DAYLIGHT & SUNLIGHT

IMPACT ON NEIGHBOURING PROPERTIES REPORT: APPENDICES

New Henry Street, Bristol

Dominus Bristol Limited

06 December 2023

GIA No: **19167**

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CONTENTS

USER TIP:
Click any heading to go directly to that content.

USER TIP:
Return to the contents list from any page by clicking on the GIA logo.

APPENDIX 01

PRINCIPLES OF DAYLIGHT, SUNLIGHT & OVERSHADOWING

APPENDIX 01

PRINCIPLES OF DAYLIGHT, SUNLIGHT & OVERSHADOWING

The Building Research Establishment (BRE) have set out in their handbook 'Site Layout Planning for Daylight & Sunlight: A Guide to Good Practice 3rd edition (2022)', guidelines and methodology for the measurement and assessment of daylight, sunlight and overshadowing.

BACKGROUND & CONTEXT

A 1.1 The quality of daylight and sunlight amenity as well as the overshadowing of open spaces is often stipulated within planning policy for protection or enhancement and a concern for adjoining owners and other interested parties.

A 1.2 The BRE Guidelines provide advice on site layout planning to determine the quality of daylight and sunlight both within buildings and reaching open spaces.

A 1.3 The BRE Guidelines note that the document is intended to be used in conjunction with the interior daylight recommendations found within the British Standard Daylight in buildings, BS EN 17037 and the CIBSE Publication LG 10 Daylighting – a guide for designers.

A 1.4 Whilst the BRE Guidelines are typically referred to for daylight, sunlight and overshadowing matters within the planning process, they are not intended to be used as an instrument of planning policy, nor are the figures intended to be fixedly applied to all locations.

A 1.5 In the introduction of 'Site Layout Planning for daylight and sunlight (2022)', section 1.6 (page 7), states that:

> *"The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and this document should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design (see Section 5). In special circumstances the developer or planning authority may wish to use different target values. For example, in a historic city centre, or in an area with modern high-rise buildings, a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings".*

A 1.6 Paragraph 2.2.3 (page 14) of the document states:

> *"Note that numerical values given here are purely advisory. Different criteria may be used based on the requirements for daylighting in an area viewed against other site layout constraints".*

A 1.7 The numerical criteria suggested by the BRE are therefore designed to provide industry advice/ guidance to plan/design with daylight in mind. Alternative values may be appropriate in certain circumstances such as highly dense urban areas. The BRE approach to creating alternative criteria is detailed within Appendix F of the Document.

A 1.8 Paragraph 2.2.2 (page 14) of the document states that the guidelines are:

> *"intended for use for rooms in adjoining dwellings where daylight is required, including living rooms, kitchens, and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas, and garages need not be analysed."*

A 1.9 Although primarily designed to be used for residential properties, the BRE Guidelines continue to state that they may be applied to any existing non-residential buildings where there may be a reasonable expectation of daylight including; schools, hospitals, hotels and hostels, small workshops, and some offices.

A 1.10 Local planning authorities generally consider daylight and sunlight an important factor for determining planning applications. Policies refer to both the protection of daylight and sunlight amenity within existing properties and areas of amenity as well as the creation of proposed dwellings and spaces with high levels of daylight and sunlight amenity.

A 1.11 Although decision makers will look to the BRE Guidelines to understand any numerical reductions in daylight and sunlight amenity, the acceptability of these reductions is considered against the relevant policies within the development plan. For example, a Site's location within an Opportunity Area or Tall Building Zone is relevant context for how the daylight and sunlight impacts of a development should be considered.

A 1.12 It is an inevitable consequence of the built-up urban environment that daylight and sunlight will be more limited in dense urban areas. It is well acknowledged that in such situations there may be many other conflicting and potentially more important planning and urban design matters to consider other than just the provision of ideal levels of daylight and sunlight.

A 1.13 The following sections extract relevant sections from the Guide.

EFFECTS TO DAYLIGHT

A 1.14 The BRE Guidelines provide two methodologies for daylight impact assessment, namely;

1 The Vertical Sky Component (VSC); and

2 The No Sky Line (NSL).

Vertical Sky Component (VSC)

A 1.15 The Vertical Sky Component (VSC) method is described in the Glossary of BRE Guidelines as the:

> *"Ratio of that part of illuminance, at a point on a given vertical plane, that is received directly from a CIE standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. Usually the 'given vertical plane' is the outside of a window wall. The VSC does not include reflected light, either from the ground or from other buildings"*

A 1.16 Put simply, the VSC provides an assessment of the amount of skylight falling on a vertical plane (generally a window) directly from the sky, in the circumstance of an overcast sky (CIE standard).

A 1.17 The national numerical value target "ideal" for VSC is 27%. The BRE Guidelines advise that upon implementation of a development, a window should retain a VSC value of 27% or at least 0.8 of its former value (i.e. no more than a 20% change) as per paragraph 2.2.23 of the Guide.

A 1.18 The VSC calculation is undertaken in both the existing and proposed scenarios so as to make a comparison.

A 1.19 The image in Figure 01 depicts a Waldram Diagram which can be used to calculate the VSC. The existing buildings are solidly pictured with the proposed scheme semi-transparent in the foreground.

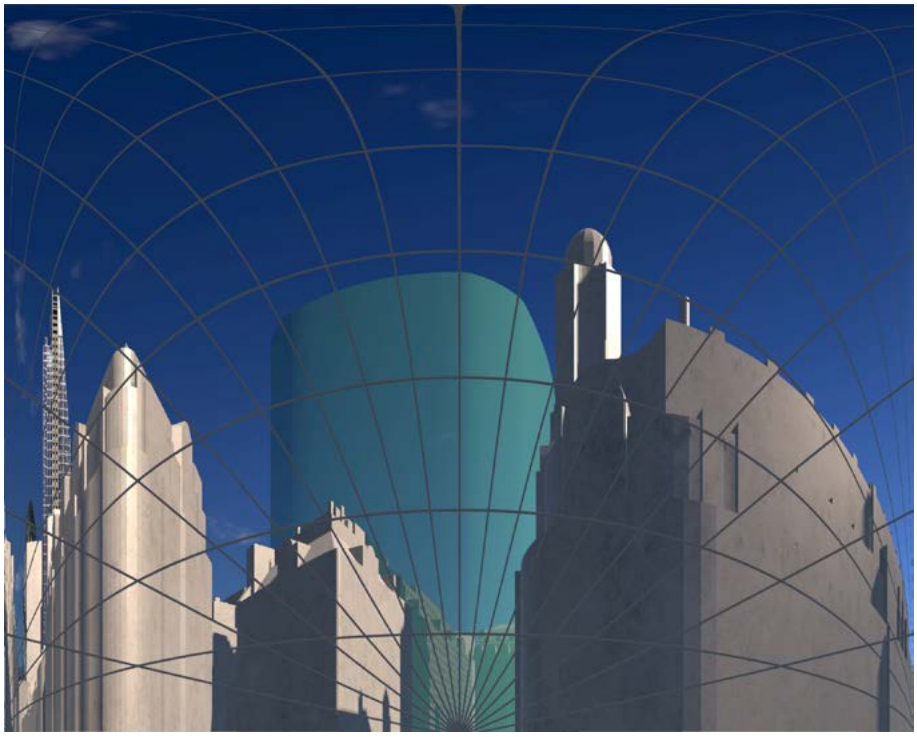

Figure 01: Waldram diagram

A 1.20 This form of assessment does not take account of window size, room use, room size, window number or dual aspect rooms. The assessment also assumes that all obstructions to the sky are 100% non-reflective thereby omitting the consideration of reflection and considering only the light coming directly from the sky.

A 1.21 The images belpw provide an example of how the VSC methodology does not necessarily paint an accurate picture of the experiential change in daylight condition. Figure 02 shows three windows of different size serving three rooms of identical size. In each case, the windows will have equal VSC values given that VSC is a measurement of the amount of sky visible from the centre point of a window.

A 1.22 The three rooms will experience a very different daylight environment because of the varying window sizes serving each one. Figure 03 depicts how window size affects the distribution of daylight within a room despite each window having an identical VSC value. This highlights that while the VSC methodology is a reasonable starting point to assess daylight, it does not accurately depict the change likely to be experienced with the room.

A 1.23 The BRE Guidelines state that a VSC of 27% VSC or more should mean that enough skylight is reaching the window of an existing building and that if windows retain at least 0.8 times its former value, occupants would not notice the reduction in skylight.

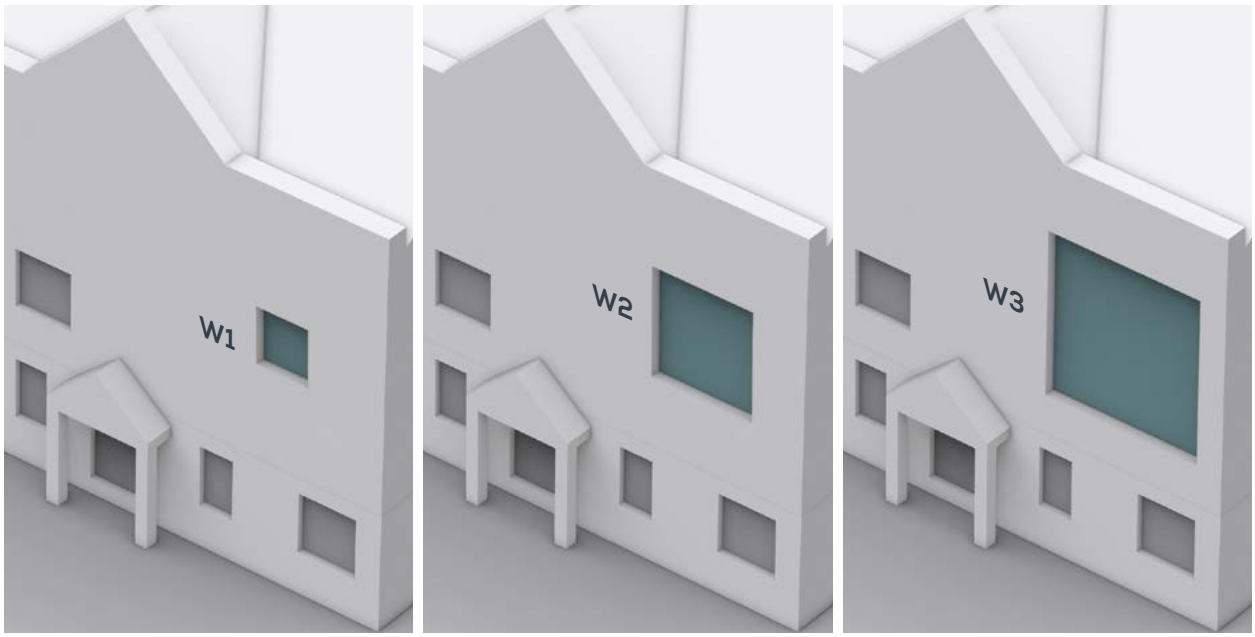

Figure 02: Vertical Sky Component (VSC) indicative analysis

DAYLIGHT FACTOR STUDIES FOR SAMPLE ROOMS WITH SAME VSC

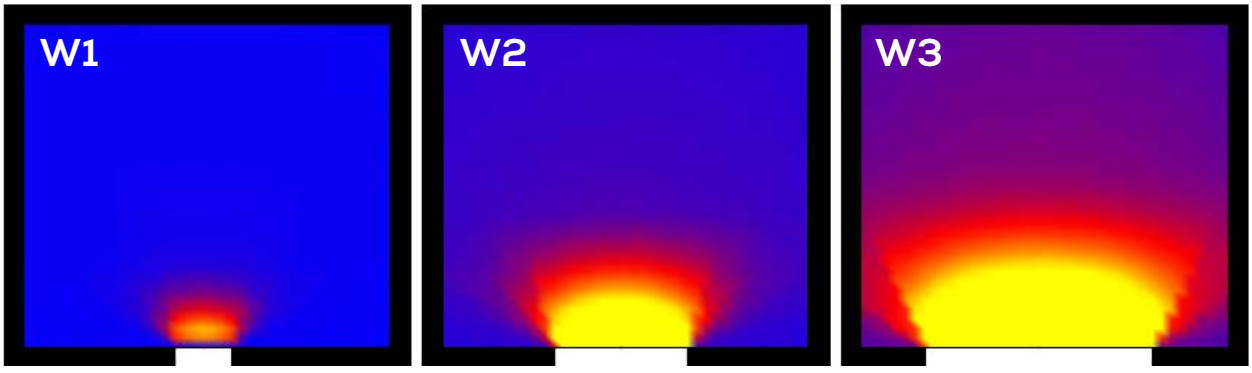

Figure 03: Comparative radiance analysis

A 1.24 As an example, if a window with a retained VSC value of 27% experiences a reduction of 20% thus retaining 21.6% VSC (see Figure 04), the impact would meet the recommendations of the BRE Guidelines by reference to paragraph 2.2.7. This indicates logically that a retained value of 21.6% should be acceptable in principle. Of course, in urban areas, the threshold of what might be acceptable must for the reasons identified above be much more flexible.

