



Client: Custom House (Gravesend) Limited

Daylight and Sunlight Assessment for the Development at Customs House,
The Terrace, Gravesend DA12 2DE

June 2021

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1 Background and Scope of Appraisal

1.1 Study Objectives

Herrington Consulting has been commissioned by Custom House (Gravesend) Limited to assess the potential impact of the proposed development at Customs House, The Terrace, Gravesend DA12 2DE, in relation to daylight, sunlight and overshadowing on the neighbouring building. The key objectives of the assessment are to:

- assess the baseline conditions at the site;
- analyse the potential impacts of the development on the daylight and sunlight currently received by the neighbouring building;
- assess these impacts in line with any relevant planning policies and best practice guidance.

In addition to the assessment of impacts on the neighbouring building, this study also includes an assessment of the natural daylight and sunlight that will be available within the habitable rooms of the proposed development that are located on the lower ground floor where daylight availability is considered more restricted..

1.2 Site Location

The site is situated in the area of Gravesend in Kent and is located within administrative boundaries of Gravesham Borough Council. The location of the site is shown in Figure 1.1 and the site plan included in Appendix A.1 of this report gives a more detailed reference to the site location and layout.



Figure 1.1 – Location map (Contains Ordnance Survey data © Crown copyright and database right 2011)

1.3 The Development

The proposal for development is to construct two additional floors along the eastern flank wall of the existing building and convert the existing buildings into residential accommodation. Drawings of the proposed scheme are included in Appendix A.1 of this report.

2 Policy and Guidance

2.1 National Planning Policy

National Planning Policy Framework (Revised February 2019)

Paragraph 123 on 'Achieving appropriate densities' states that "c) local planning authorities should refuse applications which they consider fail to make efficient use of land, taking into account the policies in this Framework. In this context, when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site (as long as the resulting scheme would provide acceptable living standards)."

Guidance on Effective Use of Land (Revised July 2019)

The guidance states that: 'Where a planning application is submitted, local planning authorities will need to consider whether the proposed development would have an unreasonable impact on the daylight and sunlight levels enjoyed by neighbouring occupiers, as well as assessing whether daylight and sunlight within the development itself will provide satisfactory living conditions for future occupants.'

Further to this, it also states that 'All developments should maintain acceptable living standards. What this means in practice, in relation to assessing appropriate levels of sunlight and daylight, will depend to some extent on the context for the development as well as its detailed design. For example in areas of high-density historic buildings, or city centre locations where tall modern buildings predominate, lower daylight and daylight and sunlight levels at some windows

may be unavoidable if new developments are to be in keeping with the general form of their surroundings.

In such situations good design (such as giving careful consideration to a building's massing and layout of habitable rooms) will be necessary to help make the best use of the site and maintain acceptable living standards.'

2.2 Regional Planning Policy

Kent Design Guide, Section 2 – Creating the Design, Step 2 – Generating the Layout

Section 2.2.8 MAXIMISING THE USE OF SUNLIGHT AND DAYLIGHT

Sunlight and energy efficiency should be considered as an integral part of finalising a layout. Sunlight and energy efficiency can be maximised if the layout of new buildings is designed with the following principles in mind;

- take advantage of south facing slopes
- avoid overshadowing
- locate taller buildings to the north of a site with lower-rise buildings to the south
- locate lower-density housing at the southern end of a site, with terraced housing or higher density housing to the north
- place terraces on east-west roads so that one window wall faces south.

Passive Solar Design Passive solar design takes advantage of natural light and heat from the sun and uses air movement for ventilation. This reduces or negates the need for artificial lighting, heating, cooling or ventilation. It can be achieved with no additional cost to a development and can result in considerable cost savings. High levels of insulation complement this design approach.

In residential development the form of housing can have a significant impact on energy efficiency. Detached houses, particularly single-storey, tend to be less energy efficient, having the greatest surface area exposed to the elements. Assuming the same floor area and orientation, terraced development provides cross-insulation at a lower density, while flats retain heat better.

Layouts should maximise east-west building alignments and orientate most of the glazing to within 30 degrees of due south. Buildings should also be designed to avoid overshadowing and minimise shading from obstructions to sunlight (such as other dwellings and coniferous trees).

Designers should consider the effect of proposed layouts on the future microclimate of the area. This can include wind tunnel effects; particularly where taller buildings are concerned. Building layout and form can be used positively to improve the local microclimate, for example protection from prevailing winds. Consider the use of natural wind breaks, such as trees and hedgerows to maximise the benefits of solar shading.

2.3 Local Planning Policy

Gravesham Local Plan Core Strategy (September 2014)

Policy CS19: Development and Design Principles “New development will be located, designed and constructed to: safeguard the amenity, including privacy, daylight and sunlight, of its occupants and those of neighbouring properties and land (...)”

2.4 Best Practice Guidance

In the absence of official national planning guidance / legislation on daylight and sunlight, the most recognised guidance document is published by the Building Research Establishment and entitled ‘Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice’, Second Edition, 2011; herein referred to as the ‘BRE Guidelines’.

The BRE Guidelines are not mandatory and themselves state that they should not be used as an instrument of planning policy, however in practice they are heavily relied upon as they provide a good guide to approach, methodology and evaluation of daylight and sunlight impacts.

In conjunction with the BRE Guidelines further guidance is given within the British Standard (BS) 8206-2:2008: ‘Lighting for buildings - Part 2: Code of practice for daylighting’.

In this assessment, the BRE Guidelines have been used to establish the extent to which the Proposed Development meets current best practice guidelines. In cases where the Development is likely to reduce light to key windows the study has compared results against the BRE criteria.

Whilst the BRE Guidelines provide numerical guidance for daylight, sunlight and overshadowing, these criteria should not be seen as absolute targets. The document states that the intention of the guide is to aid rather than constrain the designer. The Guide is not an instrument of planning policy, therefore whilst the methods given are technically robust, it is acknowledged that some level of flexibility should be applied where appropriate.

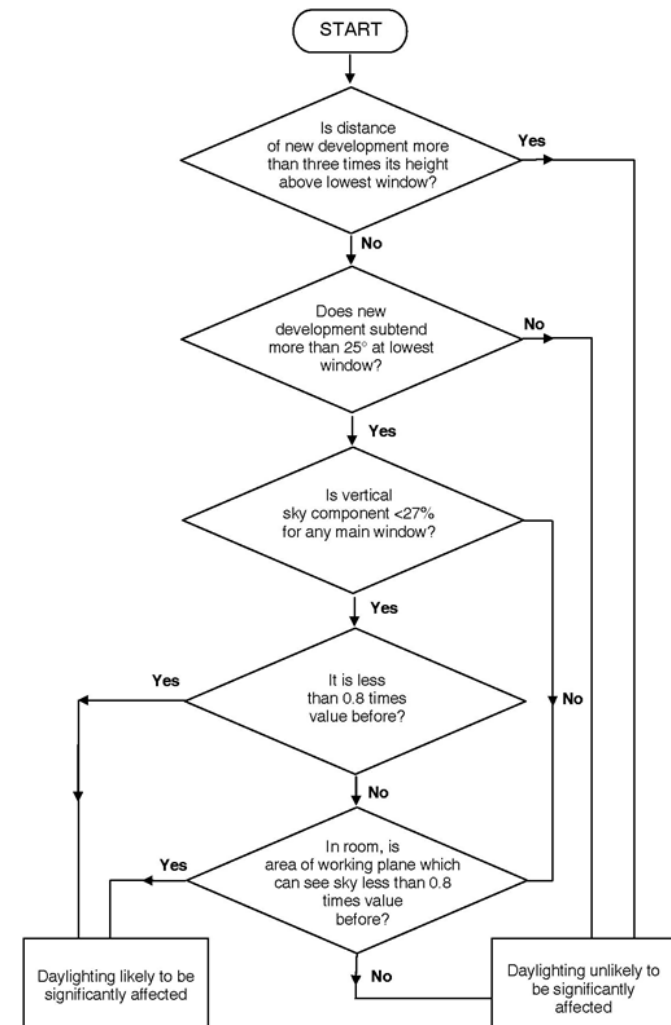
3 Assessment Techniques

3.1 Background

Natural light refers to both daylight and sunlight. However, a distinction between these two concepts is required for the purpose of analysis and quantification of natural light in buildings. In this assessment, the term '*Daylight*' is used for natural light where the source is the sky in overcast conditions, whilst '*Sunlight*' refers specifically to the light coming directly from the sun.

The primary objective of this assessment is to quantify the impacts of the proposed development on the adjacent building[s] and therefore the methods employed by this study are focussed on this objective. These methodologies are described in the following sections of this report and follow the hierarchical approach set out by the BRE Guidelines. The 'decision chart' outlining this process (Figure 20 of the Guidelines) has been reproduced for clarity.

The BRE guidelines are primarily intended for use for residential rooms in adjoining dwellings. However, they may also be applied to any existing non-domestic buildings where the occupants have a reasonable expectation of daylight, which could include schools, hospitals, hotels and offices in specific circumstances. For dwellings, it states that living rooms, dining rooms and kitchens should be assessed. Bedrooms should also be checked, although it states that they are less important. Other rooms, such as bathrooms, toilets, storerooms, circulation areas and garages need not be assessed.



3.2 Vertical Sky Component (VSC)

The Vertical Sky Component (VSC) calculation is the ratio of the direct sky illuminance falling on the outside of a window, to the simultaneous horizontal illuminance under an unobstructed sky. The standard CIE (Commission Internationale d'Éclairage) Overcast Sky is used and the ratio is expressed as a percentage. For example, a window that has an unobstructed view over open fields would benefit from the maximum VSC, which would be close to 40%. For a window to be considered as having a reasonable amount of skylight reaching it, the BRE Guidelines suggests that a minimum VSC value of 27% should be achieved. When assessing the impact of a new development on an existing building the BRE Guidelines sets out the following specific requirement:

If the VSC with the new development in place is both less than 27% and less than 0.8 times its former value, then the reduction in light to the window is likely to be noticeable.

This means that a reduction in the VSC value of up to 20% its former value would be acceptable and thus the impact would be considered negligible. It is important to note that the VSC is a simple geometrical calculation, which provides an early indication of the potential for daylight entering the space. It does not, however, assess or quantify the actual daylight levels inside the rooms.

3.3 No Sky Line

The No Sky Line, or sometimes referred to as No Sky View method, describes the distribution of daylight within rooms by calculating the area of the 'working plane', which can receive a direct view of the sky. The working plane height is generally set at 850mm above floor level within a residential property and 700mm within a commercial property. When assessing the potential impacts on the

daylight available to the neighbouring properties, the BRE Guidelines state that if the area within a room receiving direct skylight is reduced by less than 0.8 following the construction of a new development, the impact will be noticeable to the occupants. This is also true if the No Sky Line encroaches onto key areas like kitchen sinks and worktops.

The BRE Guidelines state that the main rooms should be tested, this would include living rooms, dining rooms and kitchens. While bedrooms should be included in the analysis, these are acknowledged as less important. If daylight is expected in non-domestic buildings, each of these room should be included in analysis.

When assessing the provision of daylight to a new development, the BRE Guidelines state that if a significant area of the working plane (normally more than 20%) lies beyond the No Sky Line then the daylight distribution within the room will be poor and supplementary electric lighting will be required.

One benefit of this test is that the resulting contour plans show where the light falls within a room and a judgment can be made as to whether the room will retain light to a reasonable depth. However, this method can only be accurately used to examine the daylight distribution within the rooms where the layout and dimensions are known. In the case of the proposed development, room layouts are replicated from the floor plans provided by the architects or developer. When assessing the impact of a new development on the daylight distribution within existing buildings, however, such information may not be available. As consequence, the internal layout and dimensions of the affected room(s) must then be estimated based on the property type and its overall layout.

3.4 Average Daylight Factor

The Average Daylight Factor (ADF) method calculates the average illuminance within a room as a proportion of the illuminance available to an unobstructed point outdoors under a sky of known luminance and luminance distribution. This is the most detailed of the daylight calculations and considers the physical nature of the room behind the window, including; window transmittance, and surface reflectivity.

This method of quantifying the availability of daylight within a room does, however, require the internal layout to be known and is generally only used for establishing daylight provision in new rooms. The BRE Guide sets out the following guidelines for the assessment of the ADF:

If a predominantly daylight appearance is required, then the ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. In dwellings, the following minimum average daylight factors should be achieved: 1% in bedrooms, 1.5% in living rooms and 2% in kitchens.

3.5 Room Depth Criteria

The BRE Guidelines do include advice for determining recommended room depths to proposed new rooms under specific circumstances using the Room Depth Criteria (RDC). This is more of a rule-of-thumb test that can be used to plan building layouts etc at an early conceptual stage, rather than providing quantitative outputs at the more detailed stage of a development.

This test has numerous limitations when being applied to anything but a simplistic room layout and does not take into account external obstructions. It is therefore

not considered to provide any meaningful data on the level or distribution of daylight that is not already provided by the ADF and NSL tests. Consequently, it is only applied in very particular situations.

3.6 Annual Probable Sunlight Hours

It is also possible to quantify the amount of sunlight available to a new development and the recognised methodology for undertaking this analysis is the Annual Probable Sunlight Hours (APSH) method.

To pass this test the centre point of the window will need to receive more than one quarter (25%) of the APSH, including at least 5% APSH in the winter months between 21st September and the 21st March. The BRE Guidelines state that if 'post-development' the available sunlight hours are both less than the amount above and less than 0.8 times their 'pre-development' value, either over the whole year or just within the winter months, then the occupants of the existing building will notice the loss of sunlight. In addition, if the overall annual loss is greater than 4% of APSH, the room may appear colder and less pleasant.

