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INTERNAL DAYLIGHT & SUNLIGHT REPORT

Woking Football Club
Woking, GU22 9AA

9th October 2019

A photograph of a modern building's facade, showing a curved structure with a grid of grey panels and horizontal wooden slats. The building is set against a blue sky with white clouds. The image is partially obscured by a large, dark grey geometric shape on the right side of the page.

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1. Introduction

- 1.1. This practice has been instructed to provide an assessment of the internal daylight & sunlight amenity and overshadowing within the proposed scheme at Woking Football Club, Woking.
- 1.2. The methodology and criteria used for these assessments is provided by the Building Research Establishments guidance 'Site layout planning for daylight and sunlight: a guide to good practice' (BRE, 2011).

2. Guidance

Daylight & sunlight for planning

Site layout planning for daylight and sunlight: a guide to good practice, BRE 2011

- 2.1. This document follows from previous guidance produced by Her Majesty's Stationary Office (HMSO) on daylight and sunlight in the built environment and is now the accepted methodology used by local authorities for assessing daylight and sunlight in relation to new developments. It provides methods for the calculation of daylight and sunlight impacts of development upon existing surrounding properties and within proposed new dwellings.

Daylight Assessment

- 2.2. There are three detailed methods for calculating daylight, the Vertical Sky Component (VSC), the No-Sky Line Contour (NSC) and the Average Daylight Factor (ADF). For sunlight the Annual Probable Sunlight Hours (APSH) method is detailed.
- 2.3. The 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. We have only considered the ADF method within our assessment as this is the most detailed of the daylight calculations. It considers the physical nature of the room behind the window, including; window transmittance, and surface reflectivity whereas the basic VSC assessment considers potential daylight at the window face only and does not consider room size. The BRE guidelines / British Standard sets the following recommended ADF levels for habitable room uses:
 - 1% Bedrooms
 - 1.5% Living Rooms
 - 2.0% Kitchens

- 2.4. In some cases where deep open plan living/kitchen/dining rooms are provided, kitchens areas located at the rear of the rooms would not have an expectation for natural light. As such these rooms have been assigned a target of 1.5% to ensure that the living space is sufficiently lit. It may be that the generous size of these multi use rooms would drive lower ADF levels. In such cases the kitchens at the rear of the rooms have been notionally internalised and the remaining living area assessed with a target ADF for its use (1.5%).

Sunlight Assessment

- 2.5. For sunlight the APSH test calculates the percentage of statistically probable hours of sunlight received by each window in both the summer and winter months. March 21st through to September 21st is considered to be the summer period while September 21st to March 21st is considered the winter period.
- 2.6. The guidelines suggest that windows should receive at least 25% total APSH with 5% of this total being enjoyed in the winter months.
- 2.7. It is acknowledged that the for multi block residential schemes these targets can be difficult to achieve, especially where a balcony overhangs the window.

Overshadowing

- 2.8. In respect of the shading impacts to amenity space, such as neighbouring gardens, the BRE guidelines set out a sunlight amenity assessment to ensure the space remains adequately sunlit throughout the year. This is achieved by plotting a contour of the area which receives at least 2 hours of direct sunlight on the 21st March. An amenity space with at least 2 hours of sunlight across the majority of its area can be said to see acceptable levels of direct sun.

Policy Context

- 2.9. It is important to note that within urban centres achieving good levels of daylight and sunlight in accordance with the BRE guidelines, can be weighed in the balance against other beneficial design factors.

- 2.10. The opening paragraphs of the BRE guidelines state: -

“The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and the 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 because natural lighting is only one of many factors in site layout design. In special circumstances the developer or planning authority may wish to use different target values. For example, in a historic city centre a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings”.

- 2.11. The targets set out in the BRE document are very much ‘guidelines’ and they

should be applied sensibly and flexibly based on the site-specific context of development.

3. Assumptions

- 3.1. A measured survey, architects drawings, site photographs and Ordnance Survey information have been used to create a 3D computer model of the proposed development in the context of the existing site and surrounding buildings.
- 3.2. Details of the internal layouts have been drawn from available planning records or lease plans. Where such information is unavailable floor levels have been assumed from the external appearance of the building, and the locations of windows. Unless known or otherwise appropriate the depths of rooms have been assumed at 4.27m for residential properties and 6m for commercial properties, or half the building depth if this is less than these dimensions.
- 3.3. With regard to the ADF daylight assessments, the following reflectance and window transmittance values have been used in the assessments:

| | |
|-------------------------------------|-------------------------------------|
| Internal reflectance of rooms | Walls = 0.81 (light coloured paint) |
| | Ceiling = 0.85 (White paint) |
| | Floor = 0.4 (light coloured carpet) |
| Window transmittance | = 0.68 (Double Glazed) |
| Window frame and maintenance factor | = 0.8 |
- 3.4. The architect's drawings have been used to build a model of the proposal drawings of which can also be found in appendix 1.
- 3.5. The BRE guidelines provides that non-daylit internal kitchens should be avoided where possible, however where this is inevitable, they should be directly linked to a well daylight living room. The proposal includes a number of living/kitchen/dining rooms (L/K/D's) and studio spaces with the kitchen situated towards the rear of the room. The daylight potential to kitchen spaces would be lower and artificially lit with task lighting. As such, these kitchen spaces have been excluded from the assessment where possible, and the living room target of 1.5% has been applied to the living / dining part of the room. In some cases, where this is not possible, the kitchens have been included as part of the room and the target of 2.0% has been applied.

4. Sources of Information

Woods Hardwick

0189-7-859-869.dwg

0189-7-851A-853A.dwg

Received 05/04/2019

Leach Rhodes Walker Architects

7884 - Proposed Context - No Views.skp

Received 05/09/2019

LRW_7884_L(00)251K Proposed Roof Plan.dwg

LRW_7884_L(00)282C Basement Floor Plan.dwg

LRW_7884_L(00)66P Proposed Lower Ground Floor Plan.dwg

LRW_7884_L(00)67U Proposed Ground Floor Plan.dwg

LRW_7884_L(00)68Q Proposed First Floor Plan.dwg

LRW_7884_L(00)69S Proposed Second Floor Plan.dwg

LRW_7884_L(00)70R Proposed Third Floor Plan.dwg

LRW_7884_L(00)71Q Proposed Fourth Floor Plan.dwg

LRW_7884_L(00)72S Proposed Fifth Floor Plan.dwg

LRW_7884_L(00)73T Proposed Sixth Floor Plan.dwg

LRW_7884_L(00)74U Proposed Seventh Floor Plan.dwg

LRW_7884_L(00)75U Proposed Eighth Floor Plan.dwg

LRW_7884_L(00)76U Proposed Ninth Floor Plan.dwg

LRW_7884_L(00)77T Proposed Tenth-Roof Plan.dwg

Received 13/09/2019

EB7 Ltd

Site Photographs

Ordnance Survey

5. The Site and Proposal

- 5.1. The proposal is for the comprehensive redevelopment of the current Woking Football Club site. The site is currently occupied by a football stadium (Woking Football Club); a collection of large-footprint, low-rise buildings, including the Woking Snooker Centre; David Lloyd Leisure Centre (including tennis courts), Woking Gymnastics Club; car parking; and a small number of residential properties situated in the north of the site.
- 5.2. The proposal includes the redevelopment of the site, following the demolition of all existing buildings and structures, to provide a replacement stadium with

ancillary facilities, including flexible retail, hospitality and community spaces, independent retail floorspace (Classes A1/A2/A3), a medical centre (Class D1) and vehicle parking, plus residential accommodation comprising of 1,048 dwellings (Class C3) within 5 buildings of varying heights of between 3 and 10 storeys (and undercroft and part basement levels) on the south and west sides of the site, together with provision of new accesses from Westfield Avenue to car parking, associated landscaping and the provision of a detached residential concierge building. the demolition of the existing buildings, in order to construct a residential led, mixed use development including a new sports stadium.