A 1.25 If, however, a window has a higher existing value than 27% and it experiences a greater than 20% reduction (which still provides a retained value of 21.7% VSC) the reduction is technically outside of the recommendations of the BRE Guidelines despite an identical retained level of VSC (see Figure 04).

A 1.26 This was explored at the public inquiry for the redevelopment of Hertford Gasworks (PINS Ref: APP/J1915/W/19/3234842) in which the Inspector considered that a minimum value of 21.6% VSC would be acceptable:

> *"The appellant took this further and adopted (with explanation) an approach with a retained VSC of 21.6% as the minimum level. This was specifically accepted by the Council's witness in cross-examination. On that basis, there would be only a very small number of windows falling below that level, and those which did fail would only do so by a narrow margin."*[4]

A 1.27 In this case, the Inspector considered that a minimum VSC value of 21.6% would be appropriate in the county town of Hertford. It would follow that the expectation for dense urban areas and would fall below this minimum VSC value.

4 PINS Ref: APP/J1915/W/19/3234842 (para 57)

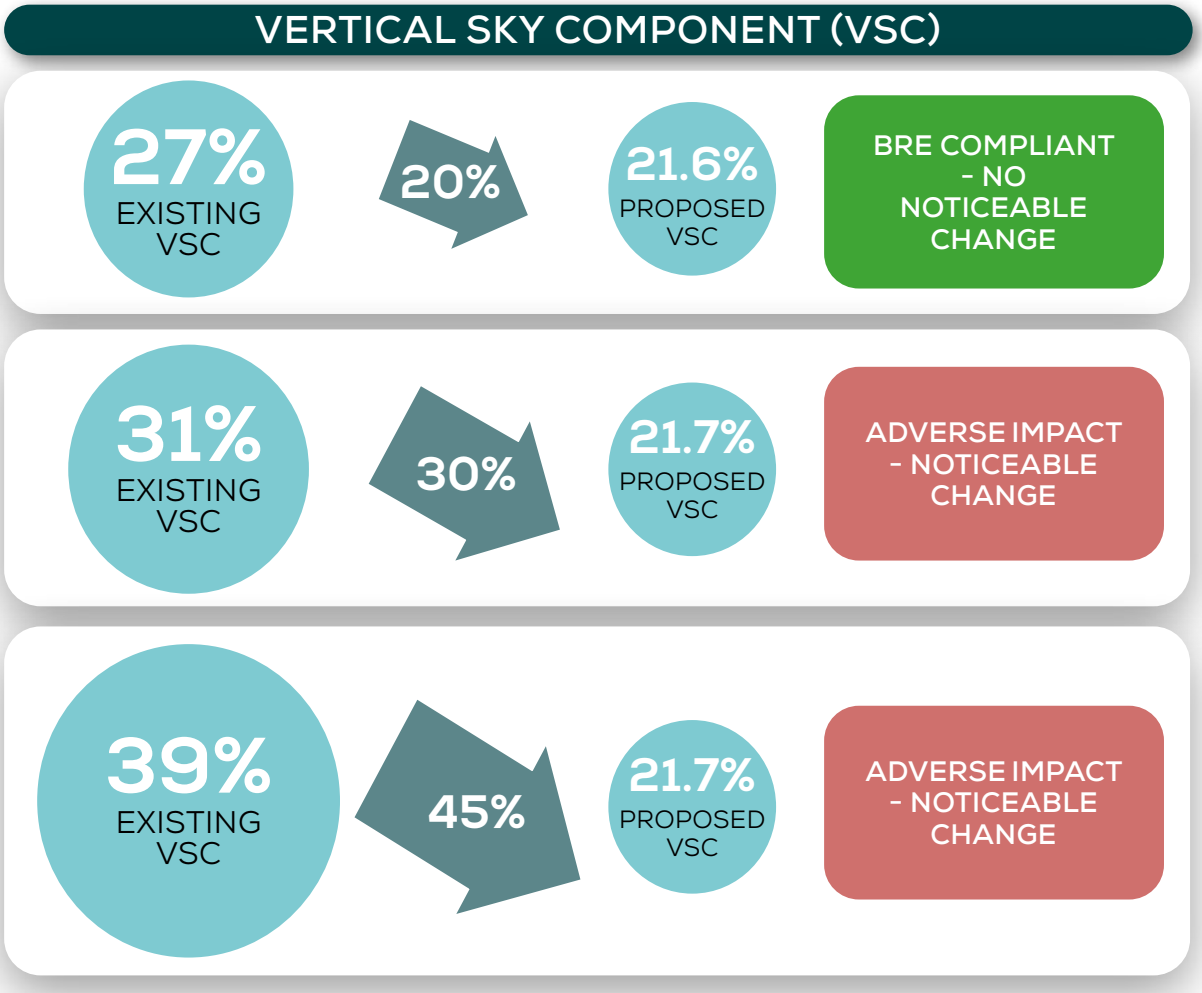

Figure 04: Percentage reduction in VSC and retained VSC values

No Sky Line (NSL)

A 1.28 In addition to the VSC, the BRE recommends the NSL method of assessment where internal layouts are known. Whilst the VSC provides information on the quantum of light reaching a window, the NSL seeks to provide information on how well this light is distributed within the room. The NSL is sometimes also referred to as 'Daylight Distribution' for this reason.

A 1.29 Paragraph D3 of Appendix D of the BRE Guidelines is clear that the no sky line can only be calculated where room layouts are known:

> *"In most cases the position of the no sky line has to be found from plans. The calculation can only be carried out where room layouts are known. Using estimated room layouts is likely to give inaccurate results and is not recommended. However where plans are available, for example on the local authority's online planning portal, the calculation should be carried out".*[5]

A 1.30 The NSL in the Glossary of the guidance as *"the outline on the working plane of the area from which no sky can be seen."* and so the NSL is effectively an assessment of sky visibility within a room. As stated already, the calculation is undertaken across the working plane which in accordance with paragraph 2.2.10 *"in houses [...] is assumed to be horizontal and 0.85m high"*.

A 1.31 Again, both the existing and proposed positions are calculated and presented alongside any change in position of the NSL. The results can then be presented in table format or else illustrated on a contour plot if required, an example of which can be found at Figure 05 overleaf.

A 1.32 The BRE Guidelines state at paragraph 2.211 (page 16) that:

> *"If, following construction of a new development, the no sky line moves so that the area of the existing room, which does receive direct skylight, is reduced to less than 0.8 times its former value this will be noticeable to the occupants, and more of the room will appear poorly lit. This is also true if the no sky line encroaches on key areas like kitchen sinks and worktops."*

A 1.33 In accordance with the strict application of the national numerical values, therefore the change in daylight would be noticeable to the occupants should the NSL experience a loss of NSL greater than 20%.

A 1.34 It is relevant to note that this assessment takes the number and size of windows serving a room into account as well as the shape of the room but, being concerned only with sky visibility and the distribution of light, does not consider the quantum of light reaching the room.

5 Littlefair, P. (2022). Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice. Hertfordshire: HIS BRE Press, para D3 p. 79

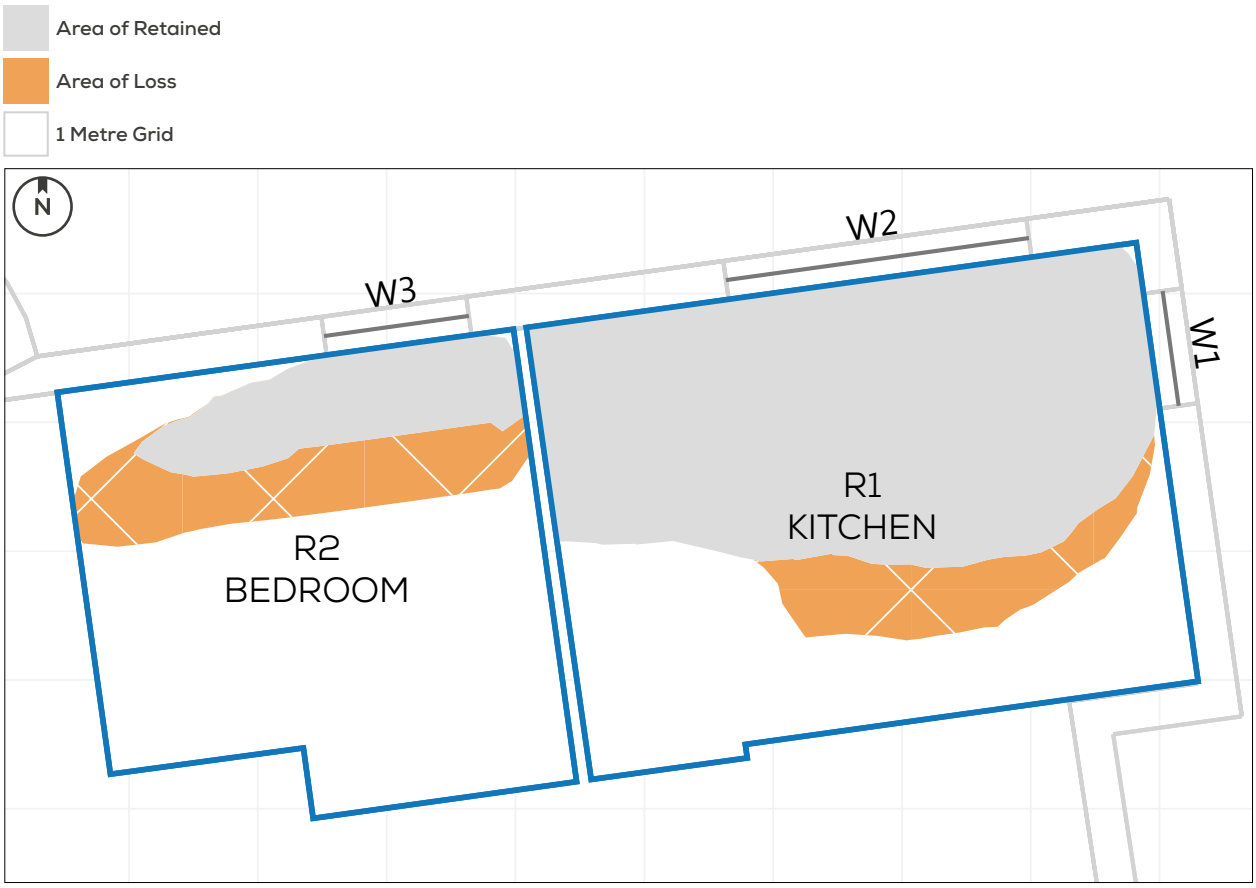

Figure 05: Example NSL Contour Plot

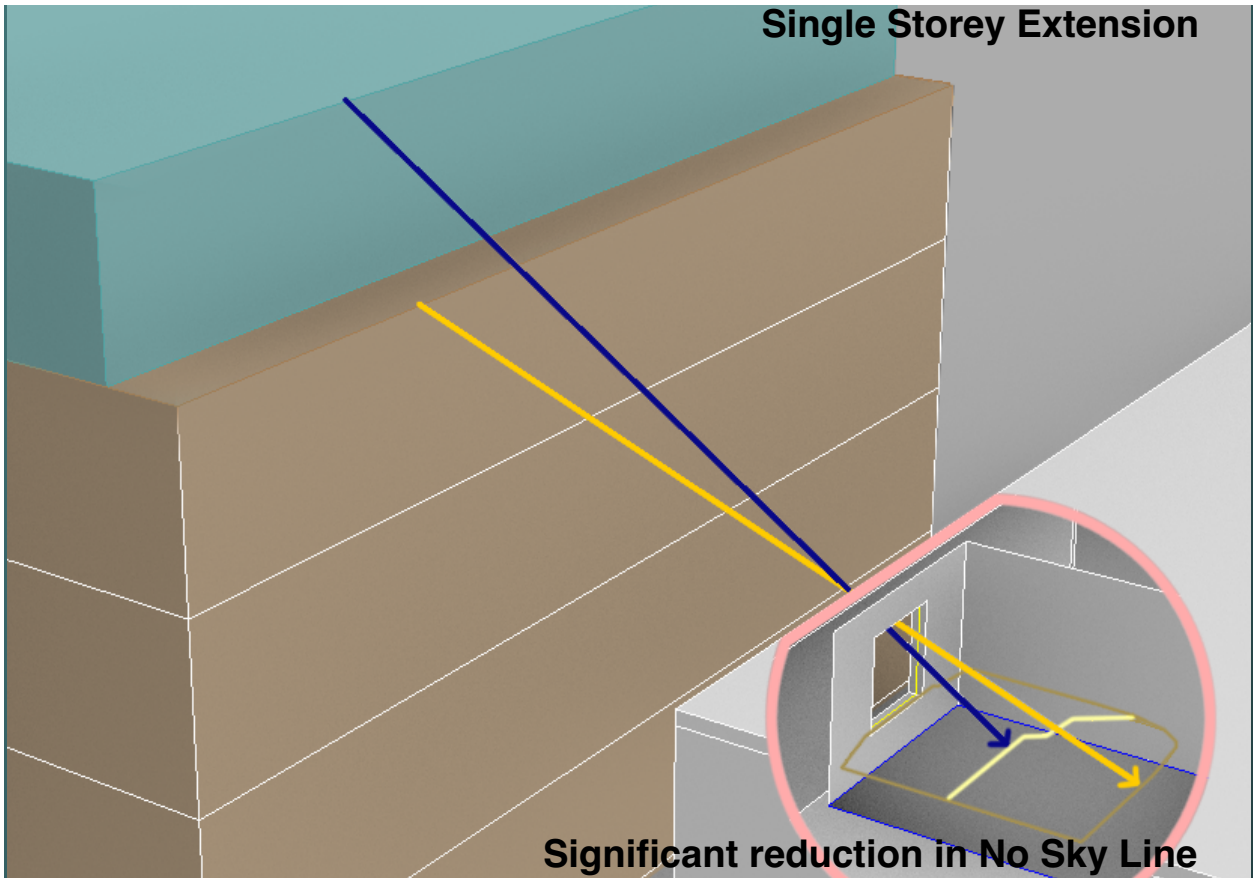

Figure 06: Example of movement of NSL

Decision Chart (Figure 20 of the BRE Guide)

A 1.35 The flowchart in Figure 09[6] illustrates the steps and criteria outlined within the BRE Guidelines to understand whether the daylighting (VSC and NSL) has been significantly affected.

