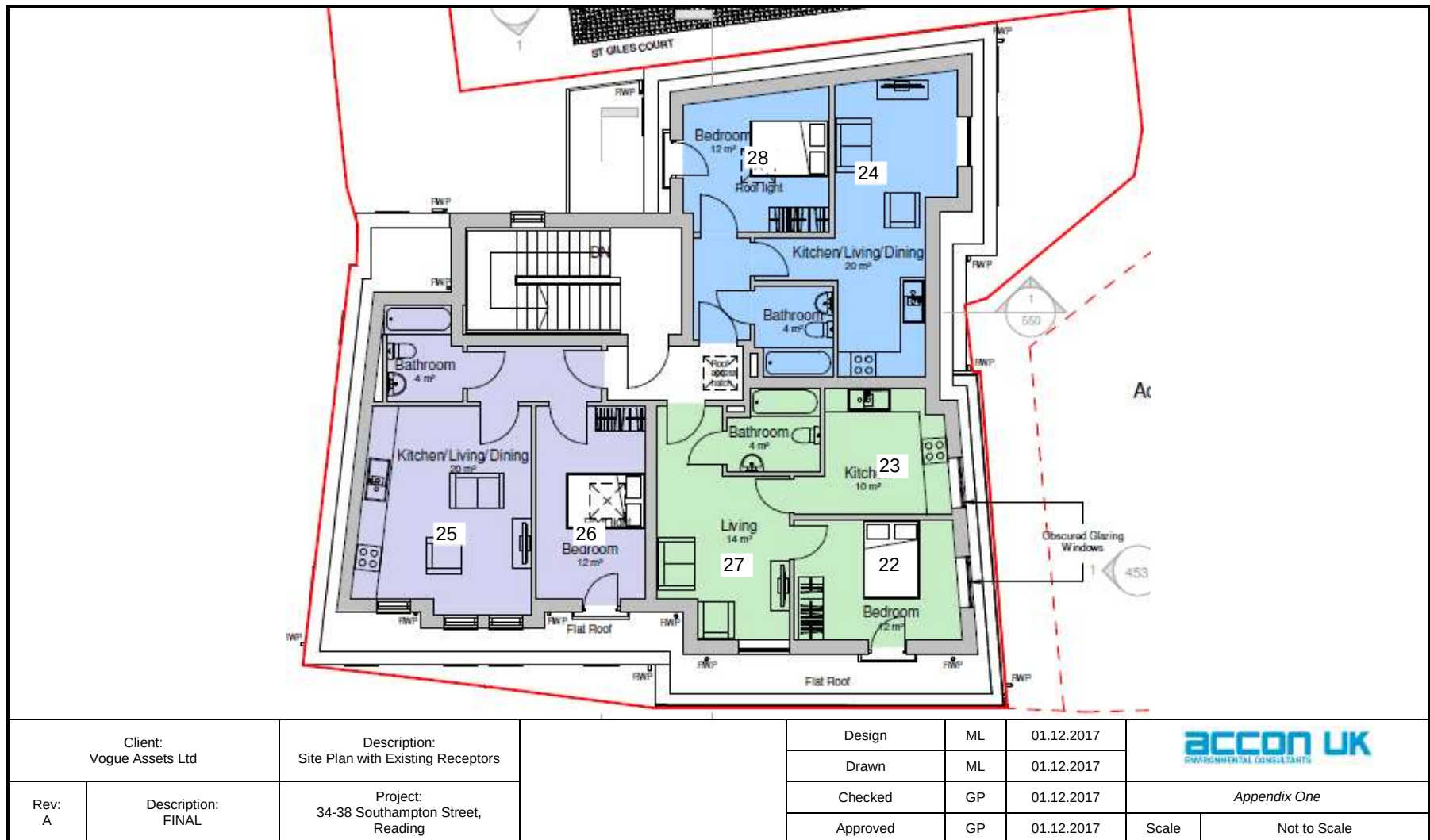
Appendix 2: Proposed Receptor Room Locations – Second Floor



19.12.2017

Page | 30

Appendix 2: Proposed Receptor Room Locations – Third Floor



19.12.2017

Page | 31

Appendix 3 The BRE Report

Appendix 3: The BRE Report

When considering daylight and sunlight assessments, reference is often made to the Building Research Establishment (BRE) report, "Site layout planning for daylight and sunlight – a guide to good practice" by PJ Littlefair.