- 5.3. Daylight design has been utilised throughout the design process in an effort to maximise light levels where possible. These daylight strategy techniques have been used throughout the scheme to improve the overall amenity levels for the occupants as is described in the results section.

6. Internal Daylight and Sunlight Results

- 6.1. Full results of the daylight and sunlight assessment, as well drawings showing the layouts of the proposed accommodation are attached within appendix 1. Given the nature of the scheme, the two lowest floors have been assessed as it can be deduced that the light levels will improve further up the buildings. As such, the compliance levels noted below are the 'worst case' as the rooms on the upper floors have not been included in the compliance calculations. If the upper floors were to be included, the compliance rate would likely improve based on the premise of being able to achieve higher levels of daylight and sunlight on the upper floors.
- 6.2. In relation to internal daylight and sunlight, the relevant assessments are internal Average Daylight Factor (ADF) and Annual Probable Sunlight Hours (APSH) respectively.
- 6.3. **Tables 1 and 2**, below, summarise the daylight and sunlight results within the proposed residential units (detailed results are presented in Appendix 2). Drawings showing the internal layouts of the proposed dwelling along with room and window labels are shown in Appendix 1.
- 6.4. **Table 1: Completed Development – Daylight within the Proposed Development (ADF)**

| Building Reference | Total number of rooms relevant for daylight assessment | Total number of rooms which meet the ADF criteria | Percentage compliance |
|--------------------|--|---|-----------------------|
| Block 1 | 118 | 109 | 92% |

| | | | |
|--------------|------------|------------|------------|
| Block 2 | 154 | 143 | 93% |
| Block 3 | 96 | 93 | 97% |
| Block 4 | 120 | 112 | 93% |
| Block 5 | 162 | 149 | 92% |
| Total | 650 | 606 | 93% |

- 6.5. The results indicate that, 605 (93%) of the 650 habitable residential rooms assessed in the proposed development show compliance by reference to the ADF methodology suggested within the BRE guidance. It should be noted that the overall compliance rate is likely to improve, when the considering the likely compliant rooms on the upper most floors which were not included within this assessment.
- 6.6. As would be expected for a development of this scale there are a small proportion of rooms which fall below the targets set within the BRE guide.
- 6.7. Of the 44 rooms that do not achieve the suggest targets, there are 20 bedrooms, 21 living rooms and 3 living / kitchen / dining (LKDs) rooms. Of these 44 rooms, 32 show ADF levels within 30% ADF of the suggested targets. Whilst these rooms deviate from the suggested targets the level of deviation is marginal, with levels falling just below the suggested targets.
- 6.8. The remaining 12 rooms show further deviations and can be identified as 4 living rooms and 8 bedrooms. These rooms are constrained in outlook due to the lower level location, coupled with the nature of the site design.
- 6.9. Given the marginal nature of the deviations, coupled with the high overall levels of compliance (93%) which would only improve on when including the upper floors, the results are in line with the overall intentions of the BRE guidelines.
- 6.10. **Table 2: Completed Development – Sunlight within the Proposed Development (APSH) – Living rooms and LKDs only**

| Building Reference | Total number of rooms assessed | Total number of rooms which meet the APSH criteria | Percentage compliance |
|---------------------------|---------------------------------------|---|------------------------------|
| Total | 133 | 71 | 53% |

- 6.11. Of the 133 south facing living or living / kitchen / dining rooms on the lower residential floors of the proposed development, 71 (53%) show compliance by reference to the APSH methodology suggested within the BRE guidance. This

level of compliance would be expected on the lower levels for a scheme such as this, where many living rooms are overhung by balconies. If the upper floors of the proposed development were included within this assessment the proportional compliance rate for each building would be higher than that stated above.

Overshadowing

- 6.12. The proposal includes external amenity spaces which have been assessed in line with the BRE criteria. The detailed results of this assessment can be found at appendix 2 of this report.
- 6.13. The proposal has been designed to allow suitable light penetration to amenity areas where possible. Overall 72% of the amenity area provided sees 2 hours of sunlight on the 21st of March, well in excess of the 50% recommended in the BRE guidelines.
- 6.14. The assessment has shown that 12 of the 15 amenity areas would experience direct sunlight across more than 50% of their area for 2 hours or more on the 21st of March. As such, 3 areas would not achieve the target and these areas are identified as amenity areas T1, T2 and G1. This is not uncommon in a large residential scheme such as this. In addition to undertaking an assessment to show the areas that achieve 2 hours of sunlight, a graded assessment showing the areas that achieve between 0 – 2 hours of sunlight. The results show that whilst these areas may not achieve 2 hours of direct sunlight, approximately half of amenity areas G1 and T2 would receive a level of approximately 1 hour of direct sunlight on the 21st March.
- 6.15. The remaining amenity area, T1, located within the courtyard of Block 1, would show levels which deviate from the suggested targets. Whilst this area would see low levels of direct sunlight, the tenants would have access to the proposed rooftop amenity area R1, where 92% of the space would receive direct sunlight for 2 hours on March 21st.
- 6.16. Amenity area T2 would also benefit from the associated rooftop amenity area R2, which would provide the potential tenants with a well sunlit amenity area on March 21st.
- 6.17. Overall, the amenity space provided within the site sees sunlight amenity well in excess of that suggested in the BRE guidelines. As would be expected, there are isolated areas where sunlight amenity is lower, however, these spaces are generally linked to well-lit spaces. Therefore, the results are considered to be in line with the overall intentions of the BRE criteria.

7. Conclusions

- 7.1. The quality of daylight amenity within the proposed residential accommodation has been assessed using the ADF assessment as recommended within the BRE document 'Site layout planning'.
- 7.2. Considered daylight design has been utilised to maximise daylight levels where possible and minimise any adverse levels accordingly.
- 7.3. The results of this assessment have shown that provision of daylight within the proposal is very high with c.93% of all rooms within the buildings meeting or exceeding the BRE targets well in excess of the levels. There are incidences where the levels are below the suggested targets, however these are primarily due to overhanging balconies and wider site constraints. The considered design has focused on maximising daylight levels to living rooms.
- 7.4. As would be expected for a scheme of this size, the results of the sunlight assessment (APSH) have shown that in some instances direct sunlight to the window face will be limited. This rate of compliance is typical on lower levels of a scheme of this type where living room windows are overhung by balconies.
- 7.5. The results of the overshadowing assessment indicates 72% of the total amenity space assessed achieve direct sunlight levels in line with the BRE criteria. Whilst there are areas below the suggested targets, these areas will receive some direct sunlight for part of the day and are generally linked to well-lit spaces.
- 7.6. The BRE guide gives the following statement in its introduction, which is repeated at various points through the document: -

"The advice given here is not mandatory and the 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 because natural lighting is only one of many factors in site layout design..."
- 7.7. Eb7 have undertaken technical analysis of the daylight / sunlight levels within the proposed residential units including those where layouts have been revised as part of this substitution. In light of the above, we feel that the provision of daylight within the proposed residential units, with the intentions of the BRE guidance and therefore local planning policy.