A 1.36 Almost invariably when this methodology is applied in a town centre or more generally in an urban context the flowchart will point to *"daylight likely to be significantly affected"* when the real-life experiential change in light may not appear to be even noticeably affected.

A 1.37 The section at Figure 08[7] provides an example of the angle measurement subtended by a new development. This is the starting point provided within the BRE Guidelines from which to assess whether daylighting is likely to be significantly affected by new development. It is clear from the image that this principle has not been developed with urban town centre locations in mind.[8]

6 Littlefair, P. (2022). Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice. Hertfordshire: HIS BRE Press, Figure 20 p. 18
7 Littlefair, P. (2022). Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice. Hertfordshire: HIS BRE Press, Figure 14 p. 15
8 Appeal Ref: APP/E5900/W/17/3171437 para 108

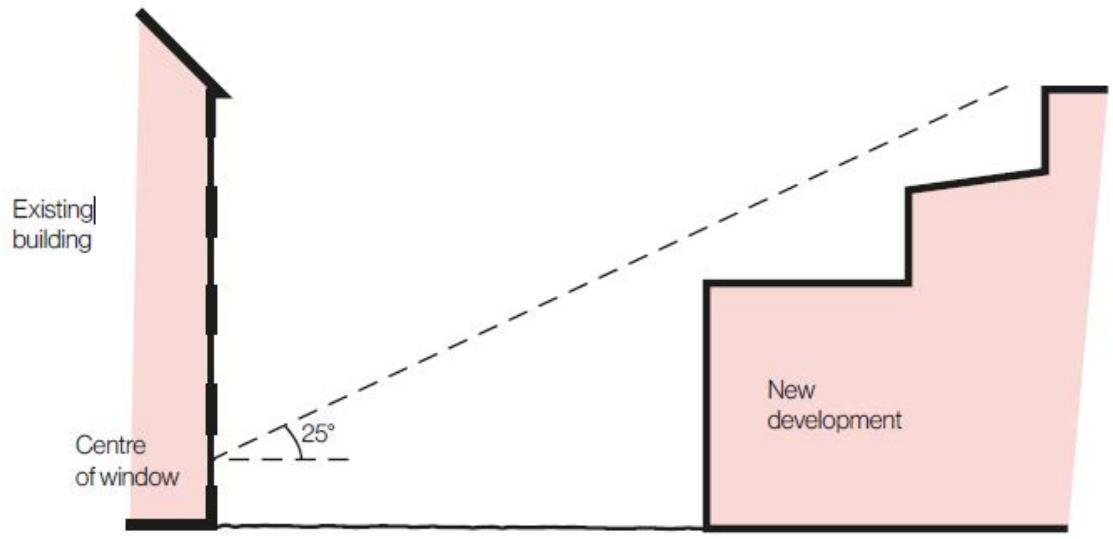

Figure 08: BRE VSC diagram (Figure 14): *Section in plane perpendicular to the affected window wall*

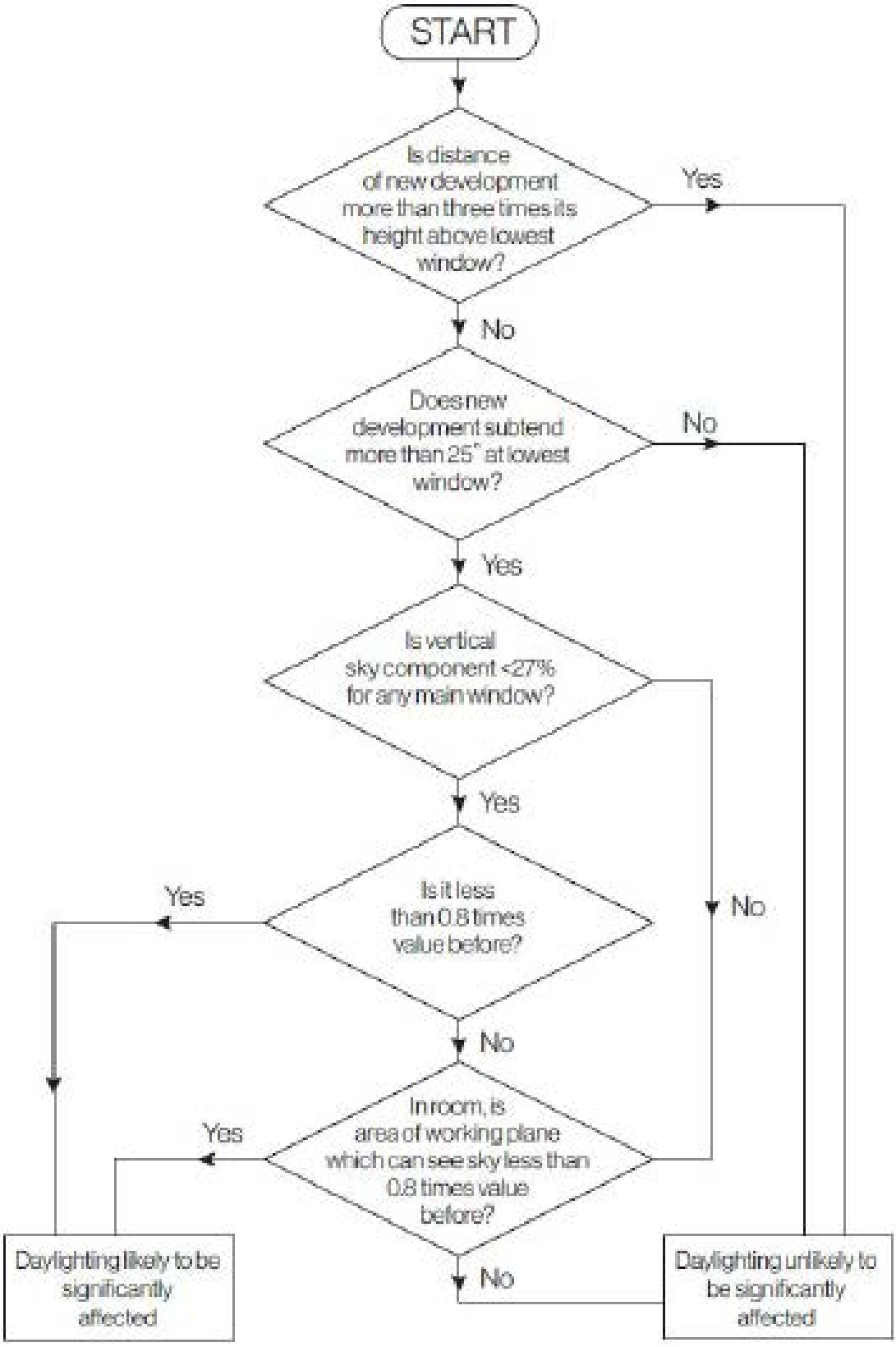

Figure 09: BRE Decision Chart (Figure 20): *diffuse daylight in existing buildings.*

EFFECTS TO SUNLIGHT

Annual Probable Sunlight Hours (APSH)

A 1.38 The BRE Guidance suggests that to understand sunlight impacts to a property, an assessment of Annual Probable Sunlight Hours (APSH) is undertaken. The APSH is defined in the Glossary as:

> *"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)"*

A 1.39 Expanding on the above, long-term averages were used to position 100 spots in the sky, representative of sunlight over the whole year. Correlating to the probability of the sun to shine, the majority of these (70) are at times to the six-months containing summer (from spring equinox to autumn equinox) which 30 are the 'winter' months from autumn equinox to spring. The APSH is calculated though calculating how many of these 'spots' can be seen from a location (normally a window) both overall and how many of these are during the winter months.

A 1.40 To understand the potential sunlight impacts therefore, all windows facing within 90 degrees of due south and overlooking the development are generally assessed for APSH.

A 1.41 The BRE Guidelines set out the overall methodology and criteria for the assessment of Sunlight in Chapter 3. The BRE Guidelines state in paragraph 3.2.3 and 3.2.5:

> *"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 degrees of due south. Kitchens and bedrooms are less important, although care should be taken not to block too much sun."*
>
> *"A point at the centre of the window on the outside face of the window wall may be taken."*

A 1.42 In interpreting the results, the BRE Guidance states in summary 3.2.13 that:

> *"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, or less than 5% of annual probable sunlight hours between 21 September and 21 March, and*
> - *receives less than 0.8 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."*

A 1.43 The image in Figure 10 depicts the APSH sun spots overlaid on a Waldram Diagram. The existing buildings are solidly pictured with the proposed scheme semi-transparent in the foreground. The yellow spots indicate summer sun and the blue spots indicate winter sun.

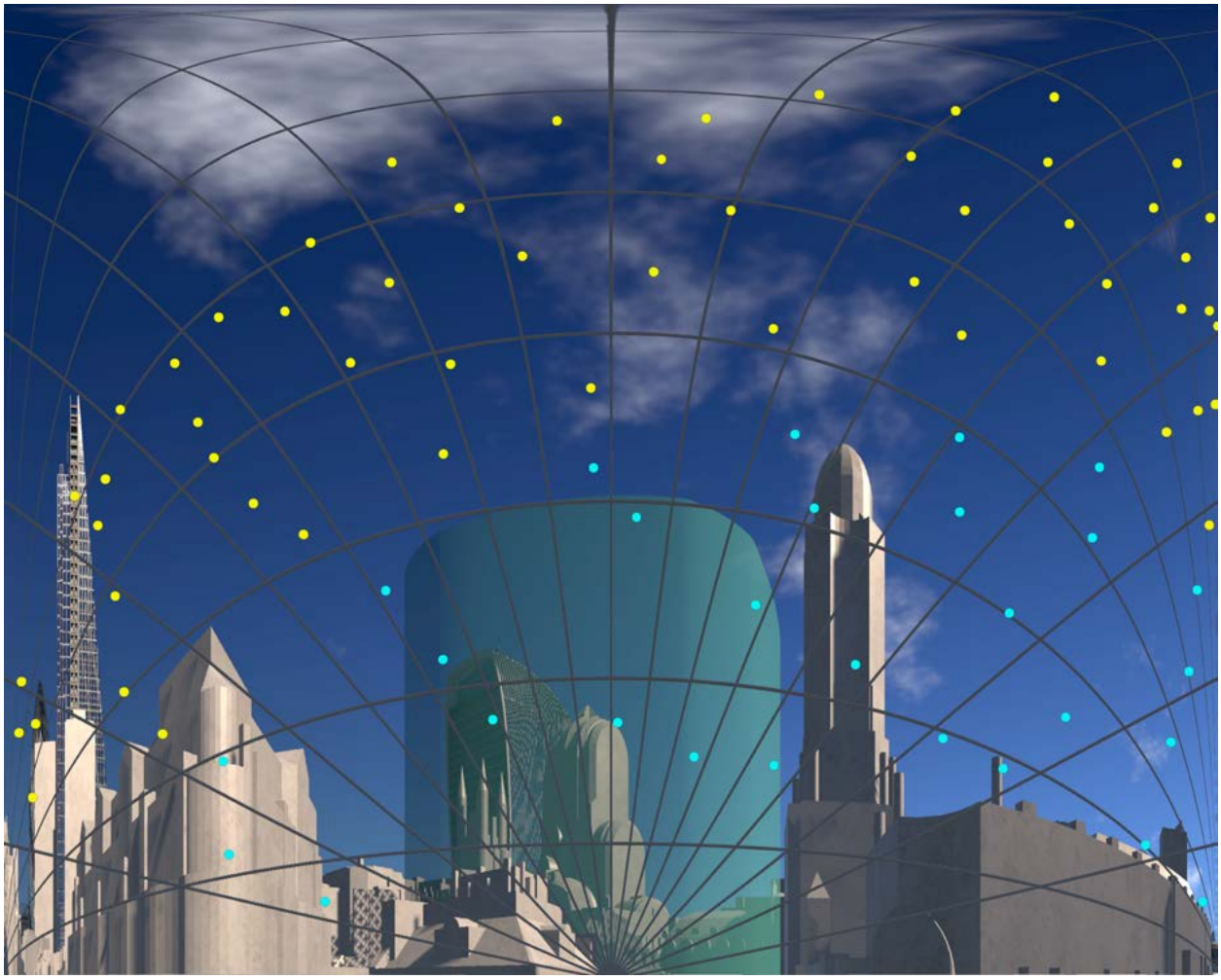

Figure 10: Waldram diagram

Sun Analysis Key:

- Winter sun restricted by the existing buildings
- Summer sun restricted by the existing buildings
- No impact to Winter sun
- No impact to Summer sun
- Winter sun restricted by the Proposed Development
- Summer sun restricted by the Proposed Development

EFFECTS TO OVERSHADOWING

A 1.44 The BRE Guidelines consider overshadowing of amenity spaces in section 3.3 which states:

> *Sunlight in the spaces between and around buildings has an important impact on the overall appearance and ambience of a development. It is valuable for a number of reasons, to:*
>
> *- provide attractive sunlit views (all year)*
>
> *- make outdoor activities like sitting out and children's play more pleasant (mainly warmer months)*
>
> *- encourage plant growth (mainly spring and summer)*
>
> *- dry out the ground, reducing moss and slime (mainly in colder months)*
>
> *- melt frost, ice and snow (in winter)*
>
> *- dry clothes (all year).*

A 1.45 It must be acknowledged that in urban areas the availability of sunlight on the ground is a factor which is significantly controlled by the existing urban fabric around the site and so may have very little to do with the form of the development itself.