For new development and especially where existing buildings are being re-developed, it is important to acknowledge that these are aspirational targets intended to aid and not constrain the designer. These aspirational targets were derived to improve the amenity of single dwellings that typically comprise a living room, kitchen and bedrooms; the objective being to maximise sunlight in the main living areas. However, for buildings that contain multiple apartments, it is rarely possible to configure the internal layout such that all rooms receive direct sunlight as it is inevitable that some windows will be situated on an elevation that faces within 90 degrees of due north.

It is therefore important to understand that when assessing the provision of sunlight to a building containing multiple dwellings, the BRE Guidelines seek only to maximise the amount of sunlight received. They do not set absolute targets.

3.7 Overshadowing

The BRE Guidance suggests that where new development may affect one or more amenity areas, then analysis can be undertaken to quantify the loss of sunlight resulting from overshadowing. Typical examples of areas that could be considered as open spaces or amenity areas are main back gardens of houses, allotments, parks and playing fields, children's playgrounds, outdoor swimming pools, sitting-out areas, such as in public squares and focal points for views, such as a group of monuments or fountains. Amenity areas in the form of balconies are not recommended to be assessed under the BRE Guidelines due to their small size and often significant obstruction.

Sun Hours on Ground

The BRE Guidelines recommend that for a garden or amenity area to appear adequately sunlit throughout the year, at least 50% of an amenity area should receive at least 2 hours of sunlight on 21st March. The BRE Guidelines also suggest that if, as a result of a new development, an existing garden or amenity area does not meet these guidelines, and the area which can receive some sun on the 21st March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable.

When undertaking this analysis, sunlight from an altitude of 10° or less has been ignored as this is likely to be obscured by planting and undulations in the surrounding topography. Driveways and hard standing for cars is also usually left out of the area used for this calculation. Fences or walls less than 1.5 metres

high are also ignored. Front gardens which are relatively small and visible from public footpaths are omitted with only main back gardens needing to be analysed.

The Guidelines also state that “normally, trees and shrubs need not be included, partly because their shapes are almost impossible to predict, and partly because the dappled shade of a tree is more pleasant than a deep shadow of a building”. This is especially the case for deciduous trees, which provide welcome shade in the summer whilst allowing sunlight to penetrate during the winter months.

Transient Overshadowing

The BRE Guidelines suggest that where large buildings are proposed, which may affect a number of open spaces or amenity areas, it is useful and illustrative to plot a shadow plan to show the location of shadows at different times of the day and at key times during the year. Typically, the 21st March, the 21st June, and 21st December are used to represent the annual variance of sun position, noting that the position of the sun in the sky during the spring equinox (21st March) is equivalent to that of the autumn equinox.

The BRE Guidelines provide no criteria for the significance of transitory overshadowing other than to suggest that by establishing the different times of day and year when shadow would be cast over surrounding areas, provides an indication as to the significance of the likely effect of a new development. The assessment of transient overshadowing effects is therefore based upon expert judgment, taking into consideration the likely effects of the various baseline conditions and comparing them with the likely significant transient overshadowing effects of the redevelopment proposals.

4 Assessment Methodology

4.1 Method of Baseline Data Collation

The following data and information has been used to inform this study:

- OS Mastermap mapping
- Measured survey data (Omega Geo – December 2020)
- Scheme drawings in AutoCAD format (Turner Jackson + DAY Associates – April and May 2021)
- Photographic information provided by Mile Property Group – April 2021
- 3D Building model of the proposed development (Turner Jackson + DAY Associates – April 2021)
- Aerial photography (Google Maps and Bing)

4.2 Identification of Key Sensitive Receptors

The BRE Guidelines are intended for use for rooms and adjoining dwellings where daylight is required, including living rooms, kitchens and bedrooms. Windows to bathrooms, toilets, storerooms circulation areas and garages are not deemed as requiring daylight and therefore are not identified as sensitive receptors. The BRE document also states that the guidelines may also be applied to any non-domestic building where the occupants have a reasonable expectation of daylight. This would normally include schools, hospitals, hotels, hostels, small workshops and some offices.

The first step in this process is to determine the key sensitive receptors, i.e. which windows may be affected by the proposed development. Key receptors are those windows that face, or are located broadly perpendicular to the proposed development.

If a window falls into this category, the second step is to measure the obstruction angle. This is the angle at the level of the centre of the lowest window between the horizontal plane and the line joining the highest point of nearest obstruction formed from any part of the proposed development. If this angle is less than 25° then it is unlikely to have a substantial effect on the diffuse daylight enjoyed by the existing window and the window is not deemed to be a sensitive receptor. A graphical representation of the 25° rule is illustrated in Figure 4.1 below.

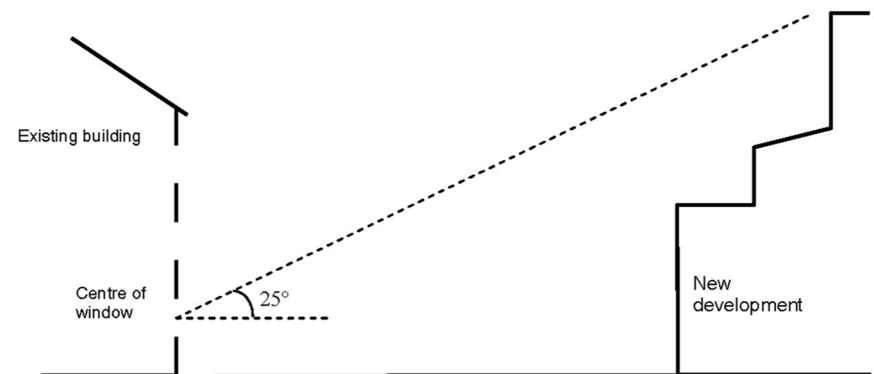


Figure 4.1 – Graphical representation of the 25° Rule (indicative buildings used for illustration purposes only)

As part of this assessment a digital three-dimensional model of the study area has been created for both the 'pre' and 'post' development scenarios. Images of these models are shown by the drawings appended to this report.

Using the 3D model, it is possible to identify all windows having an obstruction angle no greater than 25°. Impacts to these windows are therefore deemed to be negligible in line with the criteria set out within the BRE Guidelines.

There are, however, circumstances where the 25°*degree* rule is not wholly appropriate, for example where the development facing the window does not create a uniform obstruction along the skyline, or where the proposals are not directly adjacent to the receptor window. In these situations, professional judgement is used to differentiate between windows that require more detailed analysis and those that will clearly not be impacted. Where any level of uncertainty exists, the window is taken forward for detailed analysis.

Windows serving non-habitable spaces are not included within the assessment as these are not identified by planning policy or by the BRE Guidelines to be sensitive to changes in daylight and sunlight. Therefore, as part of the identification of sensitive receptor process, the use of each room is, where possible, established and windows serving non-habitable spaces such as toilets, store rooms, stairwells and circulation spaces are identified. Typically, kitchens that have a floor area less than 13m² are not considered to be habitable spaces in their own right.

Windows serving rooms within commercial premises are assumed to be non-habitable and in accordance with the BRE Guidelines are not identified as sensitive receptors. However, there are special cases where it can be assumed

that some non-domestic uses could be deemed to have a reasonable expectation of daylight and therefore could be taken forward for more detailed analysis. Typically, these could be school classrooms, hospital wards, art studios etc, but professional judgement is generally relied upon to determine this and where considered appropriate, windows serving commercial premises are included.

Drawings showing the location of all sensitive receptors that have been assessed as part of this study are included in Appendix A.2 of this report.

The habitable rooms and windows in neighbouring residential building, Heritage Quay has been identified as potential sensitive receptors and have therefore been tested.

4.3 Numerical Modelling

The numerical analysis used in this assessment has been undertaken using the Waldrum Tools (Version 5.0.0.3) software package.

4.4 Calculation Assumptions

The following assumptions have been made when undertaking the analysis:

- When assessing the VSC the calculation is based on the centre point of the window position.
- When assessing the ADF for internal rooms and in the absence of specific information, the following parameters are assumed:
 - For new buildings, the glazing type is assumed to be double glazing (Pilkington K Glass 4/16/4 Argon filled) with a light transmittance value

of 0.78 (value for double glazed unit not per pane). For existing buildings, a value of 0.68 has been assumed.

- Correction factor for frames and glazing bars = 0.8
- Where information from the designer is not available, the following values are used to derive the Maintenance Factor applied to the transmittance values.

Location / setting	Building type (Residential – good maintenance)	Exposure (normal)	Special exposure	Maintenance Factor
Urban	8%	x 1.0	x 1.0	0.92
Rural / suburban	4%	x 1.0	x 1.0	0.96

Table 4.1 – Parameters used for deriving Maintenance Factor (refer to BS 8206-2:2008 Tables A3, A4 and A5)

- The reflectance values used in the ADF analysis of neighbouring buildings are based on typical values for internal surfaces. Where information on internal finishes is not available, the default value of 0.5 prescribed by the BRE Guidelines is adopted.
- The reflectance values used in the ADF analysis of the proposed new buildings are shown in Table 4.2 below and are used unless specified otherwise by the designer:

Surface	Value
Internal walls (painted pale cream)	81%
Internal ceiling (painted white)	85%
Internal flooring	30%

Table 4.2 – Reflectance values used in ADF analysis

- Where information on internal room layouts of adjacent properties is not known, best estimates as to room layout and size have been made in order to undertake No Skyline analysis and, if applicable, ADF analysis.
- Where the internal arrangements and room uses have been estimated, it should be noted that this has no bearing upon the tests for VSC or APSH because the reference point is at the centre of the window being tested and windows have been accurately drawn from the survey information where possible. It is relevant to the daylight distribution assessment, but in the absence of suitable plans, estimation is a conventional approach.
- In areas where survey data has not been provided or needs to be supplemented with additional information, photographs, OS mapping and brick counts have been used in the process of building the 3D model of the surrounding and existing buildings.
- When analysing the effect of the new building on the existing buildings, the shading effect of the existing trees has been ignored. This is the recommended practice where deciduous trees that do not form a dense belt

or tree line are present (BRE Guidelines – Appendix H). This is because daylight is at its scarcest and most valuable in the winter.

- In situations where windows are deeply set-back beneath balconies or other overhanging features, it is common for these rooms to have low VSC values as a result of the obstruction caused by the balcony. It is widely accepted and acknowledged within the BRE Guidelines that the presence of balconies can mask the impact of a proposed development when using the VSC test and therefore the Guidelines suggest that the window should be tested both 'with' and 'without' the balcony in place. If the ratio of change with the development in place, but with the balconies removed, remains above 0.8, then it can be concluded that it is the presence of the balcony rather than the introduction of a new building that is the main factor in the loss of light.
- Where the results of the detailed analysis are presented in the appendix to 2 decimal places, these values may be rounded to a single decimal place when interpreting the results and discussing compliance with assessment criteria. This is to fit with the convention adopted within the BRE Guidelines where all ratio of change values are expressed to one decimal place.

4.5 Assessment criteria

The numerical assessment criteria specified within the BRE Guidelines is designed to identify the threshold at which point a change in daylight or sunlight would become 'noticeable' to the occupants. Consequently, where the results of the daylight/sunlight analysis demonstrate compliance with the BRE criteria it can be concluded that the impact will be negligible. However, a point that should be stressed here is that 'noticeable' does not necessarily equate to 'unacceptable' and the BRE's standard target values should not always be considered as

pass/fail criteria. Whilst the BRE Guidelines provide numerical guidance for daylight, sunlight and overshadowing, these criteria should not be seen as absolute targets since, as the document states, the intention of the guide is to help rather than constrain the designer. The Guide is not an instrument of planning policy, therefore whilst the methods given are technically robust, it is acknowledged that some level of flexibility should be applied where appropriate.

Consequently, based on the numerical assessment criteria set out with the BRE Guidelines and the use of professional judgment, the following assessment criteria have been established and are used in describing the impacts of the proposed development.

Significance	Description	Change Ratio
Negligible	No alteration or a small alteration from the existing scenario. Results demonstrate full compliance with the BRE assessment criteria and therefore occupants are unlikely to notice any change.	1.0 to 0.8
Minor adverse	An alteration from the existing scenario which may be marginally noticeable to the occupant. This may include a marginal infringement of the numerical levels suggested in the BRE Guidelines, which should be viewed in context. A typical change ratio for this level of significance would be 0.7	0.7 to 0.8
Moderate adverse	An alteration from the existing scenario which may cause a moderate noticeable change to the occupant. This may consist of a moderate infringement of the numerical BRE assessment criteria.	0.6 to 0.7
Major adverse	An alteration from the existing scenario which may cause a major noticeable change to the occupant. This may consist of a significant infringement of the numerical BRE assessment criteria.	Less than 0.6

Table 4.3 – Daylight & Sunlight Impact Descriptors

5 Assumptions of Surrounding Building

In this case, the dimensions and layouts of the habitable rooms within Heritage Quay have been based on information obtained from estate agent websites. Specifically, the most relevant floor plan available is for Flat 31 situated on the third floor with a fourth-floor mezzanine within the Heritage Quay building. The location of this flat in relation to Custom House is shown in Image 1.

The floor plan (Image 2) available for this flat indicates that the windows that could potentially be affected by the proposed development serve a bathroom, a kitchen and part of the open plan living room which is triple aspect. From the internal images available for this flat (Image 3), it can be seen that the kitchen has been extended into the open plan living area.