Appendix 1

Detailed drawings and results of the Internal Daylight (ADF) and Sunlight (APSH)
assessments

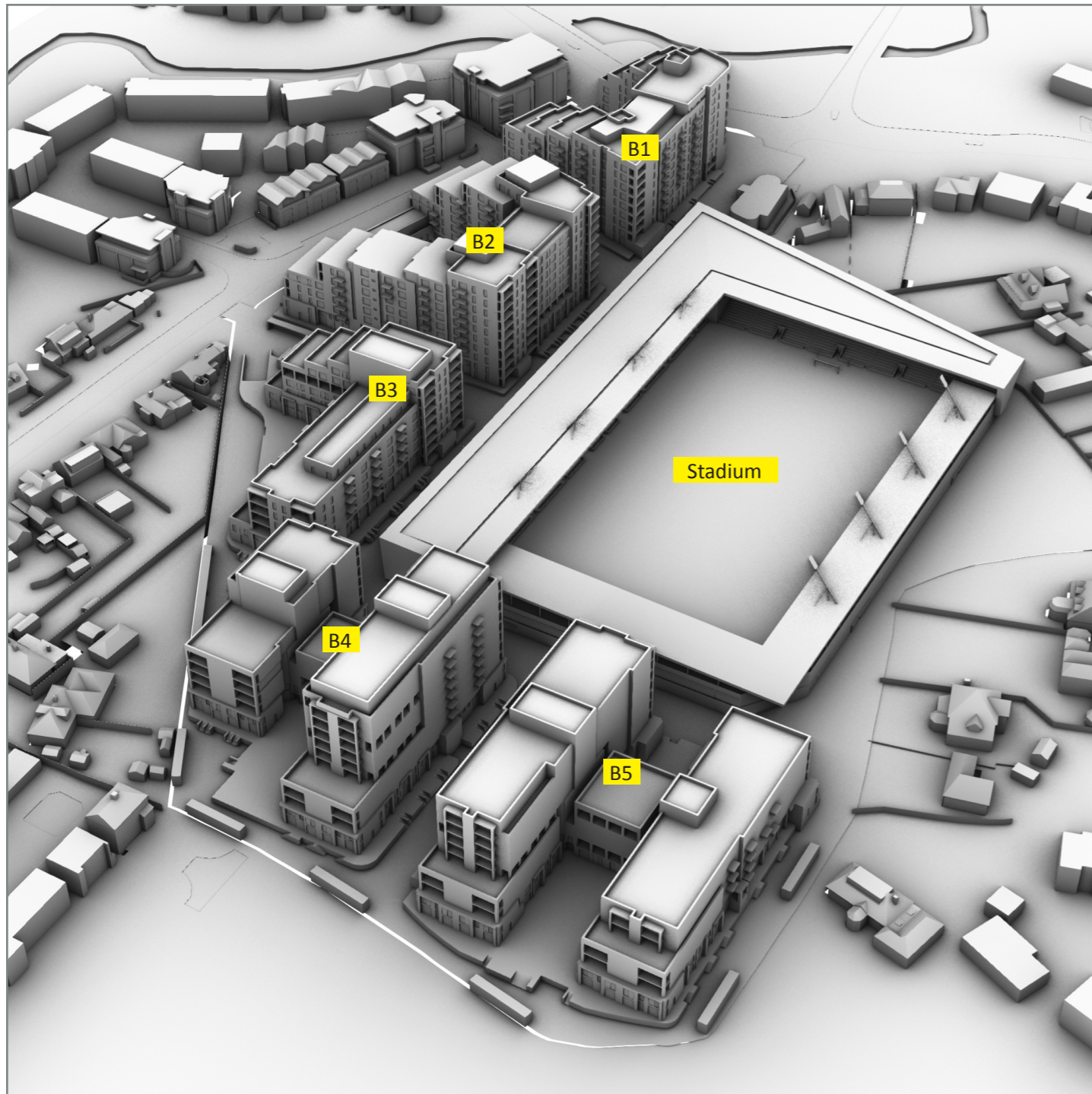


Fig. 1: Bird's Eye View

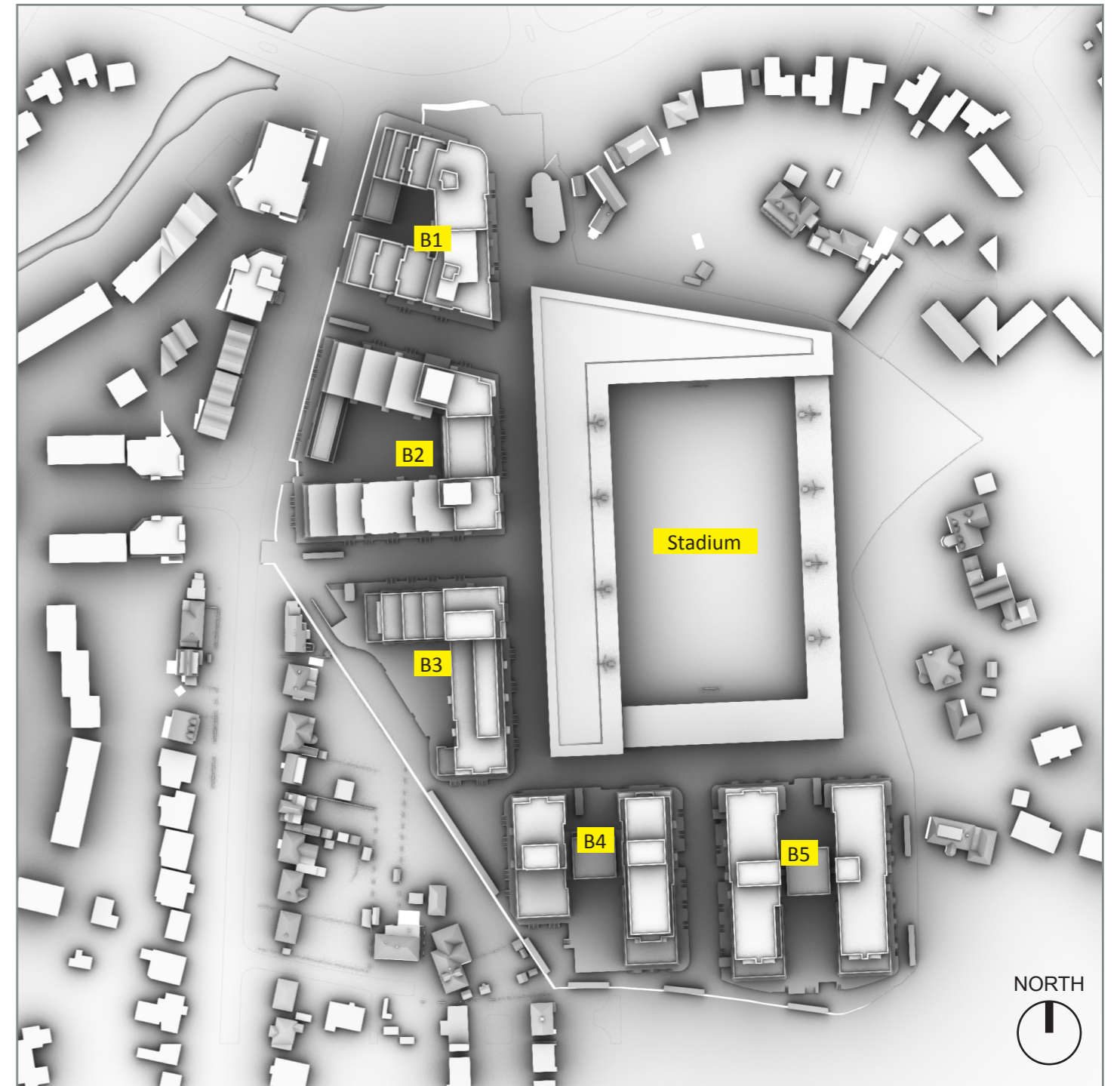


Fig. 2: Top View



Fig. 3: Floor Plan

| Room ID | Room use | Light Quan Sunlight Probability | | | Room ID | Room use | Light Quan Sunlight Probability | | |
|---------------------|-------------|---------------------------------|------------|-------------|---------|-------------|---------------------------------|------------|-------------|
| | | ADF | APSH Total | APSH Winter | | | ADF | APSH Total | APSH Winter |
| A - Floor GF | | | | | | | | | |
| B1-001 | Living room | 3.7 | | | B1-038 | Bedroom | 2.8 | | |
| B1-002 | Bedroom | 2.6 | | | B1-039 | LKD | 4.1 | | |
| B1-003 | Bedroom | 2.6 | | | B1-040 | Bedroom | 1.6 | | |
| B1-004 | Living room | 3.9 | | | B1-041 | Bedroom | 1.3 | | |
| B1-005 | Living room | 3.3 | | | B1-042 | Living room | 1.9 | | |
| B1-006 | Bedroom | 3.0 | | | B1-043 | Bedroom | 1.1 | | |
| B1-007 | Bedroom | 3.0 | | | B1-044 | Bedroom | 1.2 | | |
| B1-008 | Living room | 7.3 | | | B1-045 | Living room | 1.5 | | |
| B1-009 | Bedroom | 4.4 | | | B1-046 | Bedroom | 1.1 | | |
| B1-010 | Bedroom | 3.6 | | | B1-047 | Living room | 1.5 | 1 | 0 |
| B1-011 | Living room | 5.4 | | | B1-048 | Bedroom | 1.6 | | |
| B1-012 | Bedroom | 3.9 | | | B1-049 | Living room | 2.1 | 2 | 0 |
| B1-013 | Bedroom | 2.2 | | | B1-050 | Bedroom | 1.6 | | |
| B1-014 | Living room | 5.4 | | | B1-051 | Bedroom | 1.6 | | |
| B1-015 | Bedroom | 3.1 | | | B1-052 | Living room | 2.8 | 15 | 0 |
| B1-016 | Bedroom | 1.9 | | | B1-053 | Bedroom | 1.3 | | |
| B1-017 | Living room | 3.4 | | | B1-054 | Living room | 1.9 | 13 | 0 |
| B1-018 | Bedroom | 2.2 | | | B1-055 | Bedroom | 1.0 | | |
| B1-019 | Bedroom | 3.5 | | | | | | | |
| B1-020 | Living room | 4.7 | | | | | | | |
| B1-021 | Bedroom | 3.2 | | | | | | | |
| B1-022 | Bedroom | 3.2 | | | | | | | |
| B1-023 | Living room | 4.9 | | | | | | | |
| B1-024 | Bedroom | 3.3 | | | | | | | |
| B1-025 | Bedroom | 2.9 | | | | | | | |
| B1-026 | Living room | 2.2 | | | | | | | |
| B1-027 | Bedroom | 2.3 | | | | | | | |
| B1-028 | Living room | 2.0 | 36 | 5 | | | | | |
| B1-029 | Bedroom | 2.1 | | | | | | | |
| B1-030 | Living room | 1.9 | 18 | 2 | | | | | |
| B1-031 | Bedroom | 1.6 | | | | | | | |
| B1-032 | Living room | 2.2 | 39 | 4 | | | | | |
| B1-033 | Bedroom | 1.7 | | | | | | | |
| B1-034 | Bedroom | 1.5 | | | | | | | |
| B1-035 | Living room | 3.4 | 40 | 2 | | | | | |
| B1-036 | Living room | 3.5 | 42 | 2 | | | | | |