A 1.46 Likewise, there may be many other urban design, planning and site constraints which determine and run contrary to the best form, siting and location of a proposed development in terms of availability of sun on the ground.

Transient Overshadowing

A 1.47 In order to ascertain the additional overshadowing impact that a development would have on the neighbouring properties amenity, the hourly shadows can be mapped for the following three key dates in the year:

- 21st March (Spring Equinox);
- 21st June (Summer Solstice); and
- 21st December (Winter Solstice).

A 1.48 While the BRE Guidelines do not provide any criteria for Transient Overshadowing, the above dates are generally selected so as to present the mid-case, the best and worst scenarios. On 21st March, the sun is in the same position as on 21st September and therefore the results presented are valid for both equinoxes. On 21st June, the sun is at its highest and the shadows cast are shortest, therefore this date represents a best-case scenario in terms of overshadowing. On 21st December, the sun is at its lowest point causing longer shadows to be cast and represents the worst-case scenario.

A 1.49 For each of these dates, specialist simulation software is used to produce images showing the shadows cast at hourly intervals throughout the day from sunrise to sunset.

A 1.50 Two images are produced for each time and presented beside each other for comparison purposes. Shadows from neighbouring buildings are coloured grey but should additional shadow be cast by the existing or proposed buildings, these are coloured in green or blue to provide clarification on the cause of the shadow.

A 1.51 In order to produce the images, it is necessary to create an accurate 3D model of the existing buildings, proposed scheme and surrounding buildings. The surrounding and existing buildings are modelled from photogrammetry, providing a precise model which in turn ensures that the analysis accurately represents the overshadowing conditions within the assessed area.

A 1.52 Where the overshadowing conditions of an area cannot be clearly identified by the transient assessments, a Sun Hours on Ground test and a Sun Exposure analysis are provided. The Sun Exposure analysis illustrates in false-colours the exact number of hours of sunlight available in the area.

A 1.53 Sun Exposure is not relevant for the BRE Guidelines. The Sun Hours on Ground test is described in detail below.

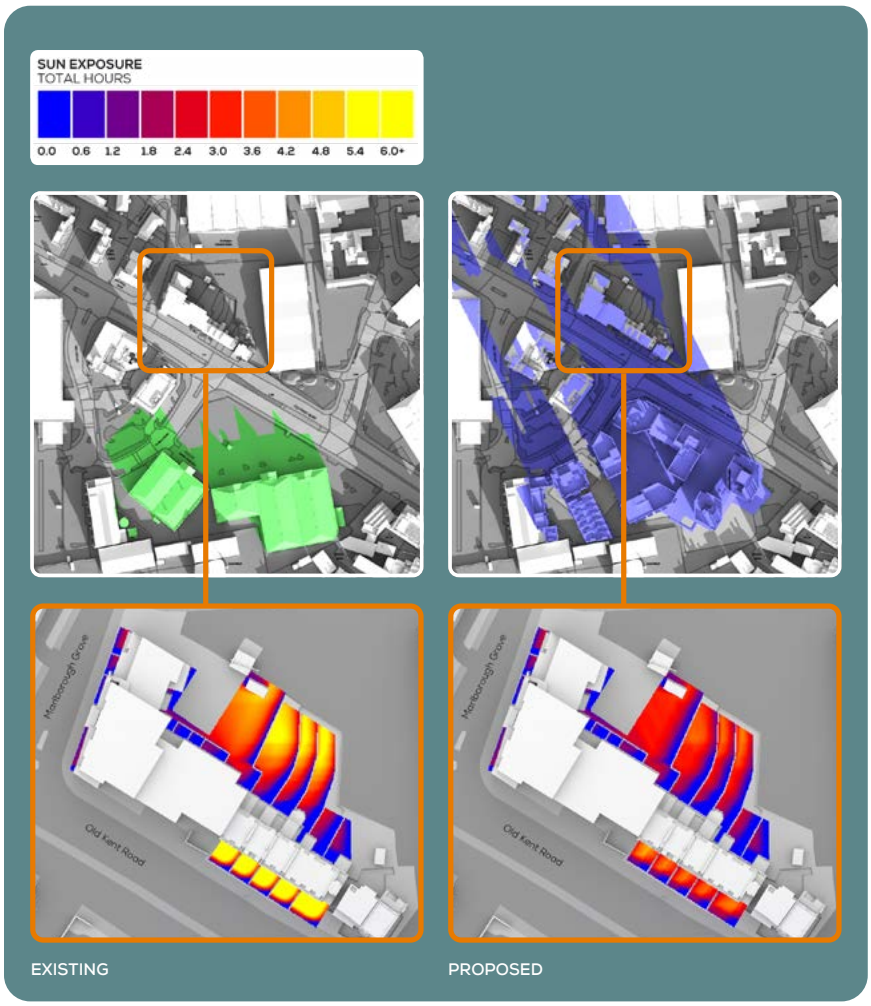

Figure 11: Example of Transient Overshadowing and Sun Exposure Analyses

Sun Hours on Ground

A 1.68 Sun Hours on Ground assessments can be undertaken to illustrate the sunlight availability within outdoor amenity areas, both within a proposed development and within the neighbouring properties.

A 1.69 The BRE Guidelines suggests that Sun Hours on Ground assessments should be undertaken on the Equinox (21st March and 21st September). Using specialist software, the path of the sun is tracked to determine where the sun would reach the ground and where it would not.

A 1.70 As with regard to any other site layout-dependent factors, the quality of an outdoor open space is determined by an array of important amenities like greenery, landscape, accessibility and design for instance, of which sun on ground is one component.

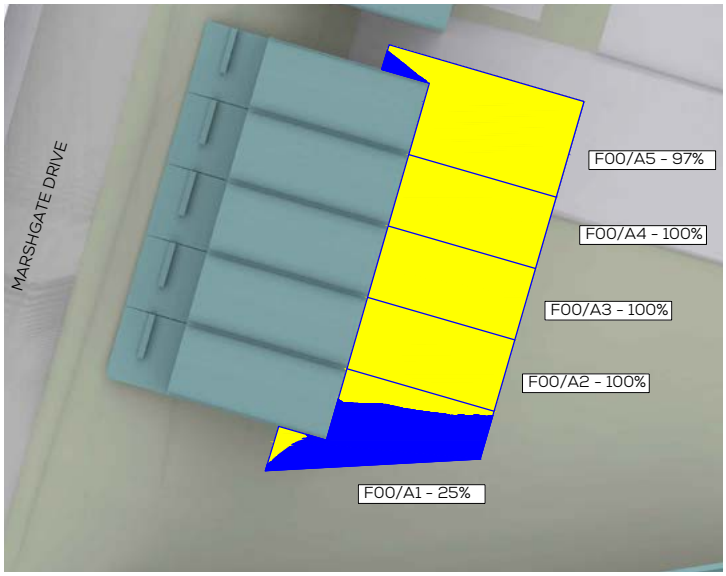

Figure 12: Example Sun Hours on Ground Assessment

AREA THAT RECEIVES MORE THAN 2 HOURS OF DIRECT SUNLIGHT ON 21st MARCH

AREA THAT RECEIVES LESS THAN 2 HOURS OF DIRECT SUNLIGHT ON 21st MARCH

BRE GUIDELINES: ADDITIONAL DAYLIGHT AND SUNLIGHT TESTS

VSC and APSH to Rooms

A 1.54 As outlined within the BRE Guidelines (paragraph 2.2.6), the VSC value is calculated for each window; however:

> *"If a room has two or more windows of equal size, the mean of their VSCs may be taken".*

A 1.55 Where a room is served by two or more windows of the same or different sizes, the VSC value to the room can be calculated by applying an average weighting calculation to understand the VSC value to the room. The formula used is as follows;

Σ(Vn*An) / ΣAn

Where:

V = window VSC
A = window area
n = the number of windows

A 1.56 The BRE provide a methodology to calculate APSH in relation to the room and window, paragraph 3.1.12 states:

> *"If a room has multiple windows, the amount of sunlight received by each can be added together provided they occur at different times and sunlight hours are not double counted."*

A 1.57 The above extract of the BRE is in relation to proposed units rather than existing buildings. It does, however, make sense to apply this methodology to existing rooms as well, when room layouts are known as a room served by multiple windows could receive the benefit of sunlight from all windows and not just one.

A 1.58 GIA calculate the APSH room assessment in the following way:

1 The sunlight hours (both winter and annual) are calculated for each window. Instead of simply returning the overall per cent pass rate, i.e. one figure for winter, and one for the whole year, the yes/no result of each of the 100 sun spots is tracked. For this accounting to work, each sun dot needs to be assigned a unique identifier, e.g. from 1 to 100;

2 The sets of 100 sun spots are combined for each room using Boolean logic, i.e. conjunctions of yes/no values. The outcome of this step is a set of 100 yes/no values corresponding to the 100 sun spots, but on a per-room basis. Each per-room dot is counted if it is unobstructed for at least one of its windows; and

3 The unobstructed sun dots for the room are summed up and expressed as a percentage of the total number of annual and winter spots.

Balconies/Overhangs

A 1.59 The BRE recognises that existing architectural features on neighbouring buildings such as balconies and overhangs inherently restrict the quantum of skylight to a window. The BRE Guidelines note on page 11, paragraph 2.1.17 and page 16, paragraph 2.2.13:

> *"This is a particular problem if there are large obstructions opposite; with the combined effect of the overhang and the obstruction, it may be impossible to see the sky from inside the room, and hence to receive any direct skylight or sunlight at all."*

> *"Existing windows with balconies above them typically receive less daylight. Because the balcony cuts out light from the top part of the sky, even a modest obstruction opposite may result in a large relative impact on the VSC, and on the area receiving direct skylight. One way to demonstrate this would be to carry out an additional calculation of the VSC and the area receiving direct skylight, for both the existing and proposed situations, without the balcony in place."*

A 1.60 As noted by the BRE Guidelines, where there are existing overhanging features, larger reductions in skylight and sunlight may be unavoidable and alternative criteria can be used. The guidance suggests that in such situations a calculation is carried out that excludes the balcony or the obstruction.

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DAYLIGHT - MIRROR MASSING & ADJOINING DEVELOPMENT LAND

Alternative target Values for Skylight and Sunlight Access "Mirror Massing"

A 1.61 The BRE Guidelines provide a calculation for the VSC and APSH analysis to quantify an appropriate alternative value based on the context of an environment. This approach is known as the 'mirror image' analysis (see Figure 12).

A 1.62 The BRE notes in paragraph F5:

> *"where an existing building has windows that are unusually close to the site boundary and taking more than their fair share of light. Figure F3 shows an example where side windows of an existing building are close to the boundary. To ensure that new development matches the height and proportions of existing buildings, the VSC and APSH targets for these windows could be set to those for a 'mirror-image' building of the same height and size, an equal distance away on the other side of the boundary."*

A 1.63 This analysis is used to understand the levels of Daylight (VSC) and Sunlight (APSH) that would be experienced by an extant neighbouring property if there were a building of the same height and extent opposite.

A 1.64 The mirror image assessment is fairly simplistic and is not, therefore, easily applied to large and complex site footprints which are not all built at equal distances from the site boundary or of the same footprint.