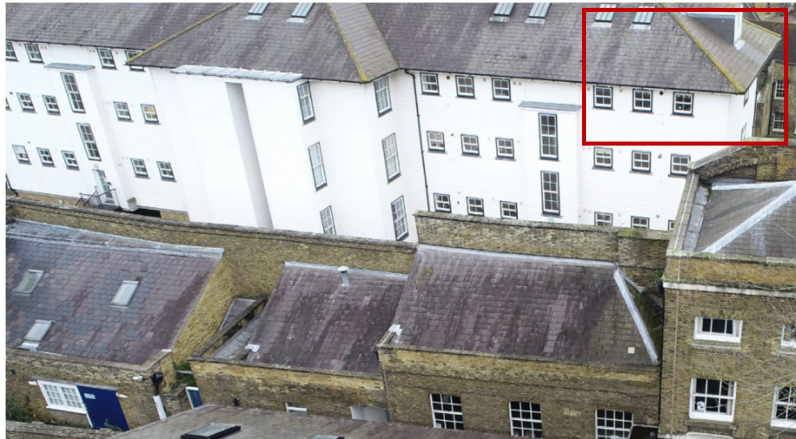


Image 1 – Location of neighbouring property Flat 31 in Heritage Quay

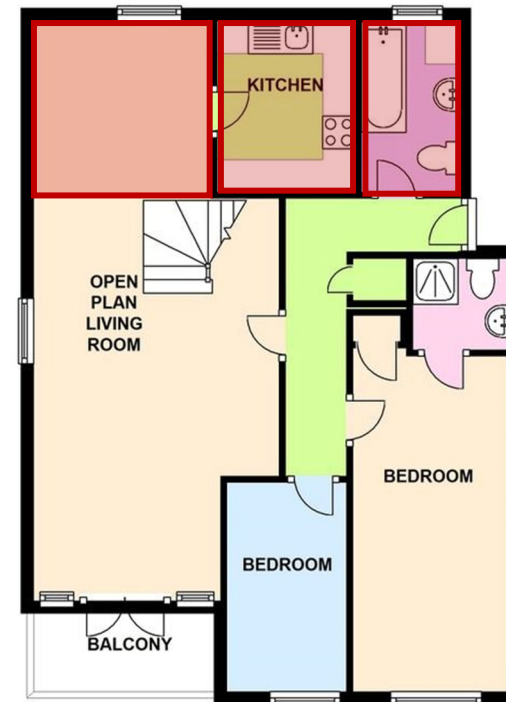


Image 2 – Floor plan for Flat 31 Heritage Quay with tested room areas marked in red.



Image 3 – Internal image of open plan living room in Flat 31

As this flat is situated on at the end of the building, the open plan living area in other flats will be dual aspect. Furthermore, as it cannot be confirmed that the room use within the other flats is identical to No. 31, we have taken an approach so assess the worst-case scenario of the neighbouring rooms. This case being that all rooms are considered single aspect, habitable and have a single window per space, rather than sharing light from additional windows across different room areas. The modelled room areas are indicated in red in Image 2.

In addition to internal estate agent information, high resolution aerial drone images have been provided which clearly show the potentially affected windows in Heritage Quay. An examples of the images provided is shown in Image 4.



Image 4 – External aerial drone image showing the windows in Heritage Quay

6 Discussion of Daylighting Impacts

Based on the results of the numerical analysis summarised in Appendix A.3, it is possible to draw conclusions on the impacts that the proposed development will have on the neighbouring building. These are based on the principle numerical tests that are discussed below.

6.1 Vertical Sky Component Assessment

The BRE Guidelines operate on the general principle that where the retained VSC is 27% or greater, or where the retained VSC has not reduced to less than 0.8 times its former value, then the reduction in daylight is unlikely to be noticeable to the building's occupants and thus the impact can be deemed negligible. The results of the VSC analysis are summarised below.

Property	No. Windows Tested	Windows meeting BRE Guidelines		VSC Windows Transgressions		
		No.	%	Minor adverse	Moderate adverse	Major adverse
Heritage Quay	19	19	100%	0	0	0

Table 6.1 – Results of Vertical Sky Component (VSC) Analysis

Inspection of the results of this test show that all of the windows either retain a VSC value greater than 27% post development, or have a ratio of change that is 0.8 or above and therefore are fully compliant. Consequently, in line with the

assessment criteria set out within the BRE Guidelines it is possible to conclude that the impact will be **negligible**.

6.2 No Sky Line Assessment

In order to pass the No Sky Line Assessment, the BRE Guidelines state that the area of the working plane within the room that has a view of the sky should not be reduced to less than 0.8 times its former value as a result of new development. One benefit of the daylight distribution test is that the resulting contour plans show where the light falls within a room, for both the existing and proposed conditions, and a judgement can be made as to whether the room will retain light to a reasonable depth.

The results of the No Sky Line/Daylight Distribution analysis are summarised below.

Property	Number of Rooms Tested	Rooms that meet BRE Guidelines		No Sky Line No. of Rooms Experiencing Transgressions		
		No.	%	Minor adverse	Moderate adverse	Major adverse
Heritage Quay	19	19	100%	0	0	0

Table 6.2 – Results of No Sky Line (NSL) Analysis

From the results in Table 6.2, it can be seen that as a result of the proposed development, the impact on the daylight distribution within the assessed rooms will be negligible. The reduction in the area of the working plane that has a direct view of the sky will be less than 20% therefore occupants are unlikely to notice any change.

6.3 Summary of Daylighting Impacts

The proposed development at Customs House, The Terrace, Gravesend DA12 2DE has been evaluated against the criteria set out by the BRE Guidelines for the assessment of the potential impacts on the daylight of the neighbouring property. Heritage Quay has been identified as the only sensitive receptor for this study, and therefore, the habitable rooms and the windows serving the rooms within this property have been tested.

When the magnitude of reduction is considered, it is evident that this will be within the acceptable limits set out within the BRE Guidelines. Consequently, it is possible to conclude that any changes to the daylight received by the habitable rooms of the neighbouring building will not be significant and is unlikely to be noticeable by the occupants.

7 Sunlight and Overshadowing Analysis

7.1 Annual Probable Sunlight Hours Assessment

The Annual Probable Sunlight Hours (APSH) tests have been carried out using the numerical model described in Section 4.3. The assessment requirements for the APSH test, as set out in the BRE Guidelines, have been reiterated below. For the assessment to conclude that the sunlighting of the existing dwelling could be adversely affected, all three of the following tests need to have been failed:

Test A - Does the window receive less than 25% of the APSH, or less than 5% the APSH between 21st September and 21st March?

Test B - Does the assessed window receive less than 0.8 times its former sunlight hours during either the 'whole year' or 'winter' period?

Test C - Is the reduction in sunlight received over the whole of the year greater than 4% of the APSH?

However, these tests are only applicable to windows that face within 90 degrees of due south. Consequently, in line with the guidelines and assessment methodologies set out within the BRE document, the analysis of sunlight impacts has only been carried out for these windows. Windows facing within 90 degrees of due north are not analysed and impacts are deemed to be negligible.

It should also be noted that where rooms have windows on more than one elevation, it is acceptable to sum the non-coincident sunlight hours to achieve a 'room total'. This approach is acknowledged by the BRE Guidelines and

facilitates a greater understanding of the sunlight received within a room by taking into account the fact that some windows will receive sunlight at different times during the day.

When examining the results of the three sunlight tests, it is first necessary to understand why there are three separate tests and more importantly, why it is not necessary to pass all three to demonstrate that there is no adverse impact. The BRE Guidelines clearly state that for the proposed development to be considered to have an adverse effect on the available sunlight to neighbouring windows, all three tests would need to have been failed.

This is because sunlight is not assessed in terms of its contribution to the overall lighting levels within the room. The value attributed to sunlight is its transient presence and the way in which it can make a room appear bright and cheerful. There are also therapeutic values associated with sunlight and therefore it can be seen that these are not quantitative metrics that can be assessed using a single pass/fail criteria test. It is also necessary to understand that the amount of sunlight received by a window is strongly influenced by the orientation of the window elevation and any surrounding obstructions.

As a consequence of these factors, the assessment methodology embodied within the three separate tests allows the change in sunlight to be assessed in terms of the magnitude of change, absolute change and the retained level of sunlight. To conclude that a new development has no adverse impact, all that is required is for one of the three tests to be passed. The APSH test has been carried out and the detailed results of the analysis are included in Appendix A.3 and a summary of the results are shown in Table 7.1.

Property	Number of Windows Tested	Annual			Winter		
		Windows that meet BRE Guidelines		No. of Windows Experiencing Adverse Impacts	Windows that meet BRE Guidelines		No. of Windows Experiencing Adverse Impacts
		No.	%		No.	%	
Heritage Quay	4	4	100%	0	4	100%	0

Table 7.1 – Results of APSH Analysis

When the results of the APSH analysis summarised in Table 7.1 and Appendix A.3 are inspected, it can be seen that all windows and rooms pass at least two of the three sunlight tests. Consequently, it has been demonstrated that the proposed scheme will have a negligible impact on neighbouring building.

7.2 Sun on the Ground

The BRE Guidelines acknowledge that good site layout planning for daylight and sunlight should not limit itself to providing good natural light inside buildings. Sunlight in the space between buildings has an important effect on the overall appearance and ambiance of a development.

The 2011 BRE Guidelines suggest that the Spring Equinox (21st March) is a suitable date for the assessment and therefore using the specialist software described in Section 4.3, the path of the sun is tracked to determine where the sun would reach the ground and where it would not.

The BRE guidelines recommend that at least half of a garden or amenity area should receive at least 2 hours of sunlight on March 21st or the area which receives 2 hours of direct sunlight should not be reduced to less than 0.8 times its former value (i.e. there should be no more than a 20% reduction).

Typical examples of areas that could be considered as open spaces or amenity areas are main back gardens of houses, allotments, parks and playing fields, children's playgrounds, outdoor swimming pools, sitting-out areas, such as in public squares and focal points for views.

However, from inspection of aerial photographs and site-specific photos, it is evident that there are no amenity areas in close proximity to the proposed development and therefore there is no potential for adverse impacts from overshadowing.

8 Daylight and Sunlight Provision to Proposed Development

8.1 Overview

As discussed in Section 4, the primary test for daylight within the proposed development is the Average Daylight Factor (ADF) test and this is discussed in detail in the following section. The No Sky Line (NSL) analysis has also been carried out to provide supporting information on the distribution of daylight within each of the habitable rooms. The NSL results are processed by the computational model in both graphical and numerical formats and these are included in the appendix to this report.

It is the intention of the BRE Guidelines to aid, rather than constrain the designer and as such a range of qualitative and quantitative tests are outlined, which vary in complexity. During the early stages of design, it is often appropriate to use the more simplistic rule-of-thumb tests. However, when assessing a final design at the planning application stage, it is more appropriate to rely upon the more detailed and quantitative analysis techniques. These allow window size and position, glazing type, room layout and dimensions etc to be taken into consideration. Consequently, the assessment of natural daylight provision has been based primarily on the results of the ADF test, although reference to the NSL results is made when deemed necessary.

8.2 Assessment of Daylight Provision to New Rooms

Using the analytical techniques discussed in Section 4, the Average Daylight Factor (ADF) for the habitable rooms within the proposed development has been calculated.

It is first important to note that in accordance with the guidance set out in both the BRE Guidelines and the BS 8206-2:2008 document, rooms that have a dual use, i.e. an open plan kitchen and lounge, are assessed as a single room and assessed against the room use with the highest daylighting requirement.

The results are summarised in Table 8.1.

Unit number & Floor level	Room number and use	ADF value achieved	Target ADF value	Meets BRE criteria
Unit 1	R1 Bedroom	1.4%	1.0%	Yes
	R2 LKD	2.5%	2.0%	Yes
Unit 2	R1 LD	1.6%	1.5%	Yes
	R2 Bedroom	2.0%	1.0%	Yes
	R3 Bedroom	1.3%	1.0%	Yes

Table 8.1 – Calculated ADF Values

From the results above, it can be seen that the habitable rooms within the two residential units on the lower ground floor of the property will exceed the ADF target values set out by the BRE Guidelines. In addition, it can be seen from the No Sky Line results in Appendix A.4 that all of the rooms will have an excellent distribution of daylight. Consequently, it can be concluded that these habitable spaces will be well lit throughout the year and will have a reduced reliance on supplementary electric lighting.

8.3 Provision of Sunlight to New Rooms

The BRE Guidelines provide guidance in respect of sunlight quality for new developments stating: “in housing, the main requirement for sunlight is in living rooms, where it is valued at any time of the day, but especially in the afternoon. Sunlight is also required in conservatories. It is viewed as less important in bedrooms and in kitchens where people prefer it in the morning rather than the afternoon.”

The assessment criteria set out within the BRE document are discussed in Section 4.3 of this report, but in general terms the overall objective sought by the guidelines is as follows:

“In general, a dwelling or non-domestic building which has a particular requirement for sunlight, will appear reasonably sunlit provided that at least one main window faces within 90 degrees of due south; and the centre of at least one window to a main living room can receive 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours in the winter months between 21st September and 21st March.

It is also worth noting that in paragraph 3.1.11 of the BRE guidance it is suggested that if a room faces significantly north of due east or west it is unlikely to meet the recommended levels of sunlight. A further observation from paragraph 5.3 of the BS 8206-2 is that with regards to sunlight duration, the degree of satisfaction is related to the expectation of sunlight. Therefore, if a room is north facing or if the building is in a densely-built urban area, the expectation of sunlight will be lower.

It should be noted that where rooms have more than one window, it is acceptable to sum the non-coincident sunlight hours to achieve a ‘room total’. This approach is acknowledged by the BRE Guidelines and facilitates a greater understanding of the sunlight received within a room by taking into account the fact that some windows will receive sunlight at different times during the day.