| B1-037 | Bedroom | 1.5 | | | | | | | |

Table 1: Results



Fig. 4: Floor Plan

| Room ID | Room use | Light Quan Sunlight Probability | | | Room ID | Room use | Light Quan Sunlight Probability | | |
|---------------------|-------------|---------------------------------|------------|-------------|---------|-------------|---------------------------------|------------|-------------|
| | | ADF | APSH Total | APSH Winter | | | ADF | APSH Total | APSH Winter |
| A - Floor 1F | | | | | | | | | |
| B1-056 | Living room | 3.0 | | | B1-093 | Bedroom | 1.3 | | |
| B1-057 | Bedroom | 2.1 | | | B1-094 | Living room | 1.6 | 29 | 7 |
| B1-058 | Bedroom | 2.1 | | | B1-095 | Bedroom | 1.8 | | |
| B1-059 | Living room | 3.2 | | | B1-096 | Bedroom | 2.3 | | |
| B1-060 | Living room | 2.7 | | | B1-097 | LKD | 4.5 | 62 | 12 |
| B1-061 | Bedroom | 2.4 | | | B1-098 | Bedroom | 2.3 | | |
| B1-062 | Bedroom | 2.4 | | | B1-099 | Bedroom | 2.3 | | |
| B1-063 | Living room | 5.6 | | | B1-100 | LKD | 3.8 | | |
| B1-064 | Bedroom | 3.3 | | | B1-101 | Bedroom | 1.5 | | |
| B1-065 | Bedroom | 2.7 | | | B1-102 | Bedroom | 1.2 | | |
| B1-066 | Living room | 3.0 | | | B1-103 | Living room | 1.7 | | |
| B1-067 | Bedroom | 2.9 | | | B1-104 | Bedroom | 0.9 | | |
| B1-068 | Bedroom | 1.7 | | | B1-105 | Bedroom | 1.0 | | |
| B1-069 | Living room | 4.1 | | | B1-106 | Living room | 1.4 | | |
| B1-070 | Bedroom | 2.4 | | | B1-107 | Bedroom | 0.4 | | |
| B1-071 | Bedroom | 1.7 | | | B1-108 | Bedroom | 0.9 | | |
| B1-072 | Living room | 3.0 | | | B1-109 | Living room | 1.3 | 2 | 0 |
| B1-073 | Bedroom | 1.8 | | | B1-110 | Bedroom | 1.3 | | |
| B1-074 | Bedroom | 2.8 | | | B1-111 | Living room | 1.1 | 5 | 0 |
| B1-075 | Living room | 2.7 | | | B1-112 | Bedroom | 1.4 | | |
| B1-076 | Bedroom | 2.5 | | | B1-113 | Bedroom | 1.4 | | |
| B1-077 | Bedroom | 2.5 | | | B1-114 | Living room | 2.5 | 20 | 0 |
| B1-078 | Living room | 3.8 | | | B1-115 | Bedroom | 1.0 | | |
| B1-079 | Bedroom | 2.7 | | | B1-116 | Bedroom | 1.1 | | |
| B1-080 | Bedroom | 2.3 | | | B1-117 | Living room | 1.7 | 19 | 0 |
| B1-081 | Living room | 1.3 | | | B1-118 | Bedroom | 0.9 | | |
| B1-082 | Bedroom | 1.9 | | | | | | | |
| B1-083 | Bedroom | 2.8 | | | | | | | |
| B1-084 | Living room | 2.9 | 43 | 7 | | | | | |
| B1-085 | Bedroom | 1.7 | | | | | | | |
| B1-086 | Living room | 1.5 | 21 | 2 | | | | | |
| B1-087 | Bedroom | 1.3 | | | | | | | |
| B1-088 | Living room | 1.1 | 23 | 4 | | | | | |
| B1-089 | Bedroom | 1.3 | | | | | | | |
| B1-090 | Bedroom | 1.2 | | | | | | | |
| B1-091 | Living room | 2.3 | 47 | 5 | | | | | |
| B1-092 | Bedroom | 3.5 | | | | | | | |