Adjoining Development Land

A 1.65 The "Adjoining Development Land" analysis provided within the BRE Guidelines is a simple test to ensure that a proposal is a reasonable distance from the boundary so as to "enable future nearby developments to enjoy a similar access to daylight." (2.3.1)

A 1.66 The BRE comments in paragraphs 2.3.3, 2.3.6 and 2.3.7 that:

> *"The diffuse daylight coming over the boundary may be quantified in the following way. As a first check, draw a section in a plane perpendicular to the boundary (Figure 21). If a road separates the two sites then the centre line of the road should be taken. Measure the angle to the horizontal subtended at a point 1.6 metres above the boundary by the proposed new buildings. If this angle is less than 43 ° then there will normally still be the potential for good daylighting on the adjoining development site (but see Sections 2.3.6 and 2.3.7)."*
>
> *"The guidelines above should not be applied too rigidly. A particularly important exception occurs when the two sites are very unequal in size and the proposed new building is larger in scale than the likely future development nearby. This is because the numerical values above are derived by assuming the future development will be exactly the same size as the ·proposed new building (Figure 22). If the adjoining sites for development are a lot smaller, a better approach is to make a rough prediction of where the nearest window wall of the future development may be; then to carry out the 'new building' analysis in Section 2.1 for this window wall."*
>
> *"The 43° angle should not be used as a form generator, to produce a building which slopes or steps down towards the boundary. Compare Figure 23 with Figure 22 to see how this can result in a higher than anticipated obstruction to daylight. In Figure 23 the proposed building subtends 34° at its mirror image, rather than the maximum of 25° suggested here. In cases of doubt, the best approach is again to carry out a new building analysis for the most likely location of a window wall of a future development."*

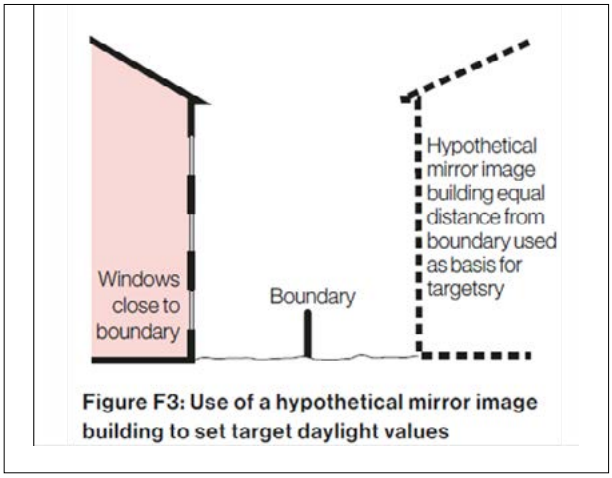

Figure 13: Littlefair, P. (2022). Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice. Hertfordshire: HIS BRE Press p 87 Figure F3

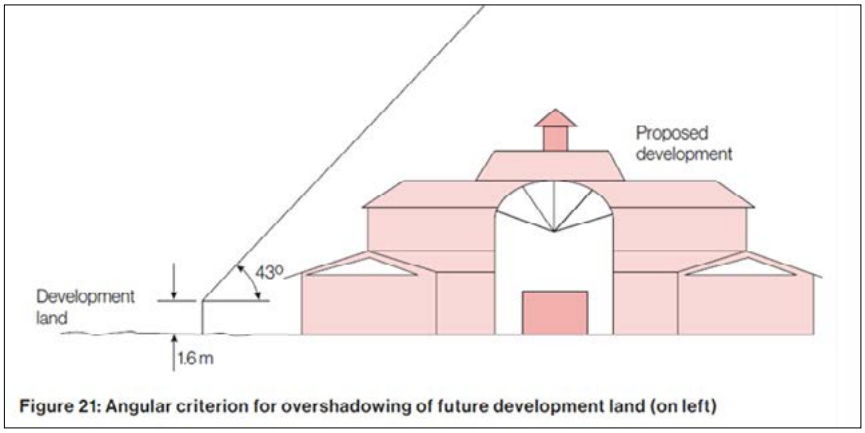

Figure 21: Angular criterion for overshadowing of future development land (on left)

Image © BRE Guidelines

Figure 14: Littlefair, P. (2022). Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice. Hertfordshire: HIS BRE Press p 19 Figure 21

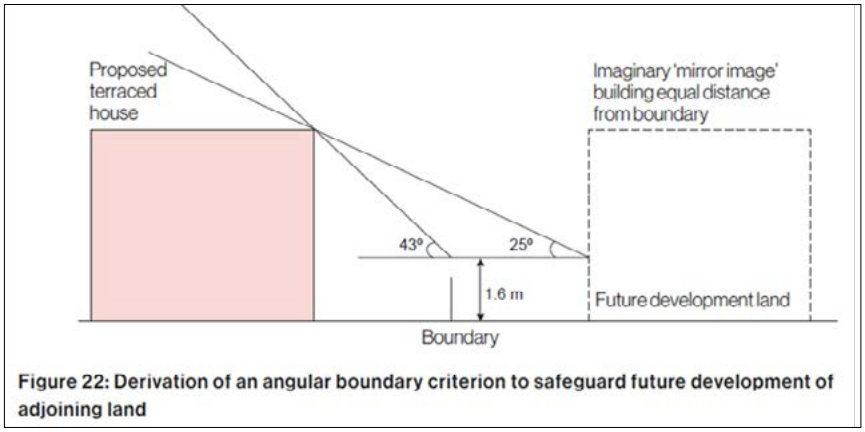

Figure 22: Derivation of an angular boundary criterion to safeguard future development of adjoining land

Image © BRE Guidelines

Figure 15: Littlefair, P. (2022). Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice. Hertfordshire: HIS BRE Press p 20 Figure 22

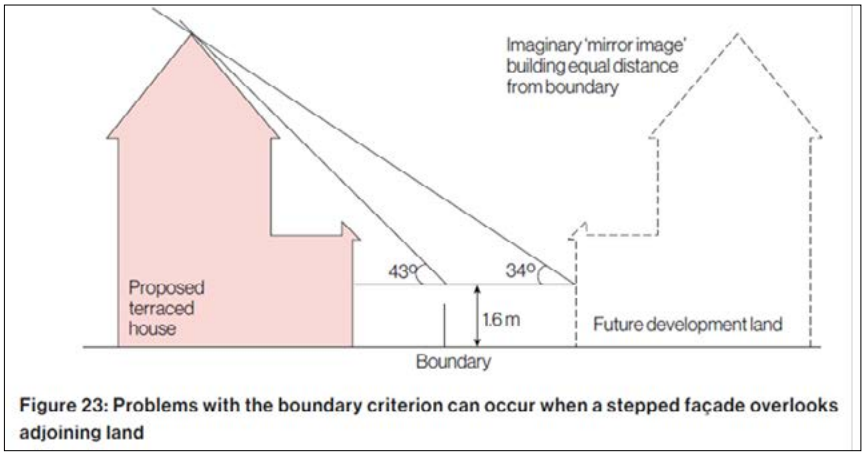

Figure 23: Problems with the boundary criterion can occur when a stepped façade overlooks adjoining land

Image © BRE Guidelines

Figure 16: Littlefair, P. (2022). Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice. Hertfordshire: HIS BRE Press p 20 Figure 23

A 1.67 As outlined above, the Adjoining Development Land analysis is predicated on ensuring that a proposal next to future development land is not negatively impacting the ability to develop in consideration of light matters.

PHOTOVOLTAICS

A 1.71 Paragraph 4.5.2 states that *"where a proposed development may result in loss of radiation to existing solar panels (either photovoltaic or solar thermal), an assessment should be carried out."*

A 1.72 Paragraph 4.5.8 states that *"Where the annual probable sunlight hours received by a solar panel with the new development in place is less than 0.90 times the value before, a more detailed calculation of the loss of solar radiation should be undertaken. This is a specialist type of assessment and expert advice should be sought. The assessment should include both direct solar and diffuse sky radiation; over a whole year, around 60% of the radiation received on a horizontal roof comes from the sky. However, reflected radiation from the ground and obstructions need not be included. The modelling should take account of the effects of cloud in reducing direct solar radiation at different times of year, and include a realistic simulation of the way that incoming solar radiation varies from different parts of the sky."*

A 1.73 Paragraph 4.5.9 states that *"if over the whole year the ratio of total solar radiation received with the new development, to the existing value is less than the values given in Table 2, then the loss of radiation is significant."*

A 1.74 Finally, paragraph 4.5.10 notes that *"numerical values given are purely advisory. Different criteria may be used based on the requirements for solar energy in an area viewed against other site layout constraints. Another important issue is whether the existing solar panels are reasonably sited, at a sensible height and distance from the boundary. A greater loss of solar radiation may be inevitable if panels are mounted close to the ground and near to the site boundary."*

OTHER AMENITY CONSIDERATIONS

A 1.75 Daylight and sunlight is one factor among many under the heading of residential amenity considerations for any given development design or planning application; others include:

- View;
- Privacy;
- Security;
- Access;
- Enclosure;
- Microclimate;
- Solar Dazzle; and
- Solar Convergence.

TABLE 2: RECOMMENDED MINIMUM RATIOS OF SOLAR RADIATION RECEIVED

SLOPE OF SOLAR PANEL IN DEGREES TO HORIZONTAL	RECOMMENDED MINIMUM RATIO OF RADIATION RECEIVED AFTER/BEFORE
0-30	0.90
30.01-59.99	0.85
60-90	0.80

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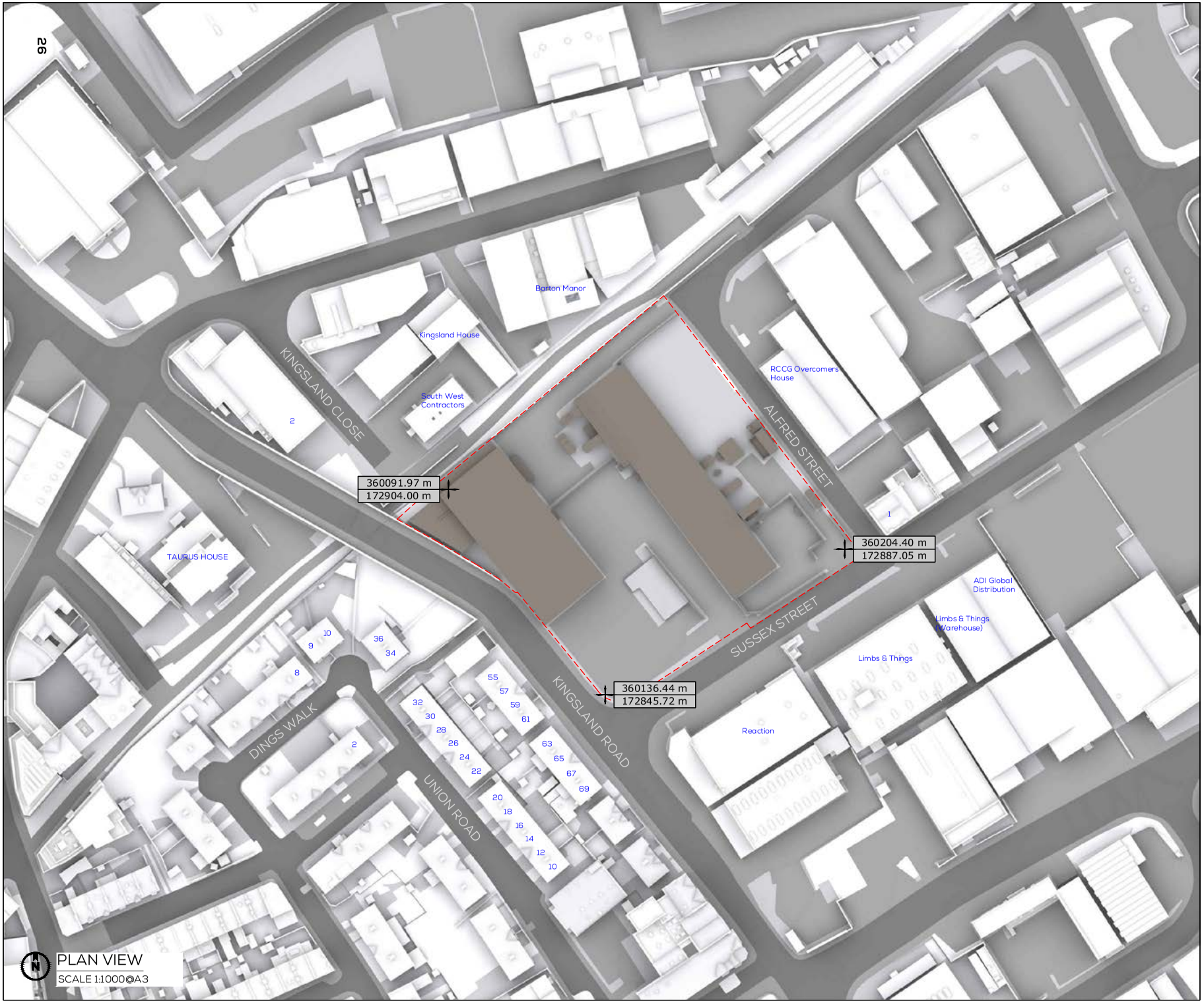
APPENDIX 02
DRAWINGS

APPENDIX 02
DRAWINGS:

EXISTING



PLAN VIEW
SCALE 1:1000@A3

SOURCES OF INFORMATION

IR01-22-0908-Dominvs (Title Plans)

IR02-22-1024-find Maps

IR11-23-1114-AHMM (3D MODEL)