Following the approach prescribed by the BRE Guidelines where preference for sunlight is given to the main living area of a proposed unit, in this case, the Living/ Kitchen/ Dining or Living/Dining areas, only the LKD rooms within the proposed units have been included in the table of results below. The complete set of results of the APSH analysis which includes the remainder rooms within the units (all bedrooms) are presented on Appendix A.4 of this report.

The results of this analysis are summarised in Table 8.1.

Floor level	Unit number	Room number & use	Percentage APSH	
			All year	Winter
Basement	Unit 1	R2 - LKD	6%	0%
	Unit 2	R1 - LKD	41%	6%

Table 8.1 – Results of APSH analysis

From the results summarised in Table 8.1, it can be seen that the main habitable room in Unit 2 will receive in excess of the target values set out by the BRE Guidelines of 25% annual probable sun hours and 5% winter probable sun hours. As consequence, it can be concluded that this unit will be well sunlit throughout the year.

Unit 1 is falling short of meeting the aspirational target values for sunlight which is due to the windows facing within 50 degree of due north. Given that this main-habitable room will be a conversion of an existing non-residential room, which will retain the existing window openings, it has been necessary to have north facing windows in order to make efficient use of the site. This is supported by the NPPF (2019) which states that *'when considering applications for housing, authorities should have a flexible approach in applying policies of guidance relating to daylight and sunlight where they would otherwise inhibit making efficient use of a site'*.

Whilst designers are encouraged to maximise the use of south-facing windows for habitable rooms, this guidance predominantly relates to new builds, where the designer has a greater degree of control over layout and orientation. However, where existing buildings are being converted, it is widely accepted that the sustainable benefits derived from re-purposing existing buildings place constraints on the ability of the designer to maximise sunlight to all rooms. Notwithstanding this, from the results of the APSH analysis it is clear that this unit will receive some degree direct sunlight during the summer months.

9 Conclusions

The detailed analysis undertaken as part of this assessment has examined the impact of the proposed development at The Terrace, Gravesend DA12 2DE, on the amount of daylight enjoyed by the neighbouring building. One property has been identified as a sensitive receptor for this study, Heritage Quay, and therefore, the habitable rooms and the windows serving this property have been tested.

In line with the assessment criteria prescribed by the BRE Guideline, it has been shown that the reduction in daylighting to the windows and rooms of the neighbouring building will be within the acceptable limits set out within the BRE Guidelines. Consequently, it is possible to conclude that any changes to the daylight received by the habitable rooms of the neighbouring building will not be significant and is unlikely to be noticeable by the occupants.

The assessment of the impact of the proposed development on the sunlight enjoyed by the neighbouring building has also shown that despite some reductions seen in the number of probable sunlight hours enjoyed by these windows and rooms these are again within the limits prescribed by the BRE Guidelines as being acceptable.

In summary, the development proposals have been appraised in line with the guidelines set out in the BRE document. When assessed against the criteria for establishing whether the proposed development will have a significant impact, it has been possible to conclude that the development will not result in a notable

reduction in the amount of either daylight or sunlight enjoyed by the neighbouring building.

In addition to the impact on its neighbours, the provision of natural daylight and sunlight to the habitable rooms within the proposed development itself has also been quantified. This analysis has shown that all habitable rooms exceed the minimum target values for natural daylight set out within the BRE Guidelines and the British Standards. Consequently, it can be concluded that these habitable spaces will be well lit and will have a reduced reliance on supplementary electric lighting.

It has also been possible to demonstrate that in the Unit 2 which has south facing windows, all rooms will receive in excess of the 'all year' and 'winter' target levels of direct sunlight. As a consequence of the light and additional visual interest provided by this direct sunlight, the amenity value of these rooms will be enhanced. Although Unit 1 is falling short of meeting the aspirational target values for sunlight, it should be noted that where existing buildings are being converted, it is widely accepted that the sustainable benefits derived from re-purposing existing buildings place constraints on the ability of the designer to maximise sunlight to all rooms.

A Appendices

Appendix A.1 – Scheme Drawings

Appendix A.2 – Graphical Model Outputs

Appendix A.3 – Tabulated Results for Daylight & Sunlight Calculations (Impact on Neighbours)

Appendix A.4 – Tabulated Results for Daylight & Sunlight Calculations (Provision to New Development)

Appendix A.1 – Scheme Drawings



Key plan

TURNER
JACKSON+DAY
ASSOCIATES

client details

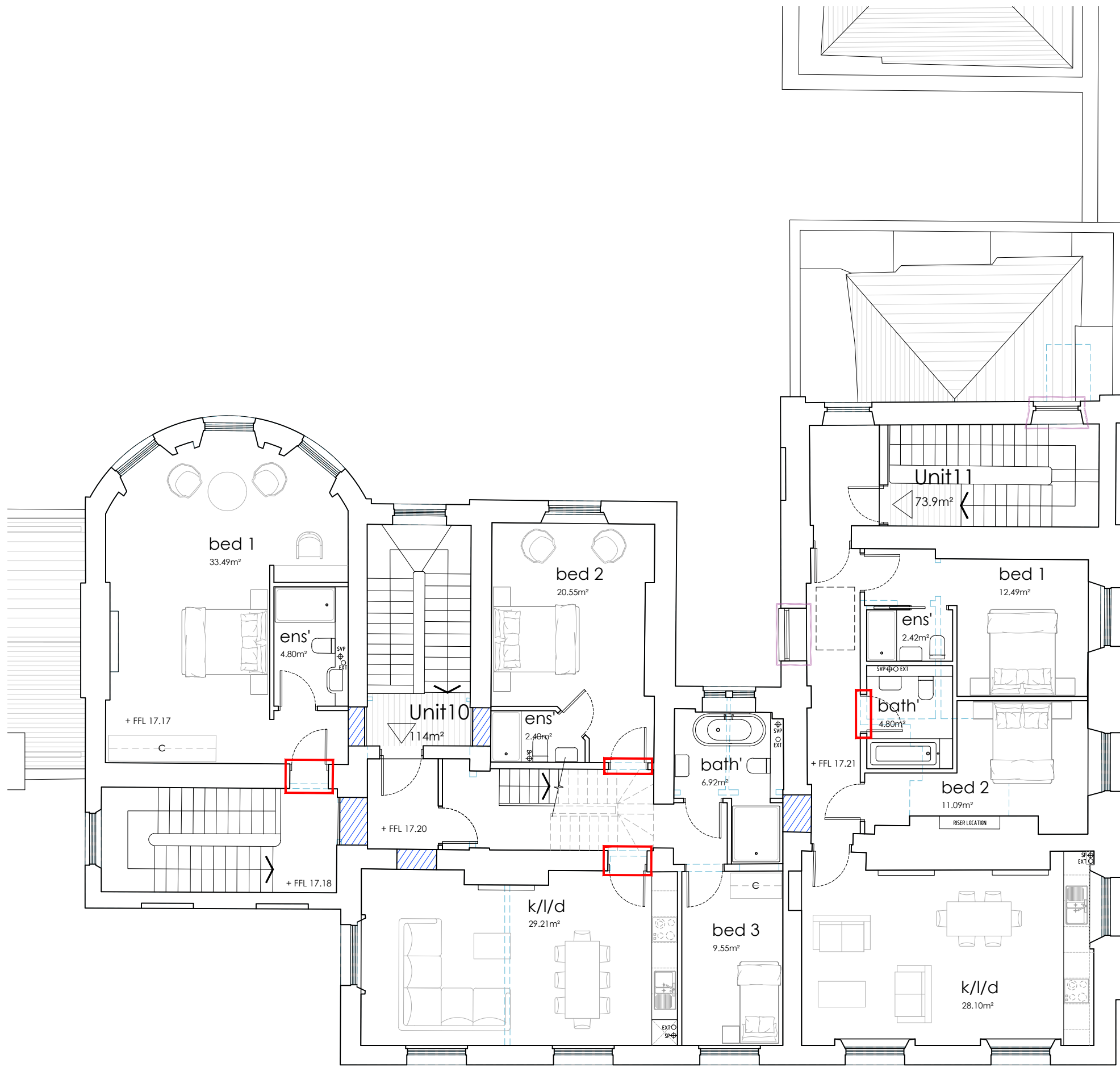
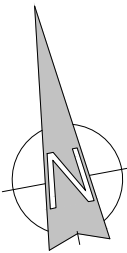
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drawing title
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Proposed Plans

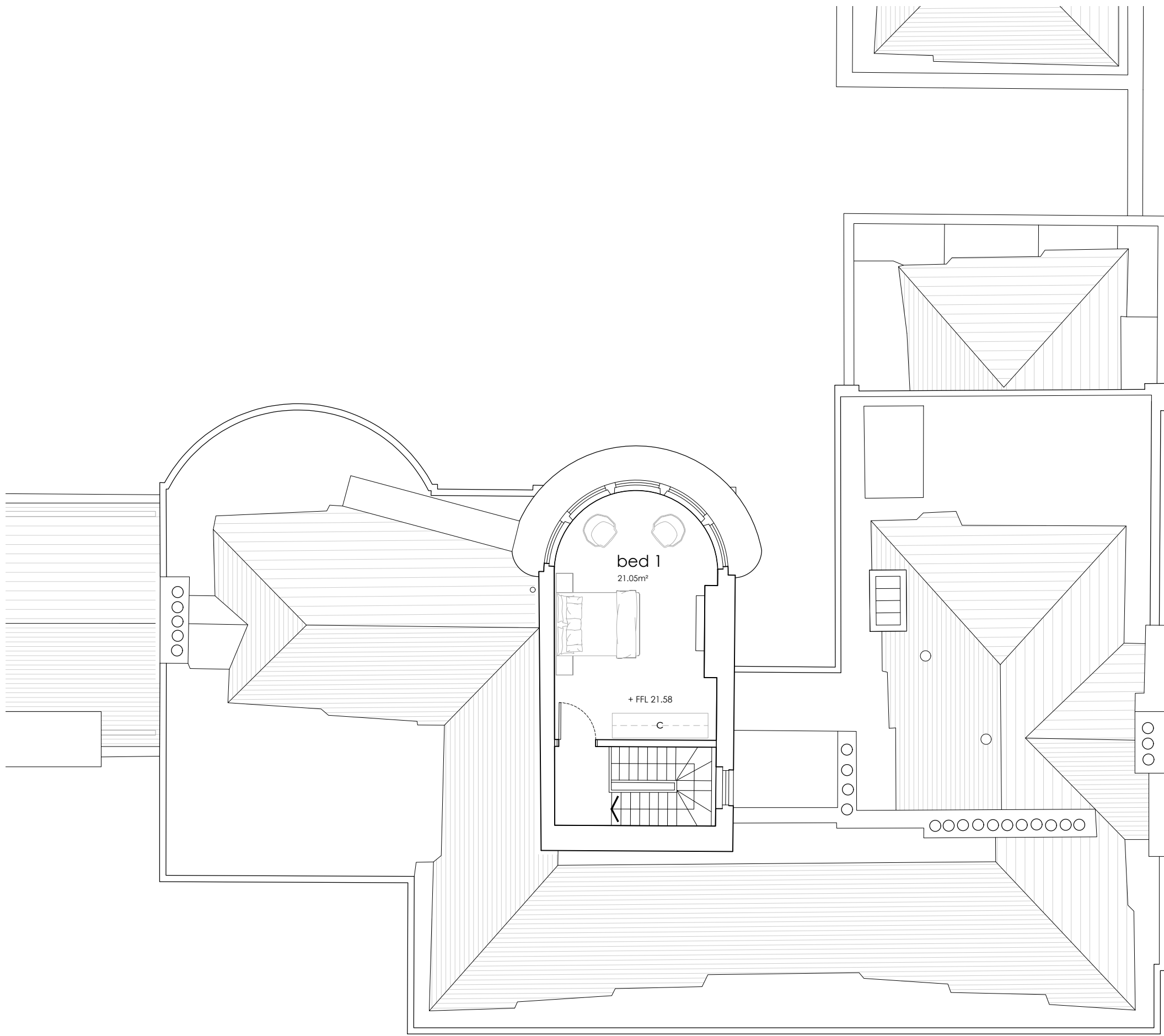
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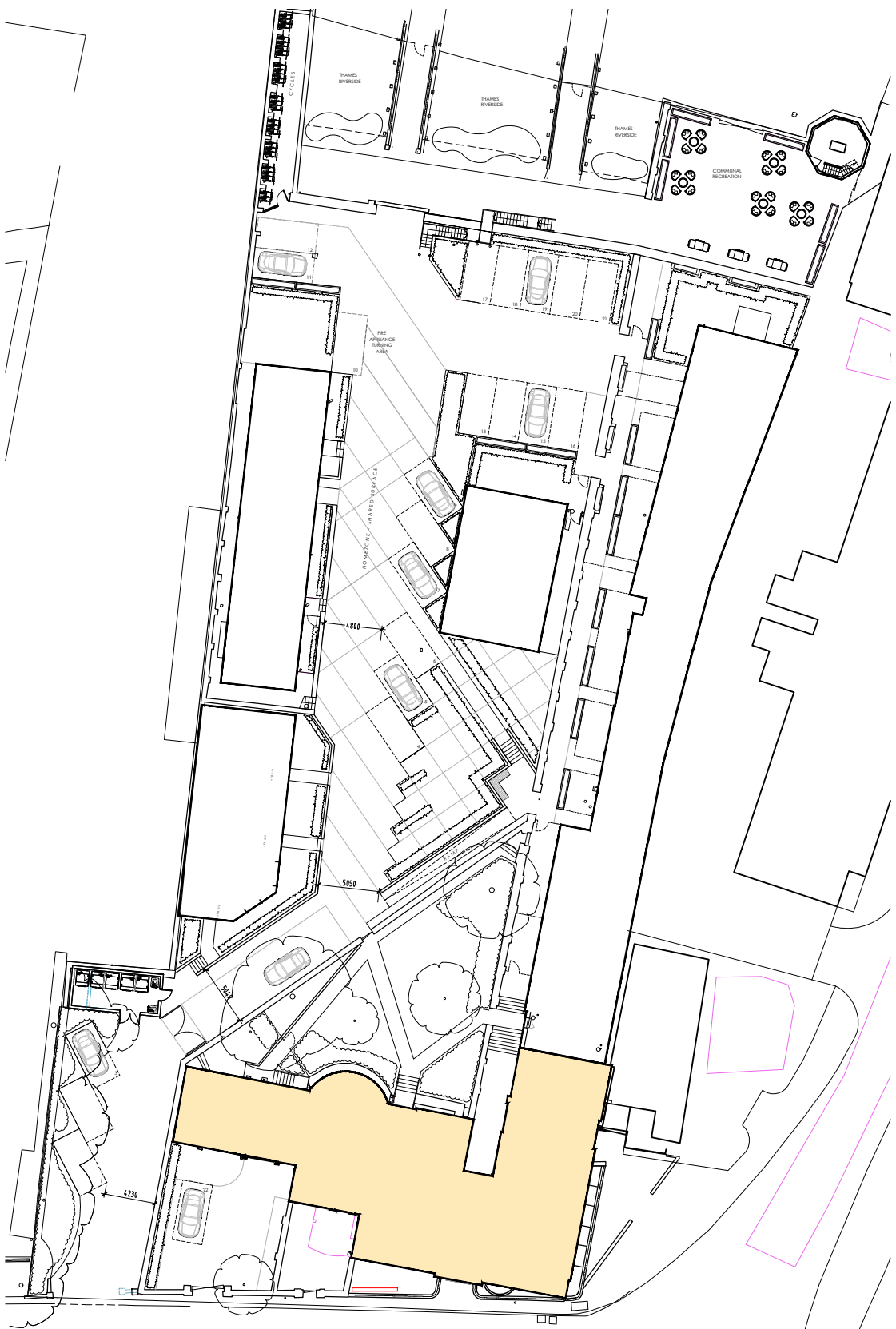
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Second floor plan