Table 2: Results



Fig. 5: Floor Plan

| Room ID | Room use | Daylight Quantum | | Sunlight Probability | | Room ID | Room use | Daylight Quantum | | Sunlight Probability | |
|---------------------|-------------|------------------|------------|----------------------|--------|-------------|----------|------------------|-------------|----------------------|--|
| | | ADF | APSH Total | APSH Winter | ADF | | | APSH Total | APSH Winter | | |
| B - Floor GF | | | | | | | | | | | |
| B2-001 | LKD | 5.5 | 47 | 11 | B2-049 | Bedroom | 2.7 | | | | |
| B2-002 | Living room | 4.7 | | | B2-050 | Bedroom | 2.1 | | | | |
| B2-003 | Living room | 4.7 | | | B2-051 | Bedroom | 1.2 | | | | |
| B2-004 | Living room | 4.6 | | | B2-052 | Living room | 1.3 | 9 | 0 | | |
| B2-005 | Living room | 4.6 | | | B2-053 | Bedroom | 1.7 | | | | |
| B2-006 | Living room | 6.8 | | | B2-054 | Living room | 2.8 | 30 | 1 | | |
| B2-007 | Living room | 6.7 | | | B2-055 | Living room | 1.9 | 26 | 2 | | |
| B2-008 | Living room | 2.7 | | | B2-056 | Living room | 2.8 | 38 | 3 | | |
| B2-009 | Living room | 2.6 | | | B2-057 | Living room | 2.1 | 27 | 4 | | |
| B2-010 | Living room | 2.4 | | | B2-058 | Living room | 2.5 | 27 | 2 | | |
| B2-011 | Living room | 2.2 | | | | | | | | | |
| B2-012 | Living room | 2.3 | | | | | | | | | |
| B2-013 | Living room | 3.1 | | | | | | | | | |
| B2-014 | LKD | 2.0 | | | | | | | | | |
| B2-015 | Bedroom | 2.8 | | | | | | | | | |
| B2-016 | Bedroom | 2.1 | | | | | | | | | |
| B2-017 | Living room | 4.3 | | | | | | | | | |
| B2-018 | Living room | 4.2 | | | | | | | | | |
| B2-019 | Living room | 4.3 | | | | | | | | | |
| B2-020 | Living room | 4.3 | | | | | | | | | |
| B2-021 | Living room | 4.3 | | | | | | | | | |
| B2-022 | Living room | 3.7 | | | | | | | | | |
| B2-023 | Living room | 1.6 | 37 | 5 | | | | | | | |
| B2-024 | Bedroom | 2.5 | | | | | | | | | |
| B2-025 | Living room | 2.9 | 44 | 6 | | | | | | | |
| B2-026 | Living room | 2.7 | 39 | 3 | | | | | | | |
| B2-027 | Living room | 2.8 | 46 | 7 | | | | | | | |
| B2-028 | Living room | 3.0 | 42 | 5 | | | | | | | |
| B2-029 | Living room | 3.4 | 54 | 11 | | | | | | | |
| B2-030 | Living room | 3.3 | 52 | 12 | | | | | | | |
| B2-031 | Living room | 3.9 | 59 | 19 | | | | | | | |
| B2-032 | Living room | 4.2 | 58 | 20 | | | | | | | |
| B2-033 | LKD | 6.7 | 78 | 24 | | | | | | | |
| B2-034 | Living room | 7.6 | 45 | 14 | | | | | | | |
| B2-035 | Living room | 7.5 | 45 | 13 | | | | | | | |
| B2-036 | Living room | 3.9 | 37 | 11 | | | | | | | |
| B2-037 | Living room | 3.2 | | | | | | | | | |
| B2-038 | Living room | 3.2 | | | | | | | | | |
| B2-039 | Bedroom | 2.8 | | | | | | | | | |
| B2-040 | Living room | 3.2 | | | | | | | | | |
| B2-041 | Living room | 3.0 | | | | | | | | | |
| B2-042 | Bedroom | 1.2 | | | | | | | | | |
| B2-043 | Living room | 1.6 | | | | | | | | | |
| B2-044 | Bedroom | 1.0 | | | | | | | | | |
| B2-045 | Bedroom | 2.3 | | | | | | | | | |
| B2-046 | Bedroom | 2.2 | | | | | | | | | |
| B2-047 | Bedroom | 2.7 | | | | | | | | | |
| B2-048 | Bedroom | 2.3 | | | | | | | | | |