The BRE Report contains guidance on how to design developments, whilst minimising the impacts on existing buildings from overshadowing and reduced levels of daylight and sunlight. As well as advice, the report contains a methodology to assess levels of daylight/sunlight and contains criteria to determine the potential impact of a new development on surrounding buildings. However, the report does state that the guidelines are not mandatory, but should be considered a guide to help rather than constrain the designer.

A2.1 Daylight

Contained within the three relevant documents, there are three criteria and calculation procedures to determine levels of daylight. Each one has its limitations and is used in different circumstances. The criteria are:

- **The 25° Rule and the Vertical Sky Component**
- **Average Daylight Factor**
- **No-Sky Line and the Working Plane**

A2.1.1 The 25° Rule and Vertical Sky Component

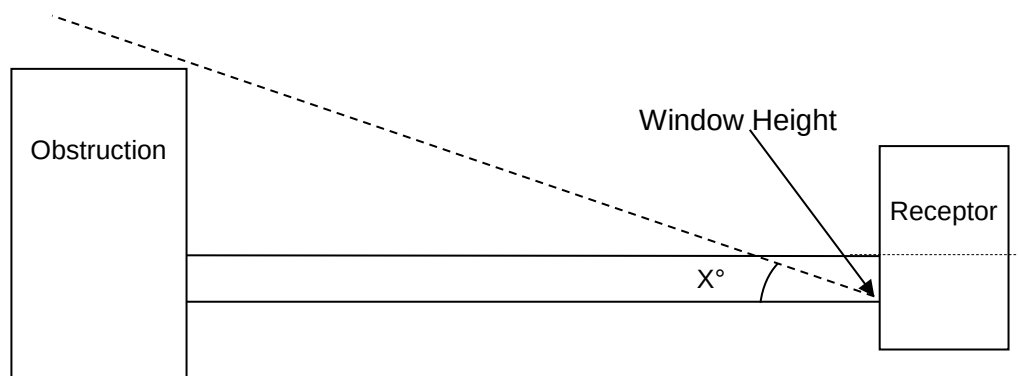
The BRE Report contains guidance on how to design developments, whilst minimising the impacts of existing buildings from overshadowing and reduced levels of daylight and sunlight, as well as ensuring developments are adequately daylighted. The report suggests that in general, a building will have the potential for good interior diffuse daylighting providing that:

- a) no obstruction, measured in a vertical section perpendicular to the main face, from a point 2m from the ground level, subtends an angle of more than 25° to the horizontal;
- or
- b) if a) is not satisfied, then all points on the main face on a line 2m above ground level are within 4m (measured sideways) of a point which has a Vertical Sky Component (VSC) of 27% or more.

The report contains a methodology for calculating the VSC, but also indicates that the methodology for calculating the levels of interior daylighting in BS 8206-2 should also be used where appropriate.

The report highlights a simplified procedure that can be used to screen new developments to determine whether a more detailed assessment is required. This screening method considers the extent to which the angle of view of the sky from the centre of the lowest window of the existing properties will be constrained by the proposed new buildings. If the new development subtends an angle of less than 25° to the horizontal from the lowest window of the existing property, then it is unlikely that the development will cause any substantive effects of the lighting of existing buildings; greater than 25° and further analysis will be required to determine the extent to which there will be a loss of daylight to the existing building. A schematic example of this calculation can be seen in **Figure A2.1**.

Figure A2.1: Schematic Example of Daylight Calculations



If the screening method determines that there may be an obstruction, the exact level of light can be calculated by determining the Vertical Sky Component (VSC). The BRE Report highlights a number of ways to calculate the VSC, including the skylight indicator method and the Waldram Diagrams.

When undertaking a daylight assessment, the BRE Report suggests a VSC of 27% or more should be achieved if a room is to be adequately day lit. It also suggests that when existing levels of daylight are below 27% VSC, a reduction of more than 20% from the existing level will be noticeable to the inhabitants, i.e. an impact will occur.

With regard to the surrounding properties, greater protection should be afforded to windows that serve habitable dwellings and, in particular, those serving living rooms and family kitchens. The tests can also be applied to non-domestic uses such as offices and workplaces where such uses will ordinarily have a reasonable expectation of daylight or sunlight. However, retail outlets such as shops and high street banks are not generally considered to have a reasonable expectation of daylight or sunlight. It is considered that retail outlets and point-of-sale displays do not rely on daylight or sunlight but on electric lighting. Assessment for daylight and sunlight is not therefore considered necessary in those instances.