Third Floor / Roof plan



Key plan

- KEY
- Blocking up of existing openings in wall. To be detailed accordingly.
 - New door / window opening in existing wall.
 - Reinstating or enlarging door / window opening in existing wall.
 - Existing building linings to be enhanced if required.
 - To be demolished.

REV	DESCRIPTION	DATE	BY	CHKD
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TURNER JACKSON+DAY ASSOCIATES

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client details
Mile Property Group Ltd

project details
Custom House
The Terrace, Gravesend, DA12 2DE

drawing title
Custom House Main Building 2 of 2
Proposed Plans

date scale drawn by checked by
Feb'21 1:100@A1 NS

project no:	drawing no:	revision
1735	026	



Front elevation



Right flank elevation



Rear elevation

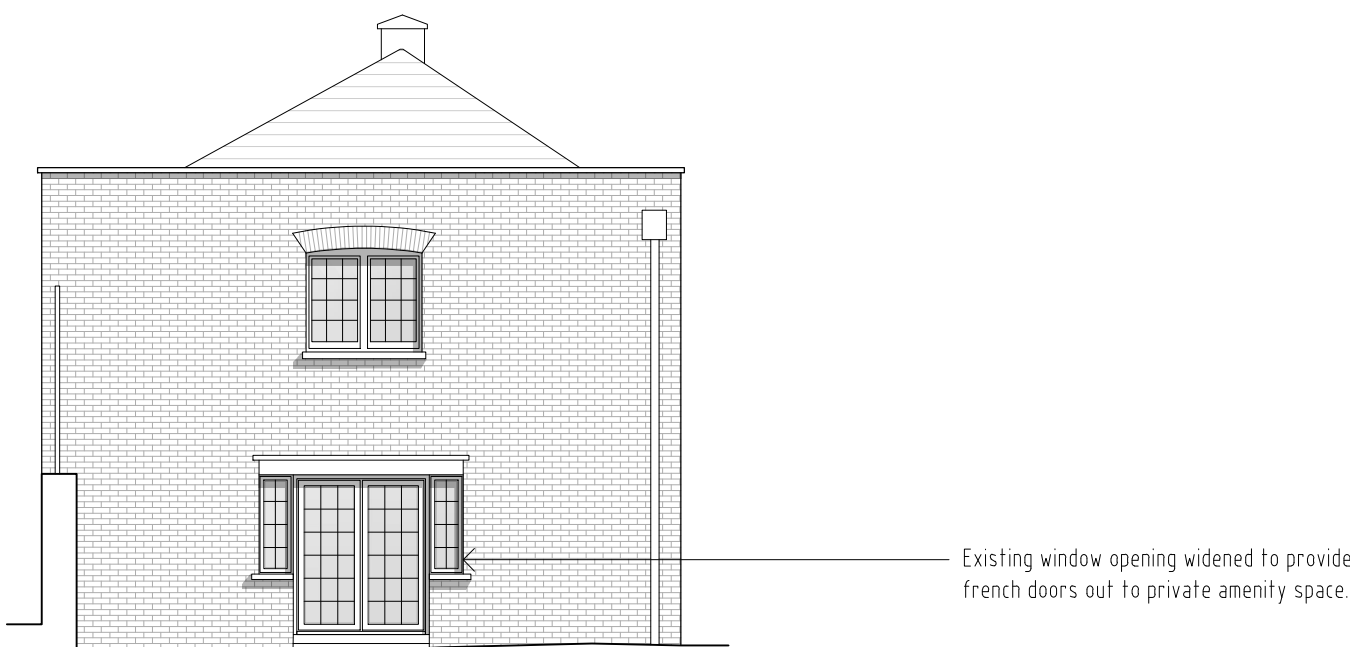


Left flank elevation



REV	DESCRIPTION	DATE	BY	CHKD
TURNER JACKSON+DAY ASSOCIATES				
Radio House Thanet Way, Whitstable Kent CT5 3QX				
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client details				
Mile Property Group Ltd				
project details				
Custom House The Terrace, Gravesend, DA12 2DE				
drawing title				
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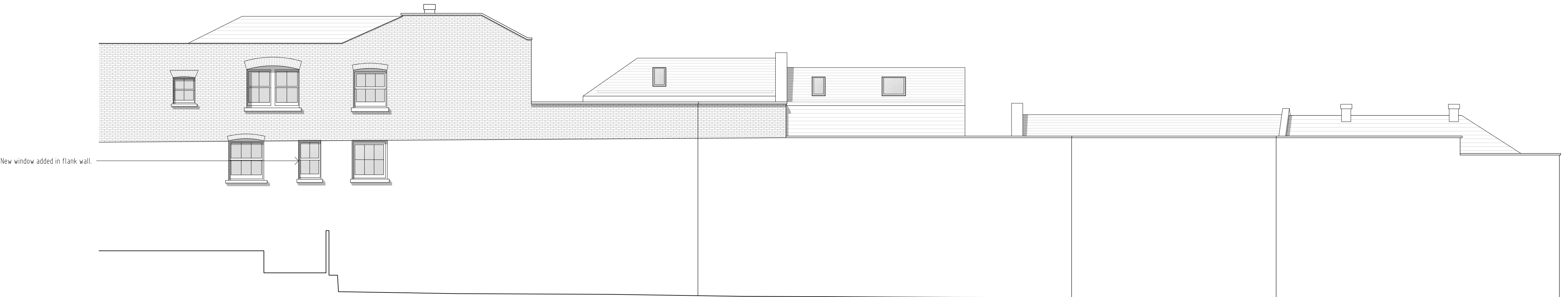
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Left flank elevation 1



Front elevation



Rear elevation

REV	DESCRIPTION	DATE	BY	CHKD
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Mile Property Group Ltd

project details

Custom House
The Terrace, Gravesend, DA12 2DE

drawing title

Custom House Outbuildings
Proposed Plans

date scale drawn by checked by

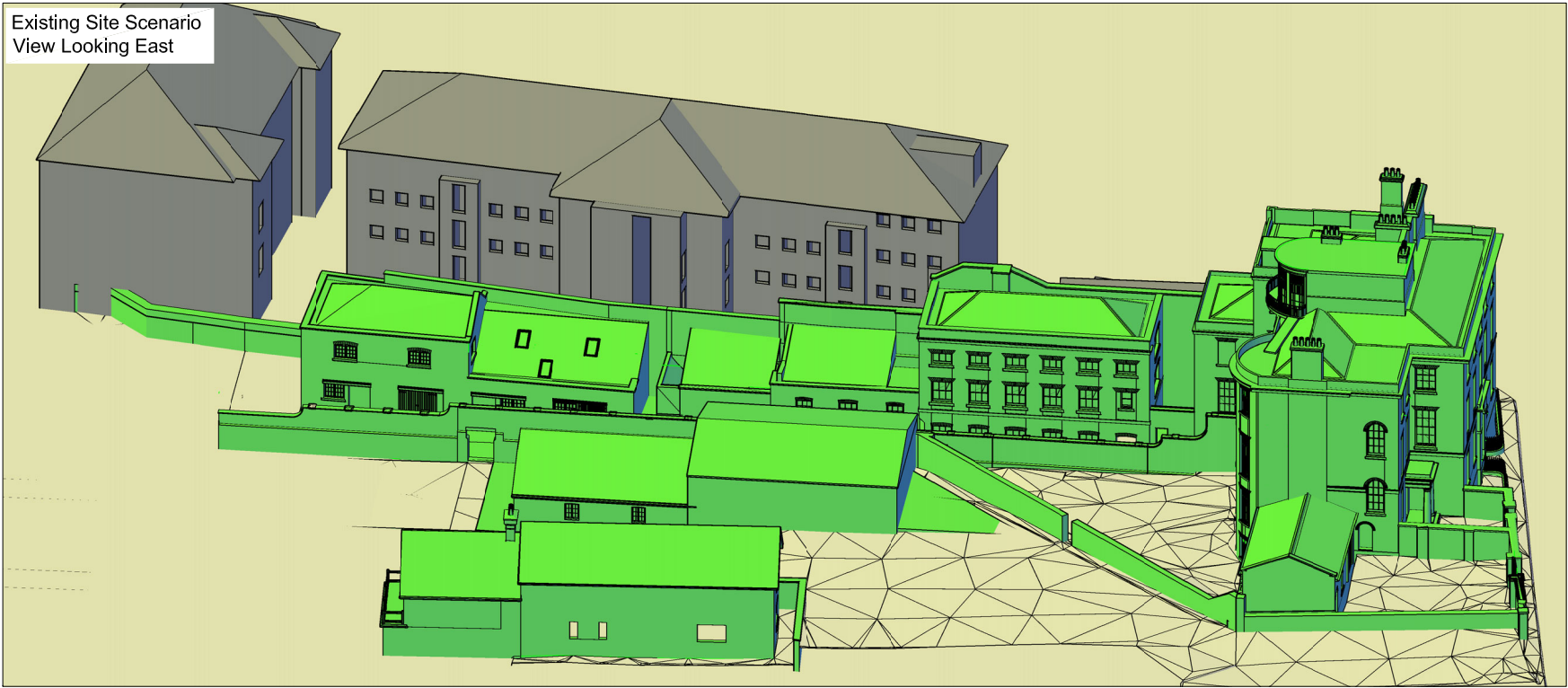
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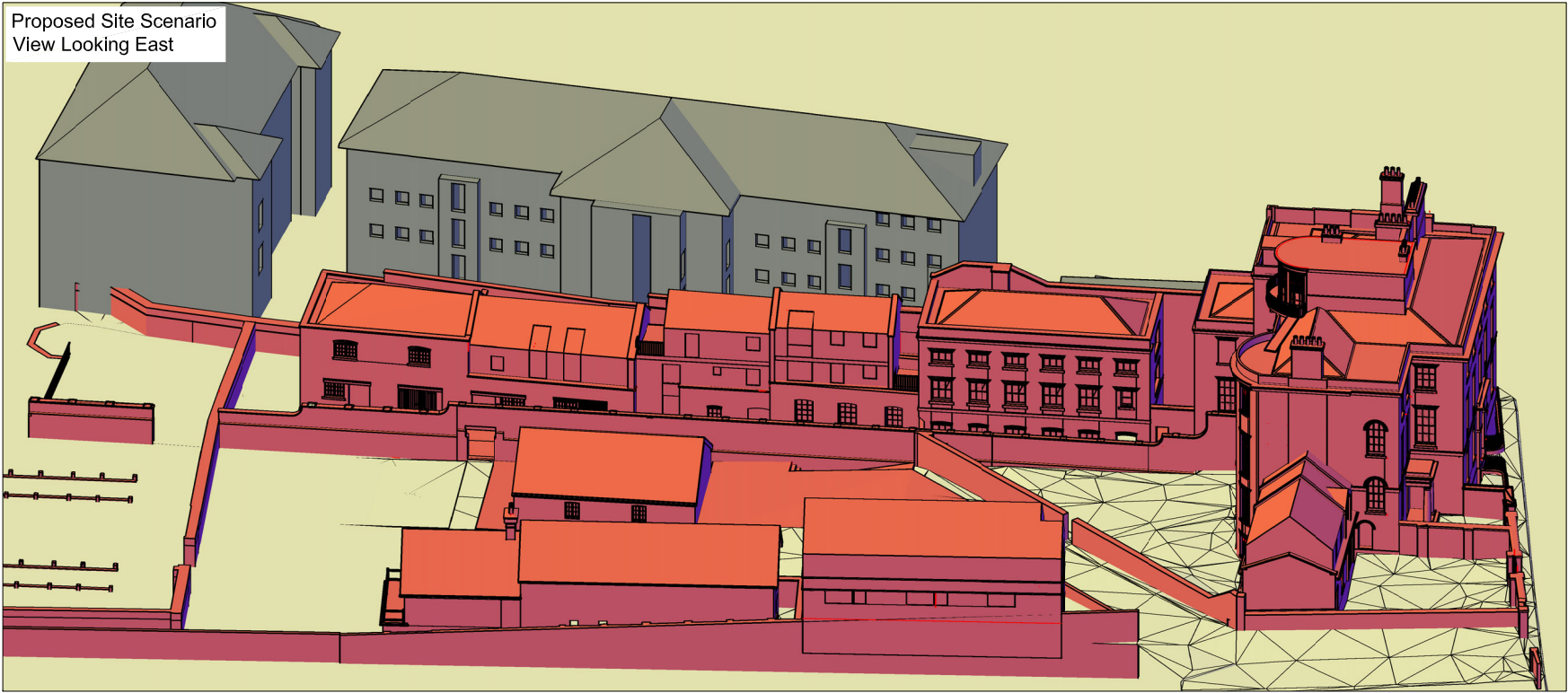
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Appendix A.2 – Graphical Model Outputs