Table 3: Results



Fig. 6: Floor Plan

| Room ID | Room use | Daylight Quantum | | Sunlight Probability | | Room ID | Room use | Daylight Quantum | | Sunlight Probability | |
|---------------------|-------------|------------------|-----|----------------------|-------------|---------|-------------|------------------|-----|----------------------|-------------|
| | | ADF | ADF | APSH Total | APSH Winter | | | ADF | ADF | APSH Total | APSH Winter |
| B - Floor 1F | | | | | | | | | | | |
| B2-059 | Bedroom | 3.7 | | | | B2-107 | Bedroom | 2.2 | | | |
| B2-060 | Bedroom | 3.4 | | | | B2-108 | Bedroom | 1.8 | | | |
| B2-061 | Bedroom | 4.2 | | | | B2-109 | Bedroom | 1.7 | | | |
| B2-062 | Bedroom | 3.4 | | | | B2-110 | Bedroom | 2.1 | | | |
| B2-063 | Bedroom | 4.3 | | | | B2-111 | Bedroom | 2.2 | | | |
| B2-064 | Bedroom | 3.4 | | | | B2-112 | Bedroom | 2.3 | | | |
| B2-065 | Bedroom | 4.3 | | | | B2-113 | Bedroom | 2.7 | | | |
| B2-066 | Bedroom | 3.3 | | | | B2-114 | Bedroom | 4.4 | | | |
| B2-067 | Bedroom | 3.3 | | | | B2-115 | Bedroom | 7.4 | | | |
| B2-068 | Bedroom | 3.6 | | | | B2-116 | Bedroom | 2.8 | | | |
| B2-069 | Bedroom | 3.5 | | | | B2-117 | Bedroom | 3.7 | | | |
| B2-070 | Bedroom | 3.5 | | | | B2-118 | Bedroom | 3.7 | | | |
| B2-071 | Bedroom | 1.3 | | | | B2-119 | Bedroom | 2.4 | | | |
| B2-072 | Bedroom | 1.2 | | | | B2-120 | Bedroom | 3.2 | | | |
| B2-073 | Bedroom | 1.1 | | | | B2-121 | Bedroom | 1.9 | | | |
| B2-074 | Bedroom | 1.2 | | | | B2-122 | Bedroom | 2.1 | | | |
| B2-075 | Bedroom | 1.1 | | | | B2-123 | Bedroom | 2.0 | | | |
| B2-076 | Bedroom | 0.8 | | | | B2-124 | Bedroom | 1.6 | | | |
| B2-077 | Bedroom | 0.8 | | | | B2-125 | Living room | 3.0 | | | |
| B2-078 | Bedroom | 0.9 | | | | B2-126 | Bedroom | 1.8 | | | |
| B2-079 | Bedroom | 1.0 | | | | B2-127 | Bedroom | 1.4 | | | |
| B2-080 | Bedroom | 1.2 | | | | B2-128 | Bedroom | 1.4 | | | |
| B2-081 | Bedroom | 1.4 | | | | B2-129 | Bedroom | 1.6 | | | |
| B2-082 | Bedroom | 1.9 | | | | B2-130 | LKD | 1.9 | | | |
| B2-083 | LKD | 2.1 | | | | B2-131 | Bedroom | 1.3 | | | |
| B2-084 | Bedroom | 2.5 | | | | B2-132 | Living room | 1.2 | | | |
| B2-085 | Bedroom | 2.4 | | | | B2-133 | Living room | 2.5 | 8 | 0 | |
| B2-086 | Bedroom | 4.5 | | | | B2-134 | Living room | 2.7 | 11 | 0 | |
| B2-087 | Bedroom | 2.4 | | | | B2-135 | Living room | 2.9 | 15 | 0 | |
| B2-088 | Bedroom | 4.5 | | | | B2-136 | Living room | 2.9 | 21 | 0 | |
| B2-089 | Bedroom | 2.4 | | | | B2-137 | Living room | 2.9 | 27 | 2 | |
| B2-090 | Bedroom | 2.0 | | | | B2-138 | Living room | 2.6 | 27 | 2 | |
| B2-091 | Bedroom | 2.0 | | | | B2-139 | Bedroom | 0.7 | | | |
| B2-092 | Bedroom | 0.4 | | | | B2-140 | Living room | 1.3 | 0 | 0 | |
| B2-093 | Living room | 0.5 | | | | B2-141 | Bedroom | 1.4 | | | |
| B2-094 | Bedroom | 2.6 | | | | B2-142 | Living room | 2.3 | 36 | 2 | |
| B2-095 | Bedroom | 2.6 | | | | B2-143 | Bedroom | 1.6 | | | |
| B2-096 | LKD | 1.7 | 47 | 7 | | B2-144 | Bedroom | 1.4 | | | |
| B2-097 | Bedroom | 2.2 | | | | B2-145 | Bedroom | 1.3 | | | |
| B2-098 | Bedroom | 1.5 | | | | B2-146 | Bedroom | 1.4 | | | |
| B2-099 | Bedroom | 2.3 | | | | B2-147 | Bedroom | 1.9 | | | |
| B2-100 | Bedroom | 3.4 | | | | B2-148 | Bedroom | 1.5 | | | |
| B2-101 | Bedroom | 3.0 | | | | B2-149 | Bedroom | 1.5 | | | |
| B2-102 | Bedroom | 1.2 | | | | B2-150 | Bedroom | 1.5 | | | |
| B2-103 | Bedroom | 3.5 | | | | B2-151 | Study | 3.0 | | | |
| B2-104 | Bedroom | 2.7 | | | | B2-152 | Study | 3.3 | | | |
| B2-105 | Bedroom | 3.0 | | | | B2-153 | Study | 3.4 | | | |
| B2-106 | Bedroom | 2.0 | | | | B2-154 | Study | 3.2 | | | |