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SITE BOUNDARY

NOTES:
EXISTING SCENARIO SHOWN IN SEPIA
ALL HEIGHTS AND DIMENSIONS GIVEN IN m AOD

N.B. DO NOT SCALE OFF THIS DRAWING

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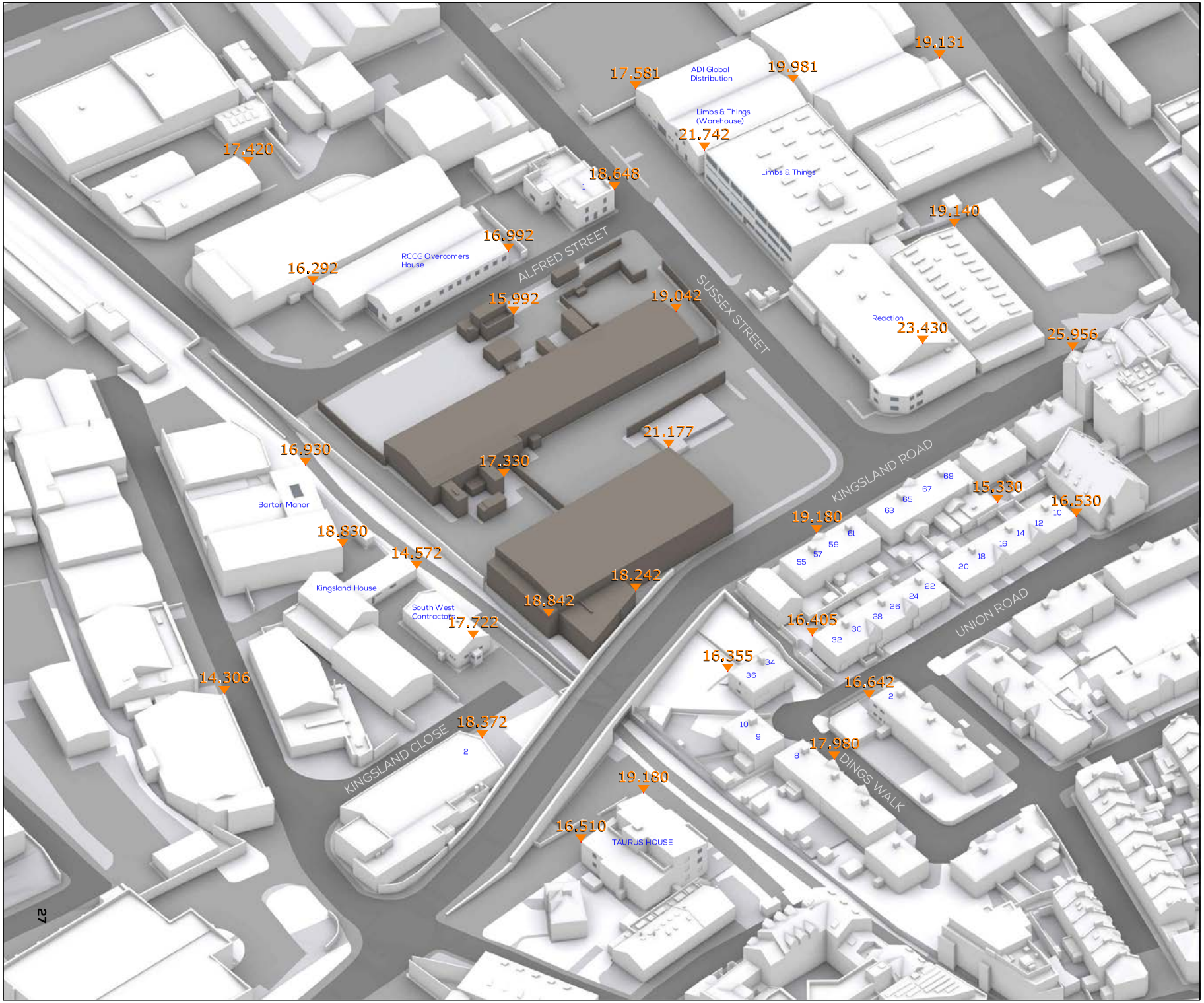

SOURCES OF INFORMATION

IR01-22-0908-Dominvs (Title Plans)

IR02-22-1024-find Maps

IR11-23-1114-AHMM (3D MODEL)

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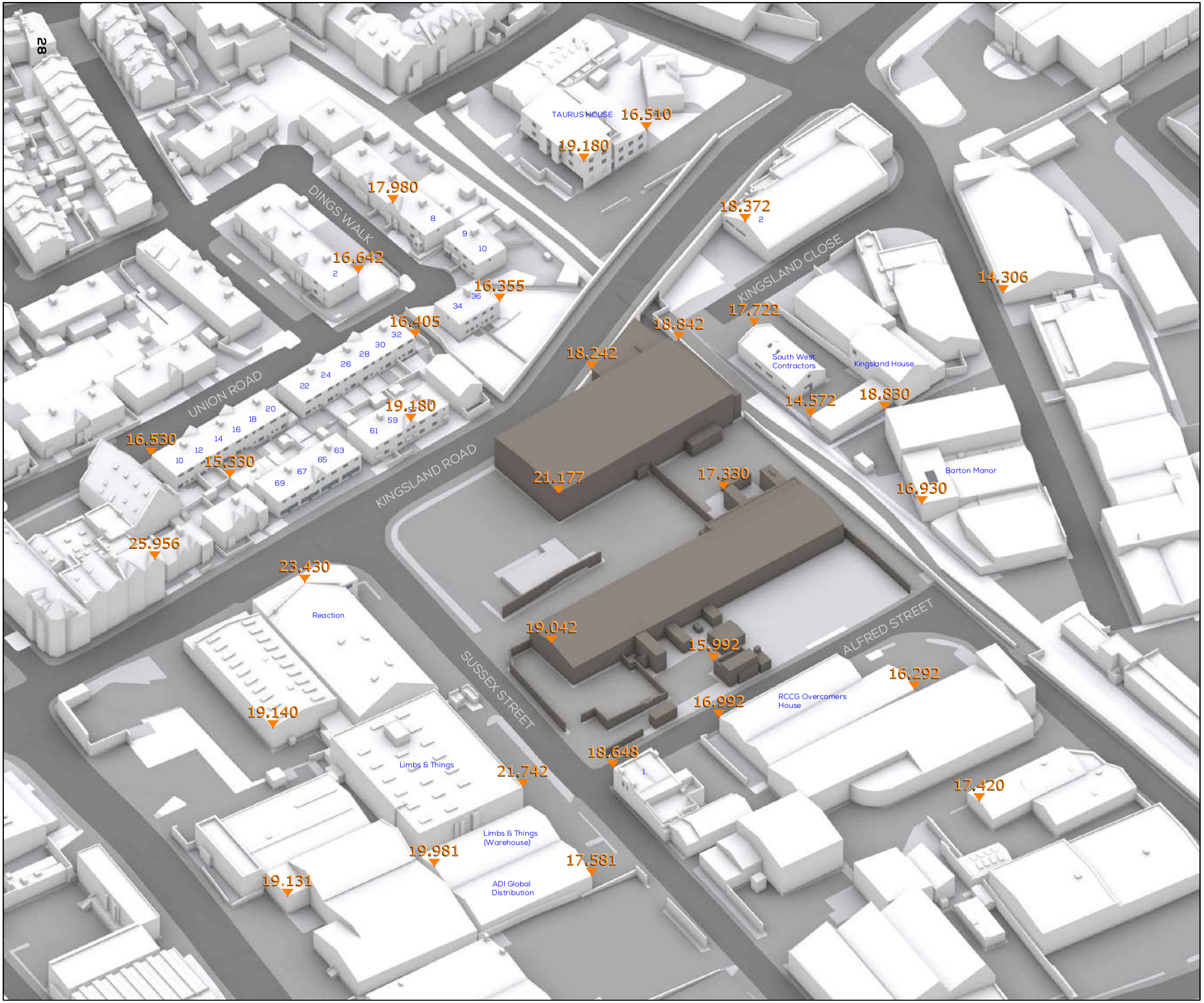

SOURCES OF INFORMATION

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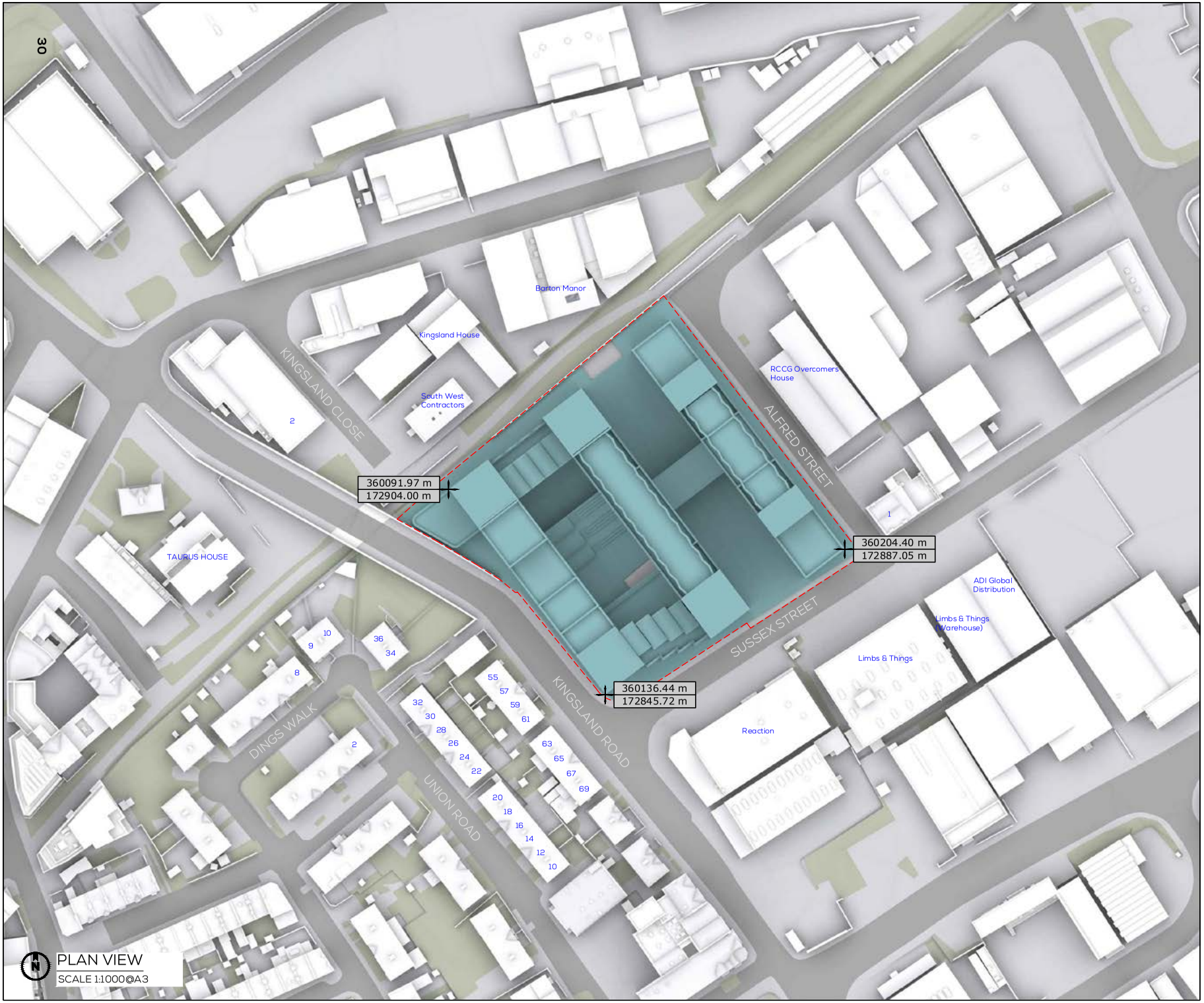
APPENDIX 02
DRAWINGS:

PROPOSED



SOURCES OF INFORMATION

IR01-22-0908-Dominvs (Title Plans)