Existing Site Scenario
View Looking East



Proposed Site Scenario
View Looking East



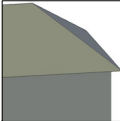
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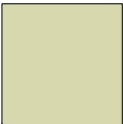
Existing Buildings



Proposed Buildings

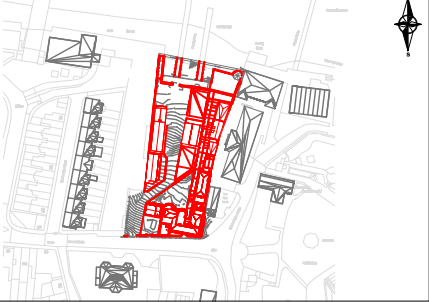


Surrounding Buildings



Ground Base

Location Plan



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Rev	Description	Date

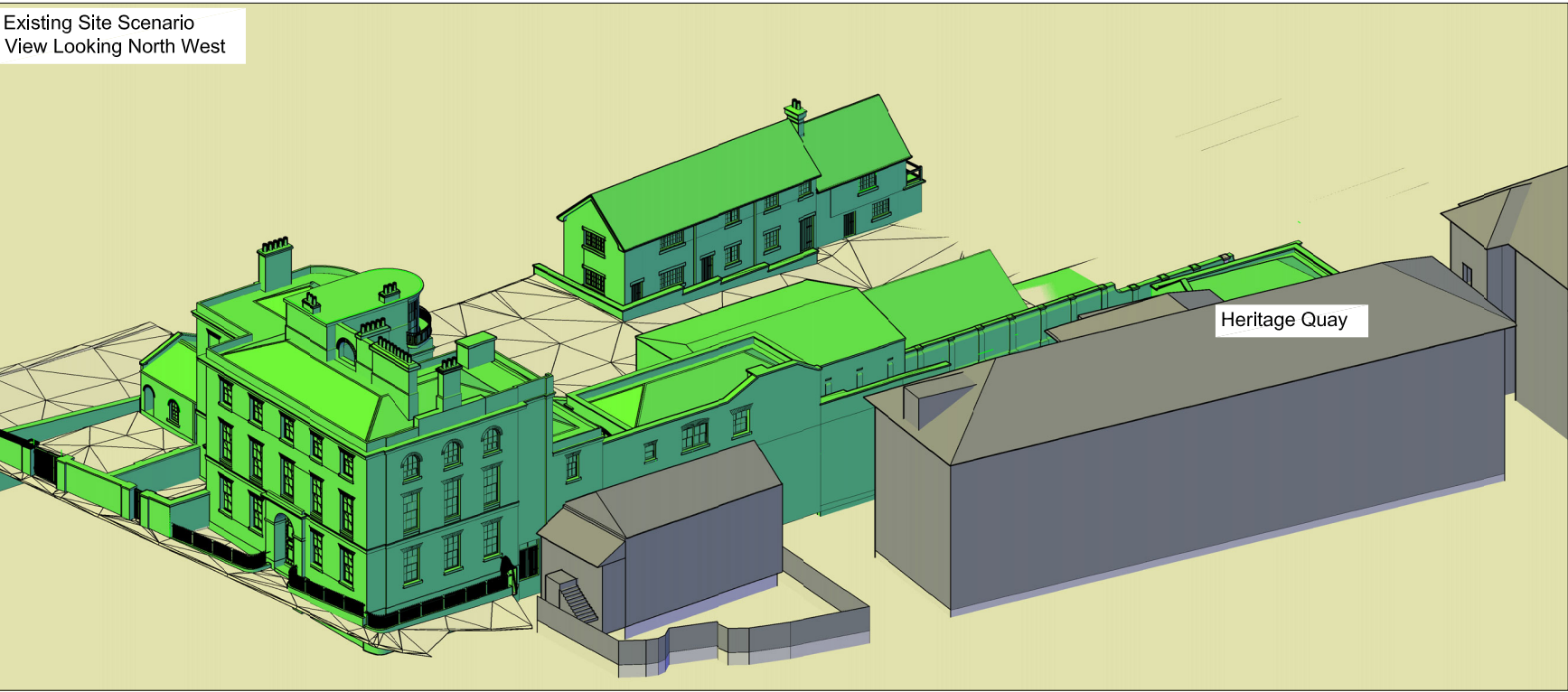
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Custom House (Gravesend) Limited

PROJECT
The Terrace, Gravesend

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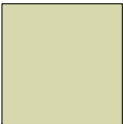
Existing Site Scenario
View Looking North West



Legend

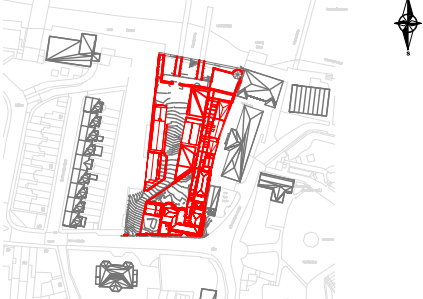


Existing Buildings Proposed Buildings Surrounding Buildings

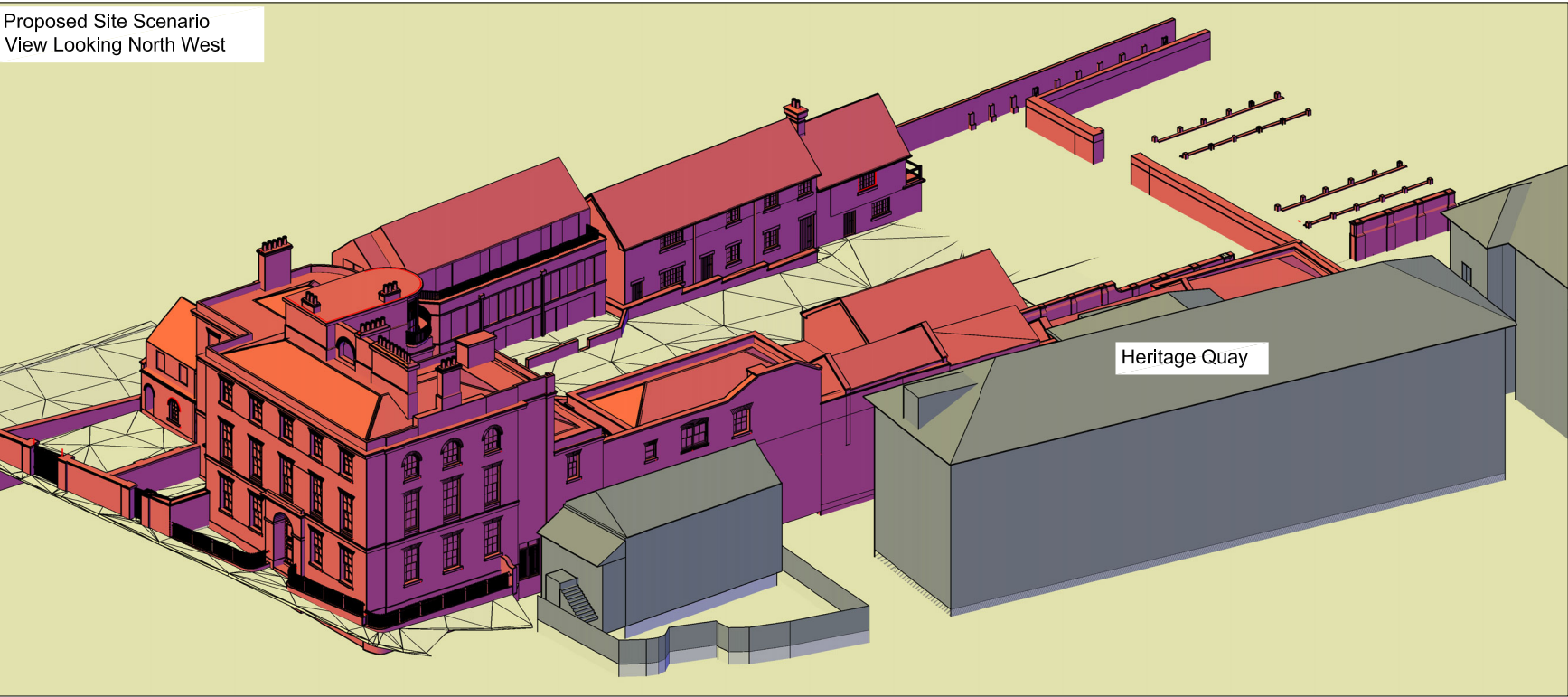


Ground Base

Location Plan



Proposed Site Scenario
View Looking North West



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CLIENT
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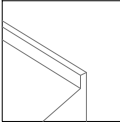
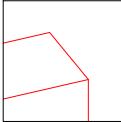
PROJECT
The Terrace, Gravesend

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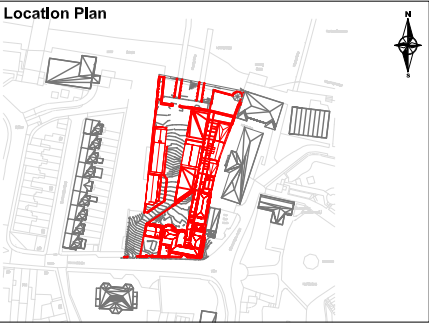
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3D Model - Existing & Proposed Site Scenarios
Identification of Neighbouring Properties

DWG No.
2813_02

Legend



Proposed Buildings Surrounding Buildings

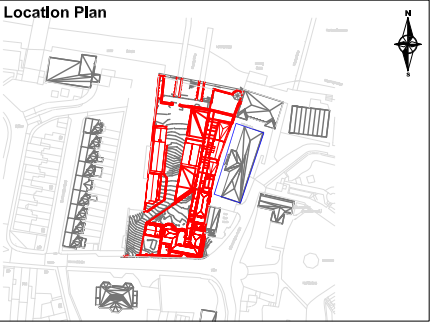
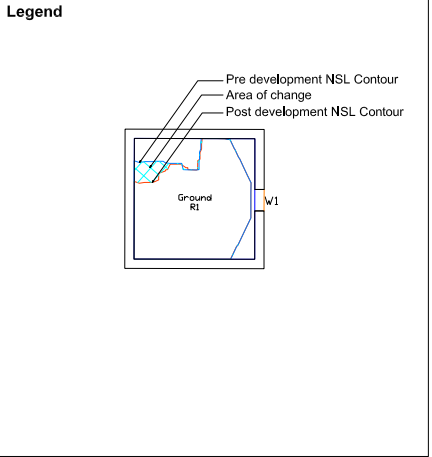