Table 4: Results

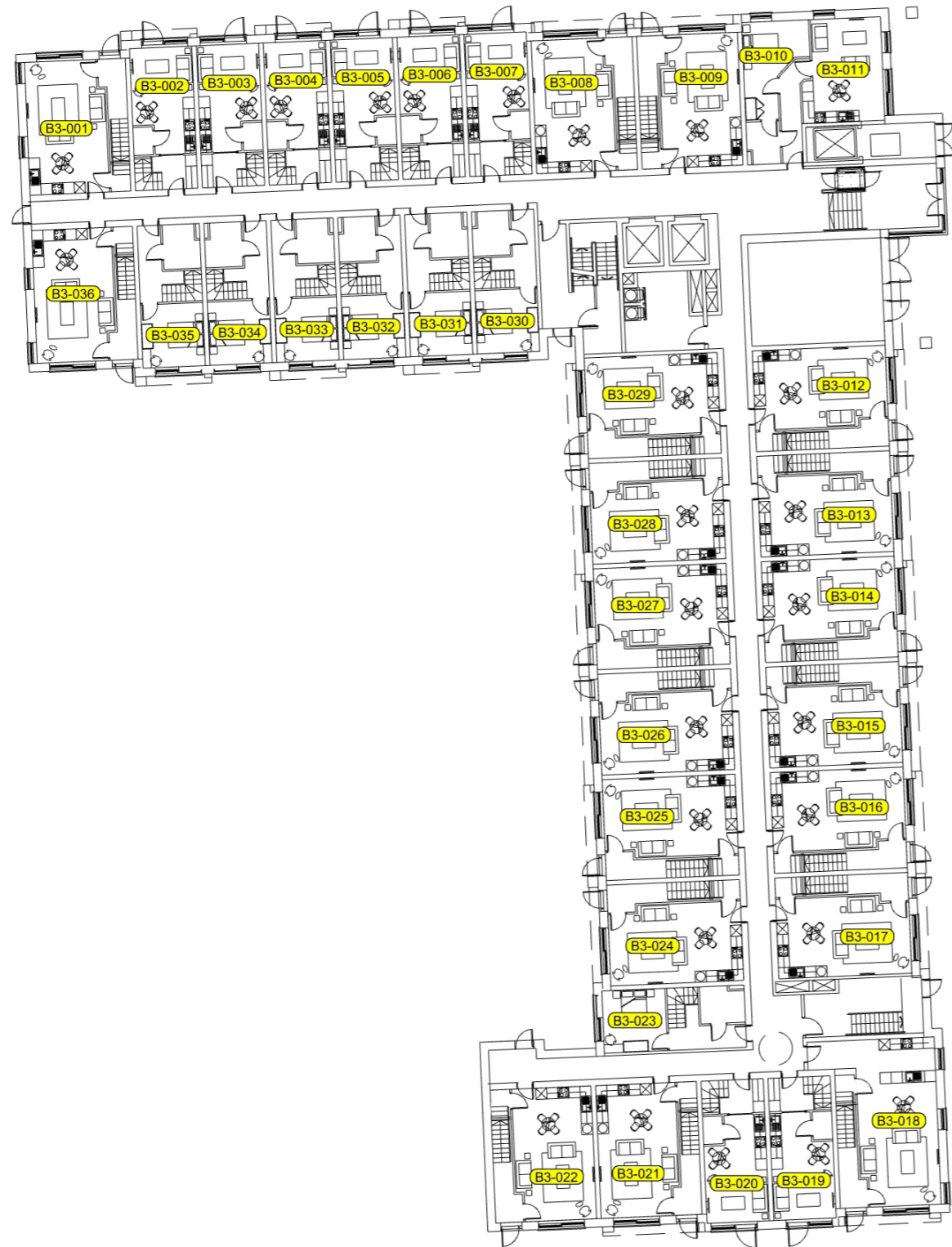


Fig. 7: Floor Plan

| Room ID | Room use | Daylight Quantum | Sunlight Probability | |
|---------------------|-------------|------------------|----------------------|-------------|
| | | ADF | APSH Total | APSH Winter |
| C - Floor GF | | | | |
| B3-001 | LKD | 5.7 | 38 | 9 |
| B3-002 | Living room | 2.6 | | |
| B3-003 | Living room | 3.9 | | |
| B3-004 | Living room | 2.3 | | |
| B3-005 | Living room | 3.8 | | |
| B3-006 | Living room | 2.1 | | |
| B3-007 | Living room | 3.8 | | |
| B3-008 | Living room | 1.5 | | |
| B3-009 | Living room | 3.1 | | |
| B3-010 | Bedroom | 2.3 | | |
| B3-011 | LKD | 1.6 | | |
| B3-012 | Living room | 3.2 | | |
| B3-013 | Living room | 3.7 | | |
| B3-014 | Living room | 3.6 | | |
| B3-015 | Living room | 3.4 | | |
| B3-016 | Living room | 3.5 | | |
| B3-017 | Living room | 3.5 | | |
| B3-018 | LKD | 4.9 | 59 | 16 |
| B3-019 | Living room | 5.9 | 52 | 20 |
| B3-020 | Living room | 6.2 | 53 | 20 |
| B3-021 | Living room | 5.1 | 53 | 21 |
| B3-022 | Living room | 5.4 | 63 | 23 |
| B3-023 | Bedroom | 2.9 | | |
| B3-024 | Living room | 5.2 | 30 | 2 |
| B3-025 | Living room | 5.6 | 39 | 9 |
| B3-026 | Living room | 5.4 | 44 | 13 |
| B3-027 | Living room | 5.2 | 41 | 12 |
| B3-028 | Living room | 4.9 | 43 | 13 |
| B3-029 | Living room | 4.1 | 36 | 12 |
| B3-030 | Bedroom | 3.0 | | |
| B3-031 | Bedroom | 3.2 | | |
| B3-032 | Bedroom | 3.7 | | |
| B3-033 | Bedroom | 3.7 | | |
| B3-034 | Bedroom | 4.0 | | |
| B3-035 | Bedroom | 4.0 | | |
| B3-036 | LKD | 7.4 | 78 | 24 |

Table 5: Results



Fig. 8: Floor Plan

| Room ID | Room use | Daylight Quantum | | Sunlight Probability | | Room ID | Room use | Daylight Quantum | | Sunlight Probability | |
|---------------------|-------------|------------------|-----|----------------------|-------------|---------|-------------|------------------|-----|----------------------|-------------|
| | | ADF | ADF | APSH Total | APSH Winter | | | ADF | ADF | APSH Total | APSH Winter |
| C - Floor 1F | | | | | | | | | | | |
| B3-037 | Bedroom | 6.7 | | | | B3-085 | Bedroom | 2.9 | | | |
| B3-038 | Bedroom | 2.0 | | | | B3-086 | Bedroom | 2.2 | | | |
| B3-039 | Bedroom | 2.2 | | | | B3-087 | Bedroom | 1.8 | | | |
| B3-040 | Bedroom | 2.1 | | | | B3-088 | Bedroom | 2.4 | | | |
| B3-041 | Bedroom | 2.1 | | | | B3-089 | Living room | 3.2 | 41 | 17 | |
| B3-042 | Bedroom | 2.0 | | | | B3-090 | Living room | 3.1 | 43 | 17 | |
| B3-043 | Bedroom | 2.0 | | | | B3-091 | Living room | 3.8 | 52 | 20 | |
| B3-044 | Bedroom | 2.0 | | | | B3-092 | Living room | 3.5 | 53 | 20 | |
| B3-045 | Bedroom | 2.7 | | | | B3-093 | Living room | 4.1 | 61 | 23 | |
| B3-046 | Bedroom | 1.7 | | | | B3-094 | Living room | 3.8 | 59 | 22 | |
| B3-047 | Bedroom | 1.8 | | | | B3-095 | Bedroom | 3.0 | | | |
| B3-048 | Bedroom | 2.2 | | | | B3-096 | Bedroom | 8.3 | | | |
| B3-049 | Bedroom | 1.9 | | | | | | | | | |
| B3-050 | LKD | 2.3 | | | | | | | | | |
| B3-051 | Bedroom | 2.1 | | | | | | | | | |
| B3-052 | Bedroom | 2.1 | | | | | | | | | |
| B3-053 | Living room | 0.9 | | | | | | | | | |
| B3-054 | Bedroom | 0.7 | | | | | | | | | |
| B3-055 | Bedroom | 1.6 | | | | | | | | | |
| B3-056 | Bedroom | 1.4 | | | | | | | | | |
| B3-057 | Bedroom | 1.4 | | | | | | | | | |
| B3-058 | Bedroom | 1.9 | | | | | | | | | |
| B3-059 | Bedroom | 1.9 | | | | | | | | | |
| B3-060 | Bedroom | 1.4 | | | | | | | | | |
| B3-061 | Bedroom | 1.3 | | | | | | | | | |
| B3-062 | Bedroom | 1.1 | | | | | | | | | |
| B3-063 | Bedroom | 1.7 | | | | | | | | | |
| B3-064 | Bedroom | 1.4 | | | | | | | | | |
| B3-065 | Bedroom | 1.4 | | | | | | | | | |
| B3-066 | Bedroom | 1.8 | | | | | | | | | |
| B3-067 | Bedroom | 2.9 | | | | | | | | | |
| B3-068 | Bedroom | 4.1 | | | | | | | | | |
| B3-069 | Bedroom | 2.2 | | | | | | | | | |
| B3-070 | Bedroom | 2.9 | | | | | | | | | |
| B3-071 | Bedroom | 3.1 | | | | | | | | | |
| B3-072 | Bedroom | 2.3 | | | | | | | | | |
| B3-073 | Bedroom | 2.8 | | | | | | | | | |
| B3-074 | Bedroom | 4.0 | | | | | | | | | |
| B3-075 | Bedroom | 3.3 | | | | | | | | | |
| B3-076 | Living room | 3.5 | 15 | 0 | | | | | | | |
| B3-077 | Bedroom | 3.1 | | | | | | | | | |
| B3-078 | Bedroom | 2.5 | | | | | | | | | |
| B3-079 | Bedroom | 2.4 | | | | | | | | | |
| B3-080 | Bedroom | 3.2 | | | | | | | | | |
| B3-081 | Bedroom | 2.7 | | | | | | | | | |
| B3-082 | Bedroom | 2.4 | | | | | | | | | |
| B3-083 | Bedroom | 2.2 | | | | | | | | | |
| B3-084 | Bedroom | 3.1 | | | | | | | | | |