The use of the VSC does have a number of limitations. For example, the calculation procedure only calculates the amount of light falling on the wall in question, it does not take into account the size of the windows or the size of the room that it is intending to light. Consequently, it is possible to design a room that would be adequately daylit through sensible room and window design (e.g. shallow rooms and large windows, or the use of roof lights), but the VSC will still show a low level of light falling on the wall. The VSC calculations do not take into account how designers may maximise the available light within a dwelling.

A2.2.2 Average Daylight Factor

The VSC only determines whether a room has the potential for good interior daylighting. The actual interior daylighting of the building can be checked by using the Average Daylight Factor (ADF) introduced in BS 8206: 2008.

The ADF is a very common and easy to understand measure for expressing the daylight availability in a room. It describes the ratio of outside illuminance over inside illuminance, expressed as a percentage. The higher the DF then the more that natural light is available in a room.

Rooms with an average DF of 2% give us a feeling of daylight. However, it is only when the ADF rises above 5% that we perceive it as well day lit. Different types of rooms have different minimum requirements for daylighting. **Table A2.1** details the acceptable criteria for average daylight factor for habitable rooms.

Table A2.1: Daylight Factor Criteria

Criteria	Minimum Daylight Factor
Predominantly daylight without the need for supplementary electric lighting	5%
With supplementary electric lighting:	
Suitable for kitchens	2%
Suitable for living rooms	1.5%
Suitable for bedrooms	1%

A2.2.3 No-Sky Line and the Working Plane

Whilst the ADF and VSC determine the amount of daylight in a room, the no-sky line determines how well the daylight is distributed in the room. Areas beyond the no-sky line will generally look gloomy.

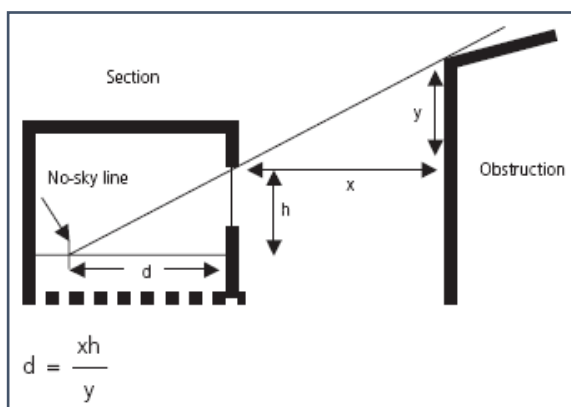
The working plane is a notional surface, typically at about desk or table height, at which the daylight factor or the 'no-sky line' is calculated or plotted. For calculations in dwellings, it is taken to be at a position 0.85 m above the floor.

The no-sky line divides those areas of the working plane which can receive direct skylight, from those which cannot. If the external obstructions already exist, it is possible to measure directly the position of the no-sky line in a room.

The assessment criteria for the working plane is detailed in the Communities & Local Government published report *Code for Sustainable Homes-Technical Guidance (2008)*. The minimum requirement stated by the guidance is 80% of the working plane in each kitchen, living room, dining room and study must receive direct light from the sky.

As an approximation, obstructions that are parallel to the window can be considered infinite. The no sky-line will then be parallel to the window at a distance 'd' from the window wall. **Figure A2.2** illustrates how the no-sky line can be calculated. If 'd' is greater than the room depth, then no part of the room lies beyond this *no-sky line*.

Figure A2.2: Pictorial calculation of the No-Sky Line



Where:

h = height of the window head above the working plane

y = height of the obstruction above the window head

x = distance from the window to the obstruction

A2.2 Sunlight

Whilst daylight is an essential element of all dwellings, sunlight is considered to be desirable rather than essential. The BRE Report suggests that not all windows need to have access to direct sunlight and that direct sunlight is most desirable in living rooms and kitchens and less important in bedrooms.

When designing a new development or an extension to an existing building, the impact on the amount of sunlight received in the living areas of residential properties must be assessed, as residents are particularly likely to notice a loss of sunlight entering their homes.

Sunlight availability can be measured in Annual Probable Sunlit Hours (APSH). The APSH assessment determines the amount of probable sunlight that will shine on the window in a typical year.

The BRE Report suggests that to ensure that a dwelling will appear reasonably sunlit, at least one main window wall should face within 90 ° of due south and that the window receives at least 25% of the total APSH available during a given year, and at least 5% of the total APSH during the winter months. Consequently, not every window in a dwelling needs to achieve the minimum levels of sunlight, nor does every room in a dwelling.

When assessing the impact on sunlight from a new development on an existing development, if the levels with the development proposals include an APSH less than 0.8 times their former value, then the existing occupants will notice the loss in sunlight.



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