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The Terrace, Gravesend		
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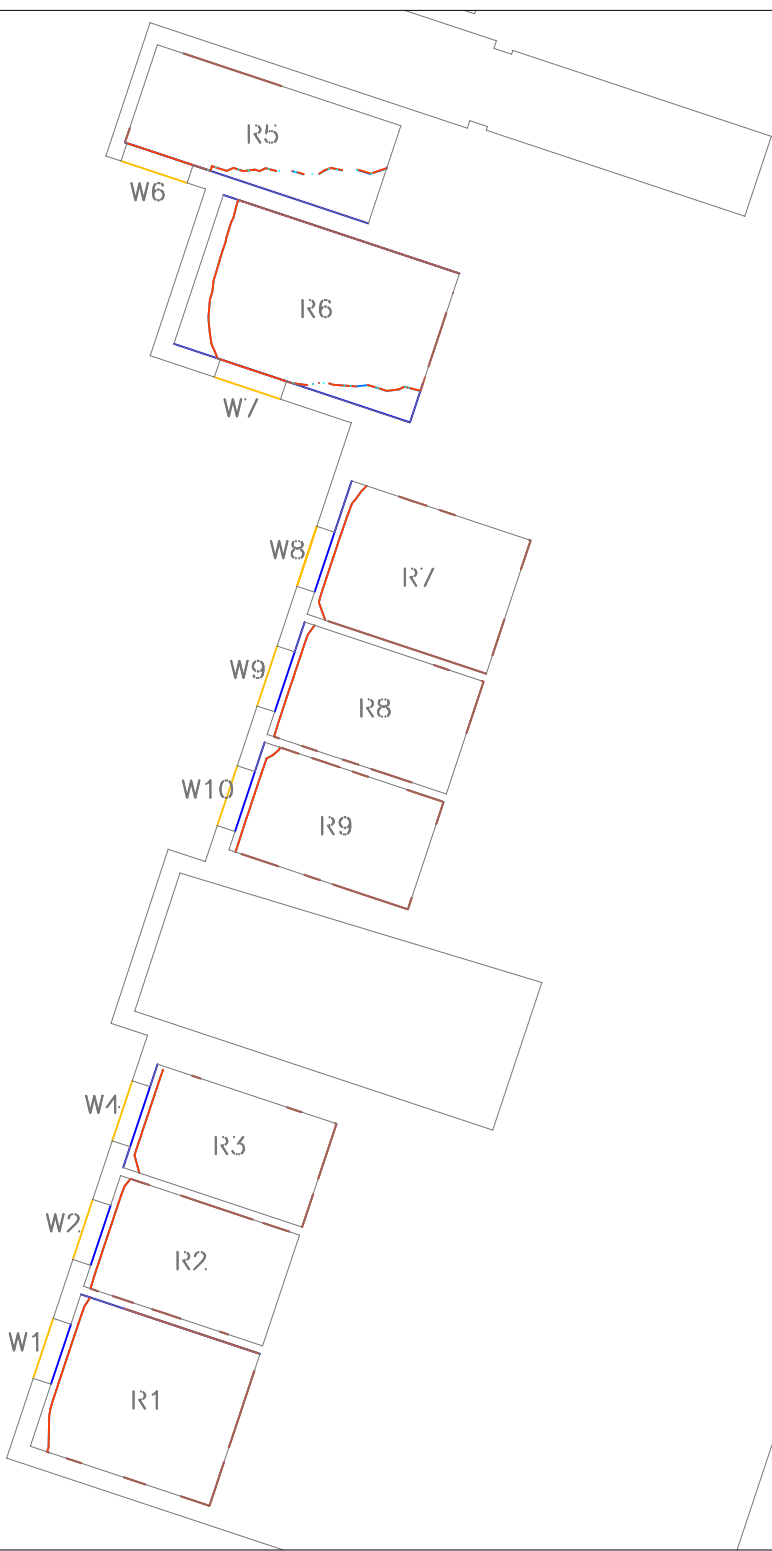


Unit 6 - Barham Business Park
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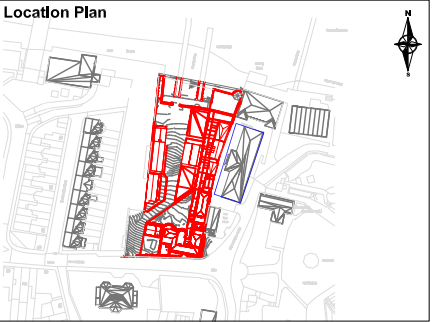
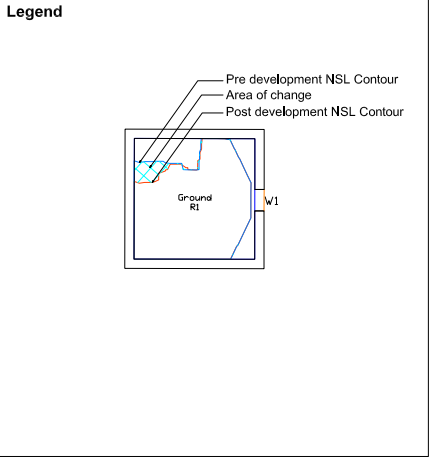


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NSL contours		2813_04



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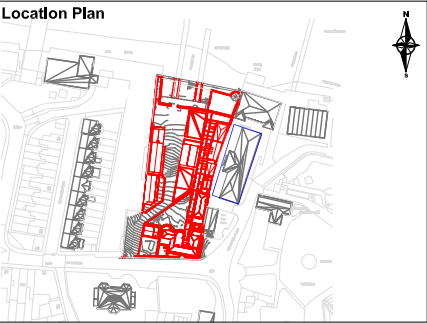
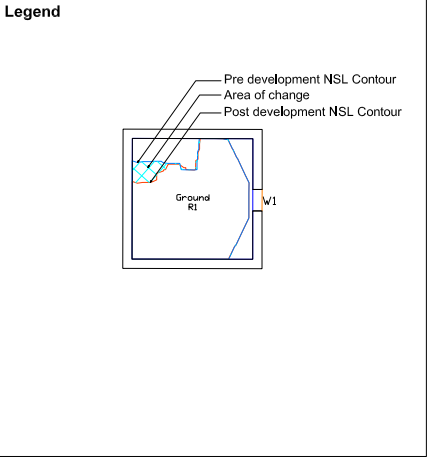
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Rev	Description	Date
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PROJECT		
The Terrace, Gravesend		
SCALE	PROJ REF	ANALYST
Not to scale	2813	KC
DRAWN BY		JP
DWG REF.		DWG No.
NSL contours		2813_05

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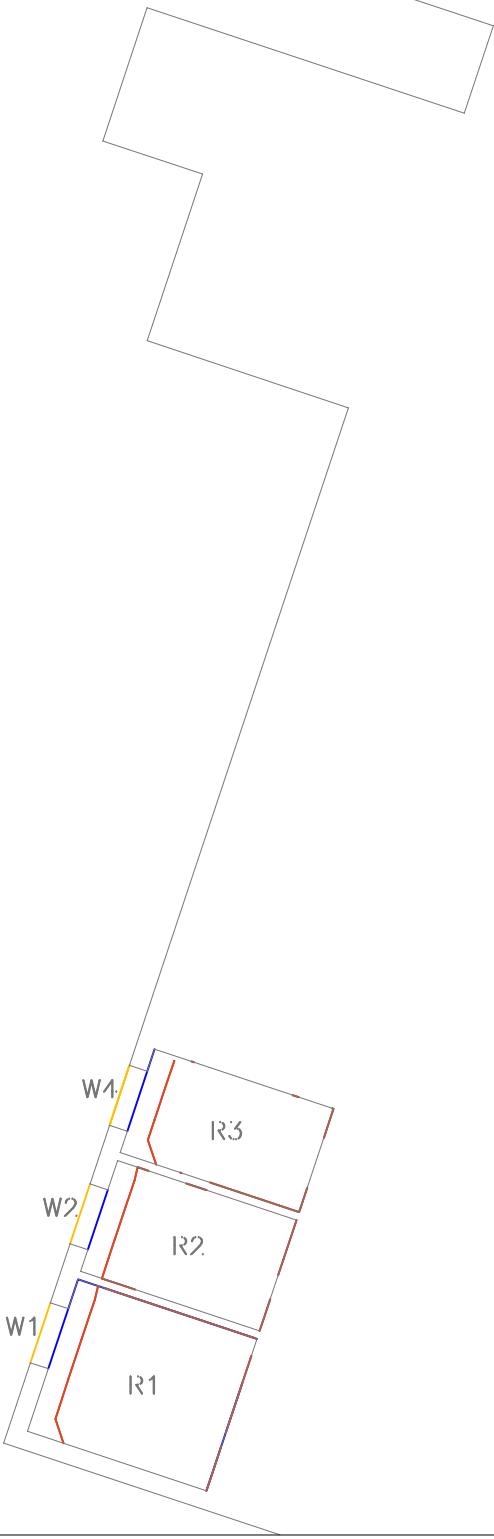
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Rev	Description	Date

CLIENT
Custom House (Gravesend) Limited

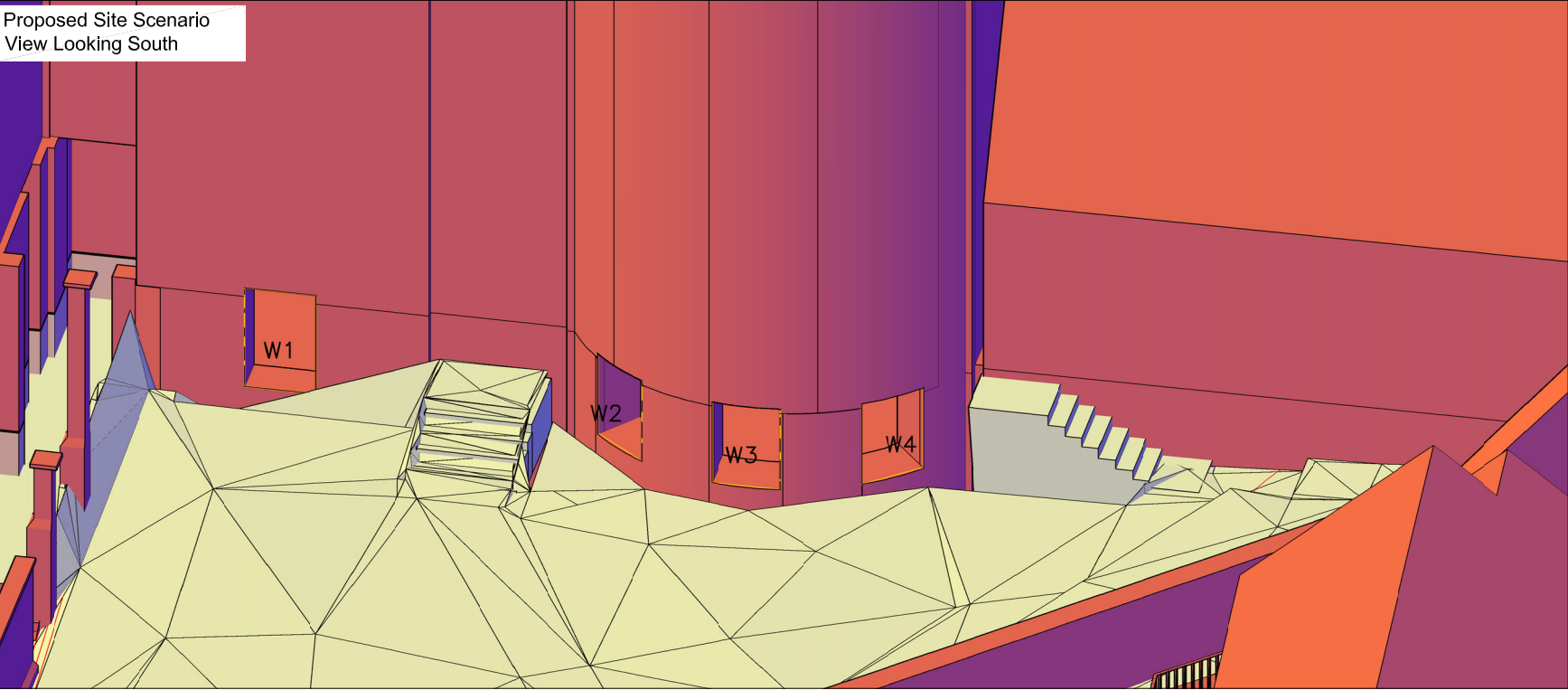
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The Terrace, Gravesend

SCALE	PROJ REF	ANALYST	DRAWN BY
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DWG REF. NSL contours	DWG No. 2813_06
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Proposed Site Scenario
View Looking South



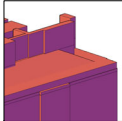
Unit 6 - Barham Business Park
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Canterbury
Kent CT4 6DQ

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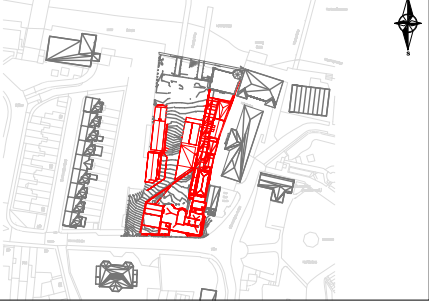


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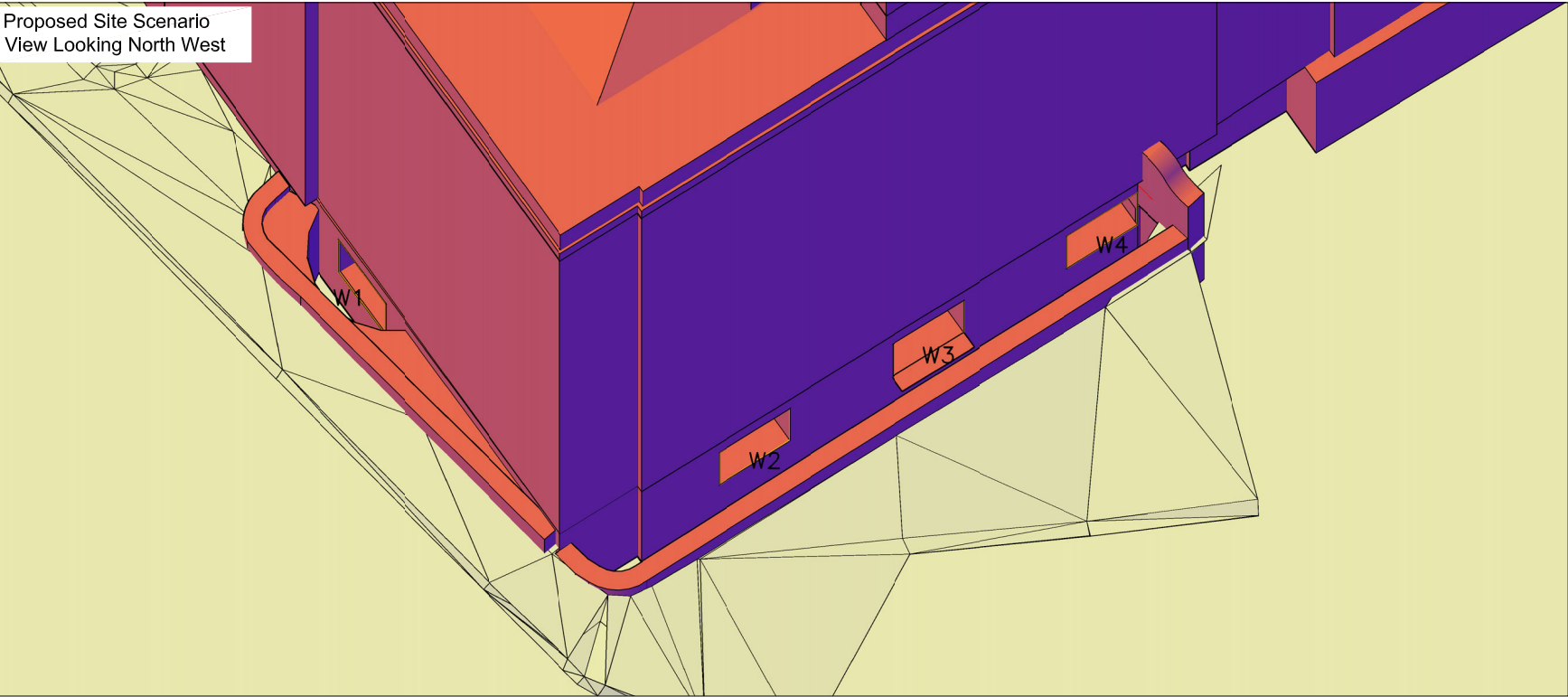