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SITE BOUNDARY

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PROPOSED SCHEME_IR11

CONFIRMATION

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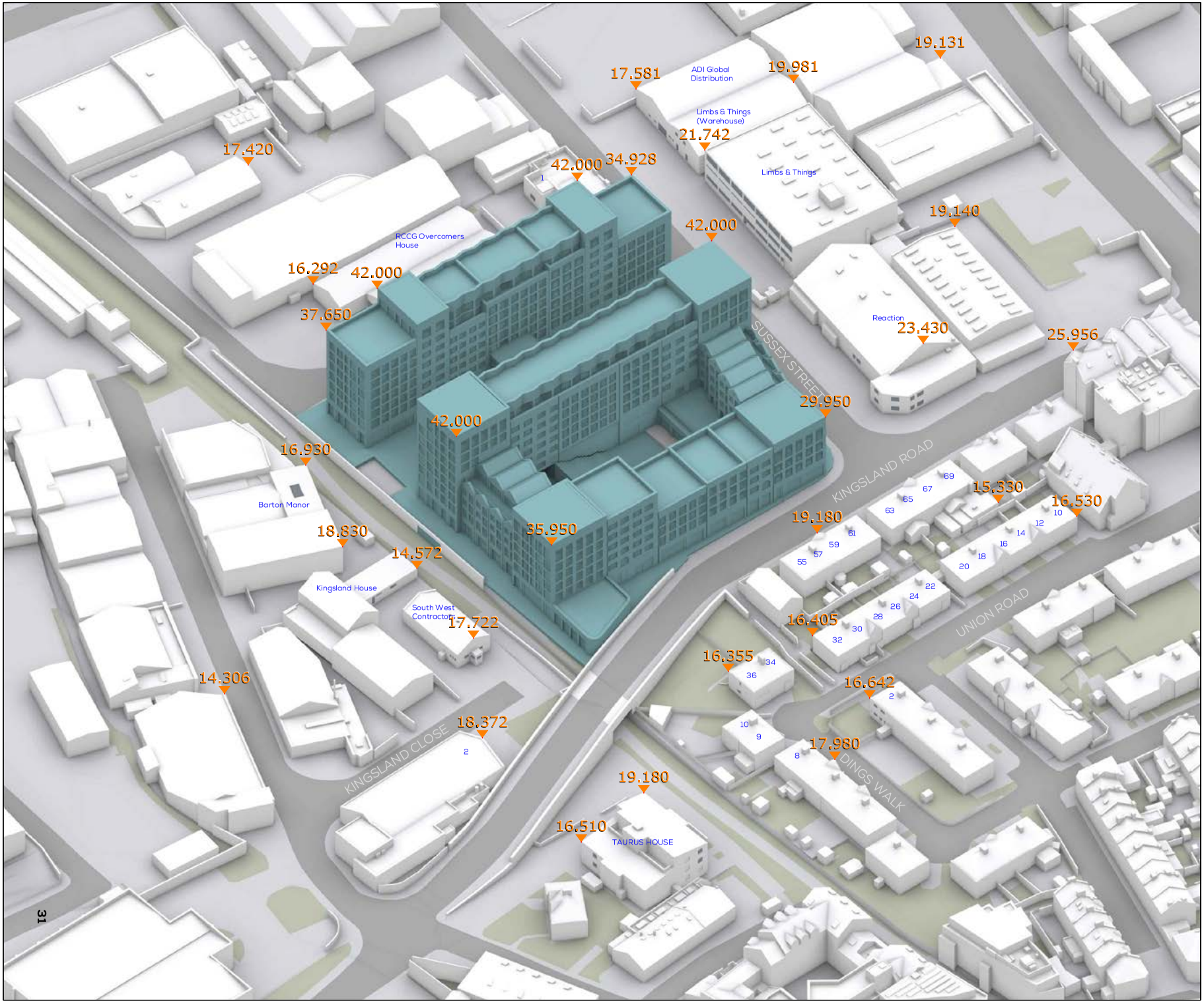

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SOURCES OF INFORMATION

IR01-22-0908-Dominvs (Title Plans)

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IR11-23-1114-AHMM (3D MODEL)

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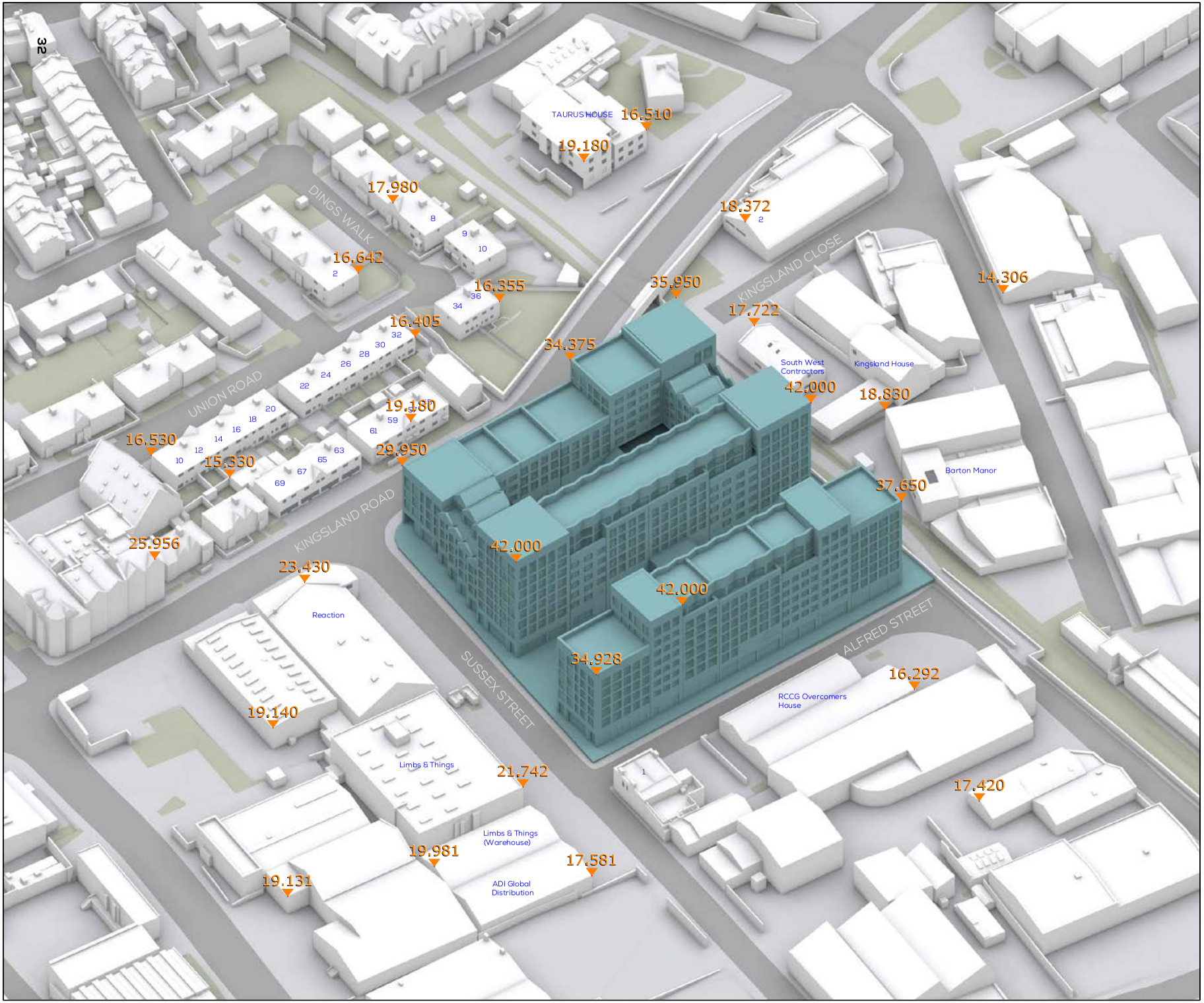

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APPENDIX 03
ASSUMPTIONS

APPENDIX 03
ASSUMPTIONS

01

A 3.1 The context model has been produced using our VU.CITY platform. GIA have extracted the required area, creating a 3D model with an overall building tolerance of up to 150mm. The relevant windows have been added to the VU.CITY model from site photographs, observations and brick counting.

02

A 3.2 GIA have identified the following properties as relevant for daylight and sunlight assessment. All results can be found in Appendix 04:

- Taurus House;
- 55-69 (odd) Kingsland Road;
- 10-36 (even) Union Road;
- 31 Union Road; and
- 8-10 Dings Walk.

03

A 3.3 GIA have sought to create the most accurate 3D model possible based on the data available, however, a degree of tolerance should be applied.

04

A 3.4 The scope of buildings assessed has been determined as a reasonable zone which considers both the scale of the proposed scheme and the proximity of those buildings which surround and face the site. There may be properties outside of the considered scope that are affected by the scheme; however, no significant effects are anticipated.

05

A 3.5 The property uses have been ascertained by reference to a Valuation Office Agency search carried out in November 2023 and based upon a review of online imagery. The latest review of due diligence and research into neighbouring layouts on BCC online planning portal was undertaken in November 2023.

06

A 3.6 As part of the due diligence and research into the layouts of neighbouring properties, we were unable to find accurate floor plans of any of the properties listed above with the exception of 63-69 (odd) Kingsland Road. Where the layouts are not known and can only be assumed, we have only considered the VSC methodology as directed by paragraph 2.2.10 and Appendix D of the BRE Guidelines which states:

> *"In most cases the position of the no sky line has to be found from plans. The calculation can only be carried out where room layouts are known. Using estimated room layouts is likely to give inaccurate results and is not recommended. However where plans are available, for example on the local authority's online planning portal, the calculation should be carried out."*

A 3.7 The floor plans for 63-69 (odd) Kingsland Road have been obtained via planning permission ref. 21/02530/FB approved in September 2021. It does not appear that the permission has been implemented therefore the property has been modelled in line with the existing plans submitted in respect of this application.

07

A 3.8 Floor levels have been assumed for adjoining properties as access has not been obtained. This dictates the level of the working plane which is the point at which the No Sky Line assessments are carried out (if relevant).

08

A 3.9 GIA have discounted rooms that appear to be or are confirmed to be bathrooms, hallways, circulation space etc. These rooms are not considered to be habitable and thus do not require assessment in accordance with the BRE Guidelines.

09

A 3.10 The research of neighbouring solar panels is limited to identifying clearly visible solar panel arrays from online map imagery (e.g. Google or Bing Maps) and what can be ascertained from site visits. Where solar tiles are in use, it may not be possible to clearly identify them as solar receptors and therefore consider them in the assessment.

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APPENDIX 04
RESULTS

EXISTING v PROPOSED (RESULTS)

						VSC (WINDOW)				NSL				APSH (WINDOW)					
FLOOR	ROOM	PROPERTY TYPE	ROOM USE	INFO USED	WINDOW	EX. %	PR. %	LOSS	LOSS %	EX. %	PR. %	LOSS SQM	LOSS %	EX.		PR.		LOSS %	
														ANNUAL	WINTER	ANNUAL	WINTER	ANNUAL	WINTER
TAURUS HOUSE																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	32.9	32.9	0	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W2/F00	35.6	34.2	1.4	3.9%					N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W3/F00	35.5	34.1	1.4	3.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R3	RESIDENTIAL	UNKNOWN	ASSUMED	W4/F00	35.4	33.9	1.5	4.2%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R4	RESIDENTIAL	UNKNOWN	ASSUMED	W5/F00	27.8	26.6	1.2	4.3%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	36.3	36.3	0	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W2/F01	37.7	36.1	1.6	4.2%					N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W3/F01	37.7	36	1.7	4.5%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R3	RESIDENTIAL	UNKNOWN	ASSUMED	W4/F01	37.6	35.8	1.8	4.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R5	RESIDENTIAL	UNKNOWN	ASSUMED	W6/F01	37.8	35.9	1.9	5.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R6	RESIDENTIAL	UNKNOWN	ASSUMED	W7/F01	37.8	35.8	2	5.3%	N/A	N/A	N/A	N/A	30	5	27	5	10.0%	0.0%
			UNKNOWN		W8/F01	36.4	35.2	1.2	3.3%					68	23	66	23	2.9%	0.0%
	R7	RESIDENTIAL	UNKNOWN	ASSUMED	W9/F01	20.6	18.8	1.8	8.7%	N/A	N/A	N/A	N/A	29	4	28	4	3.4%	0.0%
			UNKNOWN		W10/F01	11.6	11.6	0	0.0%					35	17	35	17	0.0%	0.0%
	R8	RESIDENTIAL	UNKNOWN	ASSUMED	W11/F01	11.6	10.4	1.2	10.3%	N/A	N/A	N/A	N/A	29	5	28	5	3.4%	0.0%
			UNKNOWN		W12/F01	19.8	19.8	0	0.0%					48	22	48	22	0.0%	0.0%
	R9	RESIDENTIAL	UNKNOWN	ASSUMED	W13/F01	36.1	35.4	0.7	1.9%	N/A	N/A	N/A	N/A	75	26	74	26	1.3%	0.0%
			UNKNOWN		W14/F01	35.8	35.8	0	0.0%					67	22	67	22	0.0%	0.0%
F02	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W3/F02	38.6	36.8	1.8	4.7%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R3	RESIDENTIAL	UNKNOWN	ASSUMED	W4/F02	38.6	36.6	2	5.2%	N/A	N/A	N/A	N/A	30	5	29	5	3.3%	0.0%
			UNKNOWN		W5/F02	38.3	37.1	1.2	3.1%					74	24	73	24	1.4%	0.0%
	R4	RESIDENTIAL	UNKNOWN	ASSUMED	W6/F02	23.9	22.2	1.7	7.1%	N/A	N/A	N/A	N/A	30	5	30	5	0.0%	0.0%
			UNKNOWN		W7/F02	7.6	7.6	0	0.0%					21	16	21	16	0.0%	0.0%
	R5	RESIDENTIAL	UNKNOWN	ASSUMED	W8/F02	7.5	6.4	1.1	14.7%	N/A	N/A	N/A	N/A	28	5	28	5	0.0%	0.0%
			UNKNOWN		W9/F02	23.6	23.6	0	0.0%					53	22	53	22	0.0%	0.0%
	R6	RESIDENTIAL	UNKNOWN	ASSUMED	W10/F02	38.2	37.5	0.7	1.8%	N/A	N/A	N/A	N/A	76	27	76	27	0.0%	0.0%
			UNKNOWN		W11/F02	37.4	37.4	0	0.0%					69	24	69	24	0.0%	0.0%
34 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	32.6	27	5.6	17.2%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W2/F00	30.1	24.7	5.4	17.9%					N/A	N/A	N/A	N/A	N/A	N/A