Proposed Buildings

Location Plan



Proposed Site Scenario
View Looking North West



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Rev	Description	Date

CLIENT
Custom House (Gravesend) Limited

PROJECT
The Terrace, Gravesend

SCALE Not to scale	PROJ REF 2813	ANALYST KC	DRAWN BY JP
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DWG REF. Location of Window Receptors	DWG No. 2813_07
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Proposed - Basement Floor Layout

Legend

Unit 6

Basement

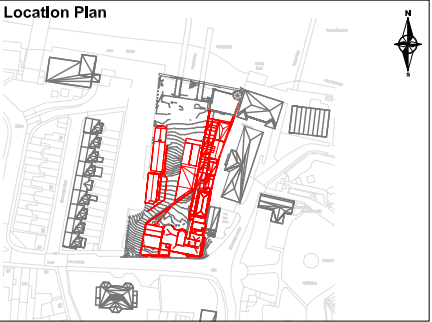
R1

W1

Li area

NSL contour

(post development)



00	First issue	13/05/2020
Rev	Description	Date
CLIENT		
Custom House (Gravesend) Limited		
PROJECT		
The Terrace, Gravesend		
SCALE	PROJ REF	ANALYST
Not to scale	2813	KC
DRAWN BY	JP	
DWG REF.	NSL contours	
DWG No.	2813_08	

Appendix A.3 – Tabulated Results for Daylight and Sunlight Calculations (Impact on Neighbours)

Project Name: Custom House, The Terrace
Project No.: 2813
Report Title: Daylight & Sunlight Assessment
Date of Analysis: 10/05/2021
VSC & APSH Analysis

Floor Ref.	Room Ref.	Property Type	Room Use.	Window Ref.		VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria	Total Suns per Room Annual	Meets BRE Criteria	Total Suns per Room Winter	Meets BRE Criteria	
Heritage Quay																				
First	R1	Residential	Assumed Habitable Likely Living Room	W1	Existing Proposed	24.39 23.13	0.95	YES	288°N	*North*		*North*					*North*	*North*	*North*	*North*
	R2	Residential	Assumed Habitable Likely Kitchen	W2	Existing Proposed	25.82 24.20	0.94	YES	288°N	*North*		*North*					*North*	*North*	*North*	*North*
	R3	Residential	Assumed Habitable Likely Bathroom	W3	Existing Proposed	26.01 23.94	0.92	YES	288°N	*North*		*North*					*North*	*North*	*North*	*North*
	R5	Residential	Assumed Habitable	W6	Existing Proposed	18.23 16.65	0.91	YES	198°	38.00 33.00	0.87	YES	10.00 9.00	0.90	YES		*North*	*North*	*North*	*North*
	R6	Residential	Assumed Habitable	W7	Existing Proposed	16.85 15.86	0.94	YES	198°	31.00 29.00	0.94	YES	5.00 5.00	1.00	YES		38.00 33.00	YES	10.00 9.00	YES
	R7	Residential	Assumed Habitable	W8	Existing Proposed	24.75 21.40	0.86	YES	288°N	*North*		*North*					31.00 29.00	YES	5.00 5.00	YES
	R8	Residential	Assumed Habitable	W9	Existing Proposed	28.16 24.82	0.88	YES	288°N	*North*		*North*					*North*	*North*	*North*	*North*
	R9	Residential	Assumed Habitable	W10	Existing Proposed	27.56 24.49	0.89	YES	288°N	*North*		*North*					*North*	*North*	*North*	*North*
																	North	*North*	*North*	*North*
Second	R1	Residential	Assumed Habitable Likely Living Room	W1	Existing Proposed	32.72 30.77	0.94	YES	288°N	*North*		*North*					*North*	*North*	*North*	*North*
	R2	Residential	Assumed Habitable Likely Kitchen	W2	Existing Proposed	33.88 31.60	0.93	YES	288°N	*North*		*North*					*North*	*North*	*North*	*North*
	R3	Residential	Assumed Habitable Likely Bathroom	W4	Existing Proposed	33.54 31.00	0.92	YES	288°N	*North*		*North*					*North*	*North*	*North*	*North*
	R5	Residential	Assumed Habitable	W6	Existing Proposed	21.78 20.24	0.93	YES	198°	46.00 42.00	0.91	YES	14.00 12.00	0.86	YES		*North*	*North*	*North*	*North*
	R6	Residential	Assumed Habitable	W7	Existing Proposed	20.65 19.71	0.95	YES	198°	42.00 40.00	0.95	YES	9.00 8.00	0.89	YES		46.00 42.00	YES	14.00 12.00	YES

Project Name: Custom House, The Terrace
Project No.: 2813
Report Title: Daylight & Sunlight Assessment
Date of Analysis: 10/05/2021
VSC & APSH Analysis

Floor Ref.	Room Ref.	Property Type	Room Use.	Window Ref.	VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria	Total Suns per Room Annual	Meets BRE Criteria	Total Suns per Room Winter	Meets BRE Criteria
	R7	Residential	Assumed Habitable	W8	Existing Proposed	28.59 26.84	0.94	YES	288°N		*North*		*North*		42.00 40.00	YES	9.00 8.00	YES
	R8	Residential	Assumed Habitable	W9	Existing Proposed	33.45 31.44	0.94	YES	288°N		*North*		*North*		*North*	*North*	*North*	*North*
	R9	Residential	Assumed Habitable	W10	Existing Proposed	33.59 31.32	0.93	YES	288°N		*North*		*North*		*North*	*North*	*North*	*North*
Third	R1	Residential	Assumed Habitable Likely Living Room	W1	Existing Proposed	27.92 27.90	1.00	YES	288°N		*North*		*North*		*North*	*North*	*North*	*North*
	R2	Residential	Assumed Habitable Likely Kitchen	W2	Existing Proposed	28.27 28.24	1.00	YES	288°N		*North*		*North*		*North*	*North*	*North*	*North*
	R3	Residential	Assumed Habitable Likely Bathroom	W4	Existing Proposed	28.49 28.47	1.00	YES	288°N		*North*		*North*		*North*	*North*	*North*	*North*

Project Name: Custom House, The Terrace
Project No.: 2813
Report Title: Daylight Assessment
Date of Analysis: 10/05/2021
No Sky Line (Daylight Distribution) Analysis

Floor Ref.	Room Ref.	Room Use.		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
Heritage Quay								
First	R1	Assumed Habitable Likely Living Room	Area m2 % of room	6.29	6.01 95%	6.01 95%	100.00%	YES
	R2	Assumed Habitable Likely Kitchen	Area m2 % of room	4.59	4.40 96%	4.40 96%	100.00%	YES
	R3	Assumed Habitable Likely Bathroom	Area m2 % of room	4.28	4.10 96%	4.10 96%	100.00%	YES
	R5	Assumed Habitable	Area m2 % of room	5.49	4.47 81%	3.69 67%	83.00%	YES
	R6	Assumed Habitable	Area m2 % of room	8.12	6.57 81%	6.55 81%	100.00%	YES
	R7	Assumed Habitable	Area m2 % of room	5.52	5.24 95%	5.24 95%	100.00%	YES
	R8	Assumed Habitable	Area m2 % of room	4.65	4.46 96%	4.46 96%	100.00%	YES
	R9	Assumed Habitable	Area m2 % of room	4.45	4.26 96%	4.26 96%	100.00%	YES
Second	R1	Assumed Habitable Likely Living Room	Area m2 % of room	6.29	6.01 96%	6.01 96%	100.00%	YES
	R2	Assumed Habitable Likely Kitchen	Area m2 % of room	4.59	4.42 96%	4.42 96%	100.00%	YES
	R3	Assumed Habitable Likely Bathroom	Area m2 % of room	4.28	4.10 96%	4.10 96%	100.00%	YES
	R5	Assumed Habitable	Area m2 % of room	5.49	4.53 82%	4.52 82%	100.00%	YES
	R6	Assumed Habitable	Area m2 % of room	8.12	6.97 86%	6.97 86%	100.00%	YES
	R7	Assumed Habitable	Area m2 % of room	5.52	5.28 96%	5.28 96%	100.00%	YES
	R8	Assumed Habitable	Area m2 % of room	4.65	4.47 96%	4.47 96%	100.00%	YES
	R9	Assumed Habitable	Area m2 % of room	4.45	4.27 96%	4.27 96%	100.00%	YES
Third	R1	Assumed Habitable Likely Living Room	Area m2 % of room	6.29	5.51 88%	5.51 88%	100.00%	YES
	R2	Assumed Habitable Likely Kitchen	Area m2 % of room	4.59	4.05 88%	4.05 88%	100.00%	YES
	R3	Assumed Habitable Likely Bathroom	Area m2 % of room	4.28	3.73 87%	3.73 87%	100.00%	YES

Appendix A.4 – Tabulated Results for Daylight and Sunlight Calculations (Provision to New Development)

Project Name: Custom House, The Terrace
Project No.: 2813
Report Title: Daylight Assessment Proposed Scheme Analysis
Date: 07/05/2021
Average Daylight Factor Analysis

Floor Ref.	Room Ref.	Room Use.	Window Ref.	Glass Transmittance	Maintenance Factor	Glazed Area	Clear Sky Angle Proposed	Room Surface Area	Average Surface Reflectance	Below Working Plane Factor	ADF Proposed	Req'd Value	Meets BRE Criteria
Unit 1													
Basement	R1	Bedroom	W1	0.78	0.92	1.74	60.38	93.17	0.65	1.00	1.41	1.0	YES
											1.4		
Basement	R2	LKD	W2	0.78	0.92	1.37	55.60	132.15	0.65	1.00	0.72	2.0	YES
			W3	0.78	0.92	1.36	68.07	132.15	0.65	1.00	0.88		
			W4	0.78	0.92	1.37	66.69	132.15	0.65	1.00	0.87		
											2.5		
Unit 2													
Basement	R1	LD	W1	0.78	0.92	1.55	36.65	121.26	0.65	1.00	0.59	1.5	YES
			W2	0.78	0.92	1.60	60.35	121.26	0.65	1.00	1.00		
											1.6		
Basement	R2	Bedroom	W3	0.78	0.92	1.59	59.13	58.08	0.65	1.00	2.02	1.0	YES
											2.0		
Basement	R3	Bedroom	W4	0.78	0.92	1.59	52.71	81.07	0.65	1.00	1.29	1.0	YES
											1.3		

Project Name: Custom House, The Terrace
 Project No.: 2813
 Report Title: Daylight Assessment Proposed Scheme Analysis
 Date: 07/05/2021
 No Sky Line (Daylight Distribution) Analysis

Floor Ref.	Room Ref.	Room Use.		Room Area	Lit Area Proposed	Meets BRE Criteria
Unit 1						
Basement	R1	Bedroom	Area m2	19.89	17.72	YES
			% of room		89%	
	R2	LKD	Area m2	34.97	34.38	YES
			% of room		98%	
Unit 2						
Basement	R1	LD	Area m2	26.50	24.20	YES
			% of room		91%	
	R2	Bedroom	Area m2	9.60	8.96	YES
			% of room		93%	
	R3	Bedroom	Area m2	14.82	13.95	YES
			% of room		94%	

APSH Analysis

Floor Ref.	Room Ref.	Room Use.	Window Ref.	Window Orientation	Annual	Winter	Total Suns per Room Annual	Meets BRE Criteria	Total Suns per Room Winter	Meets BRE Criteria
Unit 1										
Basement	R1	Bedroom	W1	11°N	1.00	0.00	1.00	NO	0.00	NO
	R2	LKD	W2	51°N	0.00	0.00				
			W3	11°N	2.00	0.00				
			W4	332°N	6.00	0.00				
								6.00	NO	0.00
Unit 2										
Basement	R1	LD	W1	190°	19.00	0.00	42.00	YES	6.00	YES
			W2	100°	37.00	6.00				
	R2	Bedroom	W3	101°	37.00	6.00	37.00	YES	6.00	YES
								36.00	YES	7.00