(1) KITCHEN SMALLER THAN 13m2

(2) INC\HZ = SKY COMPONENT (INCLINED\HORIZONTAL WINDOWS)

(3) SINGLE ASPECT ROOM DEEPER THAN 5m

						VSC (WINDOW)				NSL				APSH (WINDOW)					
FLOOR	ROOM	PROPERTY TYPE	ROOM USE	INFO USED	WINDOW	EX. %	PR. %	LOSS	LOSS %	EX. %	PR. %	LOSS SQM	LOSS %	EX.		PR.		LOSS %	
														ANNUAL	WINTER	ANNUAL	WINTER	ANNUAL	WINTER
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W3/F00	32.2	26.9	5.3	16.5%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	35.4	29.5	5.9	16.7%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	35.2	29.4	5.8	16.5%	N/A	N/A	N/A	N/A	28	3	25	3	10.7%	0.0%
			UNKNOWN		W3/F01	34.9	34.2	0.7	2.0%					76	26	73	26	3.9%	0.0%
36 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	34.1	33.7	0.4	1.2%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W2/F00	32.8	27.1	5.7	17.4%					N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W3/F00	30.5	24.8	5.7	18.7%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W4/F00	32.7	27	5.7	17.4%					N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	37	36.6	0.4	1.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W2/F01	35.8	29.8	6	16.8%					N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W3/F01	35.6	29.6	6	16.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9 DINGS WALK																			
F00	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W4/F00	19.7	19.6	0.1	0.5%	N/A	N/A	N/A	N/A	42	19	42	19	0.0%	0.0%
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	36.1	35.6	0.5	1.4%	N/A	N/A	N/A	N/A	75	25	74	25	1.3%	0.0%
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	36.3	35.9	0.4	1.1%	N/A	N/A	N/A	N/A	74	26	74	26	0.0%	0.0%
10 DINGS WALK																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	32.7	32.6	0.1	0.3%	N/A	N/A	N/A	N/A	67	22	67	22	0.0%	0.0%
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	36.1	35.8	0.3	0.8%	N/A	N/A	N/A	N/A	75	26	75	26	0.0%	0.0%
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	35.6	35.2	0.4	1.1%	N/A	N/A	N/A	N/A	75	26	75	26	0.0%	0.0%
			UNKNOWN		W3/F01	36.2	32.7	3.5	9.7%					29	1	28	1	3.4%	0.0%
8 DINGS WALK																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	31.5	31.5	0	0.0%	N/A	N/A	N/A	N/A	72	26	72	26	0.0%	0.0%
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F00	19.8	19.8	0	0.0%	N/A	N/A	N/A	N/A	49	21	49	21	0.0%	0.0%
			UNKNOWN		W3/F00	33.1	32.8	0.3	0.9%					74	24	73	24	1.4%	0.0%
			UNKNOWN		W4/F00	26	24.3	1.7	6.5%					28	1	27	1	3.6%	0.0%
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	35.9	35.4	0.5	1.4%	N/A	N/A	N/A	N/A	77	27	76	27	1.3%	0.0%
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	36	35.5	0.5	1.4%	N/A	N/A	N/A	N/A	77	27	76	27	1.3%	0.0%
			UNKNOWN		W3/F01	30.4	29.7	0.7	2.3%					30	5	29	5	3.3%	0.0%

(1) KITCHEN SMALLER THAN 13m2

(2) INC\HZ = SKY COMPONENT (INCLINED\HORIZONTAL WINDOWS)

(3) SINGLE ASPECT ROOM DEEPER THAN 5m

						VSC (WINDOW)				NSL				APSH (WINDOW)					
FLOOR	ROOM	PROPERTY TYPE	ROOM USE	INFO USED	WINDOW	EX. %	PR. %	LOSS	LOSS %	EX. %	PR. %	LOSS SQM	LOSS %	EX.		PR.		LOSS %	
														ANNUAL	WINTER	ANNUAL	WINTER	ANNUAL	WINTER
31 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	32.5	32.5	0	0.0%	N/A	N/A	N/A	N/A	71	23	71	23	0.0%	0.0%
	R3	RESIDENTIAL	UNKNOWN	ASSUMED	W4/F00	33.9	33.6	0.3	0.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W5/F00	33.6	33.3	0.3	0.9%					N/A	N/A	N/A	N/A	N/A	N/A
	R4	RESIDENTIAL	UNKNOWN	ASSUMED	W6/F00	33.1	32.9	0.2	0.6%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W7/F00	32.2	31.9	0.3	0.9%					N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	35.8	35.7	0.1	0.3%	N/A	N/A	N/A	N/A	76	26	76	26	0.0%	0.0%
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	36	35.8	0.2	0.6%	N/A	N/A	N/A	N/A	76	26	76	26	0.0%	0.0%
			UNKNOWN		W3/F01	35.8	33.5	2.3	6.4%					29	4	29	4	0.0%	0.0%
	R3	RESIDENTIAL	UNKNOWN	ASSUMED	W4/F01	36.3	36	0.3	0.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R4	RESIDENTIAL	UNKNOWN	ASSUMED	W5/F01	36.3	36	0.3	0.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
63 KINGSLAND ROAD																			
F01	R1	RESIDENTIAL	LIVING ROOM		W1/F01	37.6	28.6	9	23.9%	95.6	80.3	1.7	16.0%	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	KITCHEN		W2/F01	37.5	27.7	9.8	26.1%	95.1	66.6	2.6	30.0%	N/A	N/A	N/A	N/A	N/A	N/A
65 KINGSLAND ROAD																			
F01	R1	RESIDENTIAL	KITCHEN		W1/F01	37.7	30.2	7.5	19.9%	95.4	95.1	0.0	0.3%	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	LIVING ROOM		W2/F01	37.7	29.5	8.2	21.8%	95.6	81.7	1.6	14.6%	N/A	N/A	N/A	N/A	N/A	N/A
67 KINGSLAND ROAD																			
F01	R1	RESIDENTIAL	LIVING ROOM		W1/F01	37.6	31.1	6.5	17.3%	95.6	90.9	0.6	4.9%	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	KITCHEN		W2/F01	37.6	30.4	7.2	19.1%	95.1	82.5	0.9	13.2%	N/A	N/A	N/A	N/A	N/A	N/A

(1) KITCHEN SMALLER THAN 13m2

(2) INC\HZ = SKY COMPONENT (INCLINED\HORIZONTAL WINDOWS)

(3) SINGLE ASPECT ROOM DEEPER THAN 5m

						VSC (WINDOW)				NSL				APSH (WINDOW)					
FLOOR	ROOM	PROPERTY TYPE	ROOM USE	INFO USED	WINDOW	EX. %	PR. %	LOSS	LOSS %	EX. %	PR. %	LOSS SQM	LOSS %	EX.		PR.		LOSS %	
														ANNUAL	WINTER	ANNUAL	WINTER	ANNUAL	WINTER
69 KINGSLAND ROAD																			
F01	R1	RESIDENTIAL	KITCHEN		W1/F01	37.6	32	5.6	14.9%	95.2	91.7	0.3	3.6%	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	LIVING ROOM		W2/F01	37.6	31.7	5.9	15.7%	95.7	93.9	0.2	1.9%	N/A	N/A	N/A	N/A	N/A	N/A
61 KINGSLAND ROAD																			
F00	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F00	35.4	21.2	14.2	40.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	37.4	25.2	12.2	32.6%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	37.2	24.3	12.9	34.7%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
59 KINGSLAND ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	34.6	19.9	14.7	42.5%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	37	23.4	13.6	36.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	36.8	23	13.8	37.5%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
57 KINGSLAND ROAD																			
F00	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W3/F00	33.6	18.9	14.7	43.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	36.7	22.8	13.9	37.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	36.5	22.6	13.9	38.1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
55 KINGSLAND ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	33.3	19	14.3	42.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	36.1	22.4	13.7	38.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	35.8	22.2	13.6	38.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	24	23.9	0.1	0.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F00	23.2	23	0.2	0.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W3/F00	22.8	22.5	0.3	1.3%					N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W4/F00	21	21	0	0.0%					N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	30.9	29.7	1.2	3.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	32	30.6	1.4	4.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(1) KITCHEN SMALLER THAN 13m2

(2) INC\HZ = SKY COMPONENT (INCLINED\HORIZONTAL WINDOWS)

(3) SINGLE ASPECT ROOM DEEPER THAN 5m

						VSC (WINDOW)				NSL				APSH (WINDOW)					
FLOOR	ROOM	PROPERTY TYPE	ROOM USE	INFO USED	WINDOW	EX. %	PR. %	LOSS	LOSS %	EX. %	PR. %	LOSS SQM	LOSS %	EX.		PR.		LOSS %	
														ANNUAL	WINTER	ANNUAL	WINTER	ANNUAL	WINTER
12 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	24.5	24.4	0.1	0.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F00	23.1	23.1	0	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W3/F00	21.7	21.7	0	0.0%					N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	32.7	31.3	1.4	4.3%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	33	31.9	1.1	3.3%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	23.5	23.4	0.1	0.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W2/F00	23.7	23.6	0.1	0.4%					N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W3/F00	26.7	26.6	0.1	0.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	33	32	1	3.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	32.9	31.9	1	3.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	27.5	27.1	0.4	1.5%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W2/F00	25.5	25.1	0.4	1.6%					N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W3/F00	25.5	25.1	0.4	1.6%					N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W4/F00	27	26.4	0.6	2.2%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	33.1	31.3	1.8	5.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	33.3	31.1	2.2	6.6%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W3/F00	26.8	26.7	0.1	0.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	25.6	25.5	0.1	0.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W2/F00	25.4	25.3	0.1	0.4%					N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	32.8	31.4	1.4	4.3%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	32.9	31.3	1.6	4.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(1) KITCHEN SMALLER THAN 13m2

(2) INC\HZ = SKY COMPONENT (INCLINED\HORIZONTAL WINDOWS)

(3) SINGLE ASPECT ROOM DEEPER THAN 5m

						VSC (WINDOW)				NSL				APSH (WINDOW)					
FLOOR	ROOM	PROPERTY TYPE	ROOM USE	INFO USED	WINDOW	EX. %	PR. %	LOSS	LOSS %	EX. %	PR. %	LOSS SQM	LOSS %	EX.		PR.		LOSS %	
														ANNUAL	WINTER	ANNUAL	WINTER	ANNUAL	WINTER
16 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	27	26.9	0.1	0.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F00	25.2	25.1	0.1	0.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W3/F00	25	24.9	0.1	0.4%					N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	32.8	31.6	1.2	3.7%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	32.8	31.5	1.3	4.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
22 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	28.4	27	1.4	4.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F00	26.3	25.3	1	3.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W3/F00	26.4	25.4	1	3.8%					N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W4/F00	28.2	27.6	0.6	2.1%					N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	33.7	31	2.7	8.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	33.6	31.3	2.3	6.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	27.7	27.3	0.4	1.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F00	24.7	24.2	0.5	2.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W3/F00	24.8	24.3	0.5	2.0%					N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	33.3	31.1	2.2	6.6%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	33.4	31.1	2.3	6.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
26 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	24.7	24.2	0.5	2.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W2/F00	24.7	24.2	0.5	2.0%					N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W3/F00	27.4	26.9	0.5	1.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	33.2	30.8	2.4	7.2%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	33.4	30.8	2.6	7.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
32 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	24.9	23.5	1.4	5.6%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W2/F00	24.4	22.8	1.6	6.6%					N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W3/F00	24.3	22.6	1.7	7.0%					N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W4/F00	27.4	25.3	2.1	7.7%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(1) KITCHEN SMALLER THAN 13m2

(2) INC\HZ = SKY COMPONENT (INCLINED\HORIZONTAL WINDOWS)

(3) SINGLE ASPECT ROOM DEEPER THAN 5m

						VSC (WINDOW)				NSL				APSH (WINDOW)					
FLOOR	ROOM	PROPERTY TYPE	ROOM USE	INFO USED	WINDOW	EX. %	PR. %	LOSS	LOSS %	EX. %	PR. %	LOSS SQM	LOSS %	EX.		PR.		LOSS %	
														ANNUAL	WINTER	ANNUAL	WINTER	ANNUAL	WINTER
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	34	30.4	3.6	10.6%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	34.1	30.5	3.6	10.6%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
30 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	24.6	24	0.6	2.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W2/F00	24.8	24.2	0.6	2.4%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W3/F00	25.7	25.2	0.5	1.9%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	34	30.7	3.3	9.7%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	34.2	30.7	3.5	10.2%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
28 UNION ROAD																			
F00	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F00	27.6	27	0.6	2.2%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F00	24.9	24.2	0.7	2.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			UNKNOWN		W3/F00	25	24.3	0.7	2.8%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F01	R1	RESIDENTIAL	UNKNOWN	ASSUMED	W1/F01	33.4	30.5	2.9	8.7%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2	RESIDENTIAL	UNKNOWN	ASSUMED	W2/F01	33.7	30.6	3.1	9.2%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(1) KITCHEN SMALLER THAN 13m2

(2) INC\HZ = SKY COMPONENT (INCLINED\HORIZONTAL WINDOWS)

(3) SINGLE ASPECT ROOM DEEPER THAN 5m

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