Table 6: Results

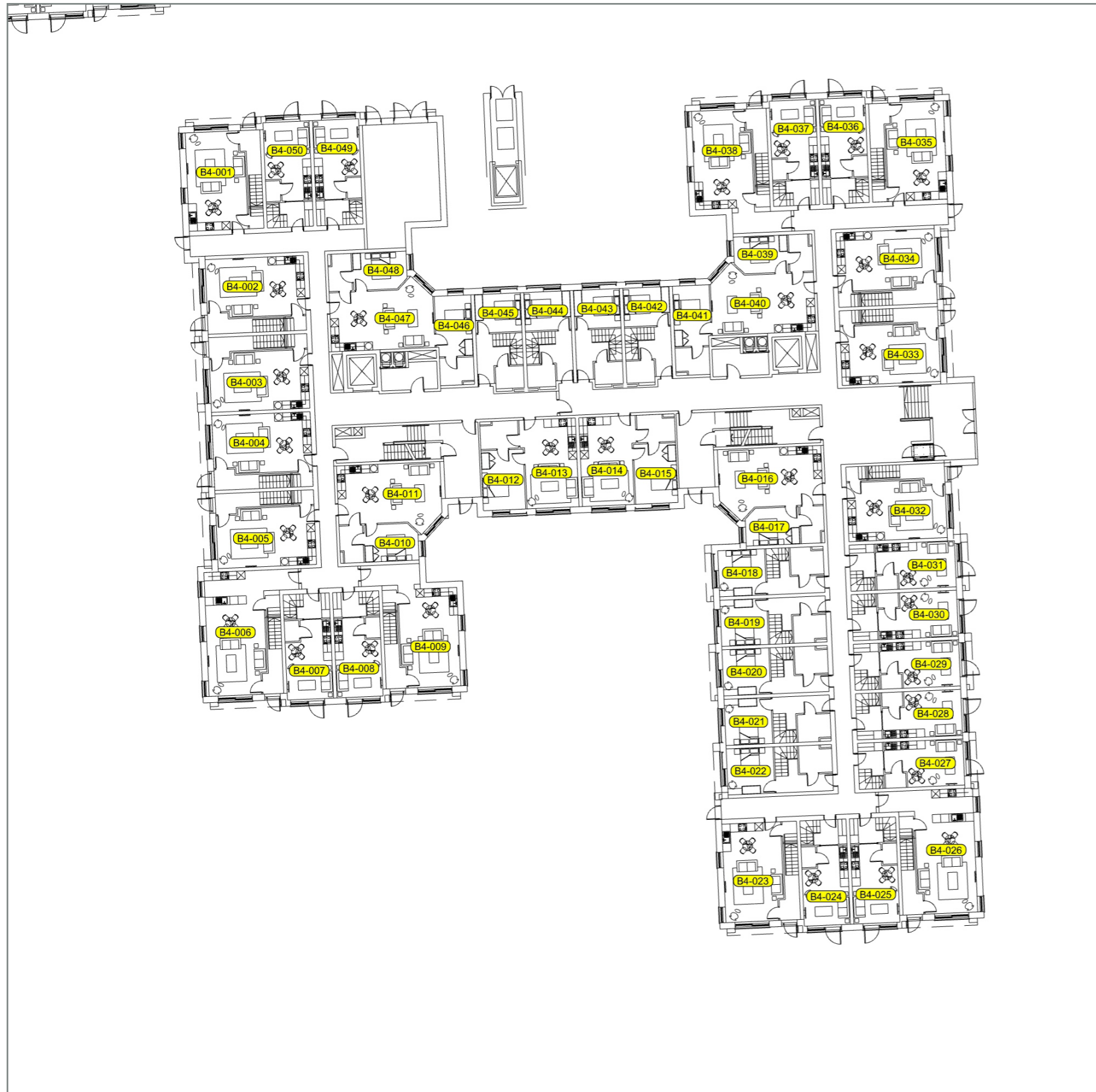


Fig. 9: Floor Plan

| Room ID | Room use | Daylight Quantum | | Sunlight Probability | | Room ID | Room use | Daylight Quantum | | Sunlight Probability | |
|---------------------|-------------|------------------|------------|----------------------|--------|-------------|----------|------------------|-------------|----------------------|--|
| | | ADF | APSH Total | APSH Winter | ADF | | | APSH Total | APSH Winter | | |
| D - Floor GF | | | | | | | | | | | |
| B4-001 | Living room | 6.8 | 39 | 10 | B4-049 | Living room | 4.8 | | | | |
| B4-002 | Living room | 4.7 | 40 | 12 | B4-050 | Living room | 4.8 | | | | |
| B4-003 | Living room | 4.9 | 34 | 7 | | | | | | | |
| B4-004 | Living room | 5.2 | 40 | 12 | | | | | | | |
| B4-005 | Living room | 4.9 | 32 | 7 | | | | | | | |
| B4-006 | LKD | 7.8 | 87 | 29 | | | | | | | |
| B4-007 | Living room | 7.7 | 75 | 28 | | | | | | | |
| B4-008 | Living room | 7.7 | 74 | 28 | | | | | | | |
| B4-009 | Living room | 6.8 | 71 | 27 | | | | | | | |
| B4-010 | Bedroom | 1.0 | | | | | | | | | |
| B4-011 | Living room | 1.3 | 9 | 2 | | | | | | | |
| B4-012 | Bedroom | 2.4 | | | | | | | | | |
| B4-013 | Living room | 3.8 | 32 | 15 | | | | | | | |
| B4-014 | Living room | 3.9 | 32 | 14 | | | | | | | |
| B4-015 | Bedroom | 2.5 | | | | | | | | | |
| B4-016 | Living room | 1.5 | 14 | 4 | | | | | | | |
| B4-017 | Bedroom | 1.2 | | | | | | | | | |
| B4-018 | Bedroom | 2.6 | | | | | | | | | |
| B4-019 | Bedroom | 2.9 | | | | | | | | | |
| B4-020 | Bedroom | 3.3 | | | | | | | | | |
| B4-021 | Bedroom | 3.4 | | | | | | | | | |
| B4-022 | Bedroom | 3.4 | | | | | | | | | |
| B4-023 | Living room | 8.9 | 87 | 29 | | | | | | | |
| B4-024 | Living room | 8.0 | 79 | 29 | | | | | | | |
| B4-025 | Living room | 8.0 | 78 | 29 | | | | | | | |
| B4-026 | LKD | 6.0 | 76 | 29 | | | | | | | |
| B4-027 | Living room | 3.7 | | | | | | | | | |
| B4-028 | Living room | 3.6 | | | | | | | | | |
| B4-029 | Living room | 3.6 | | | | | | | | | |
| B4-030 | Living room | 3.4 | | | | | | | | | |
| B4-031 | Living room | 3.3 | | | | | | | | | |
| B4-032 | Living room | 2.0 | | | | | | | | | |
| B4-033 | Living room | 2.3 | | | | | | | | | |
| B4-034 | Living room | 2.6 | | | | | | | | | |
| B4-035 | Living room | 6.3 | | | | | | | | | |
| B4-036 | Living room | 5.5 | | | | | | | | | |
| B4-037 | Living room | 5.3 | | | | | | | | | |
| B4-038 | Living room | 5.6 | 14 | 0 | | | | | | | |
| B4-039 | Bedroom | 1.6 | | | | | | | | | |
| B4-040 | Living room | 1.5 | | | | | | | | | |
| B4-041 | Bedroom | 1.9 | | | | | | | | | |
| B4-042 | Bedroom | 2.8 | | | | | | | | | |
| B4-043 | Bedroom | 3.0 | | | | | | | | | |
| B4-044 | Bedroom | 3.0 | | | | | | | | | |
| B4-045 | Bedroom | 2.8 | | | | | | | | | |
| B4-046 | Bedroom | 1.9 | | | | | | | | | |
| B4-047 | Living room | 1.5 | | | | | | | | | |
| B4-048 | Bedroom | 1.6 | | | | | | | | | |

Table 7: Results

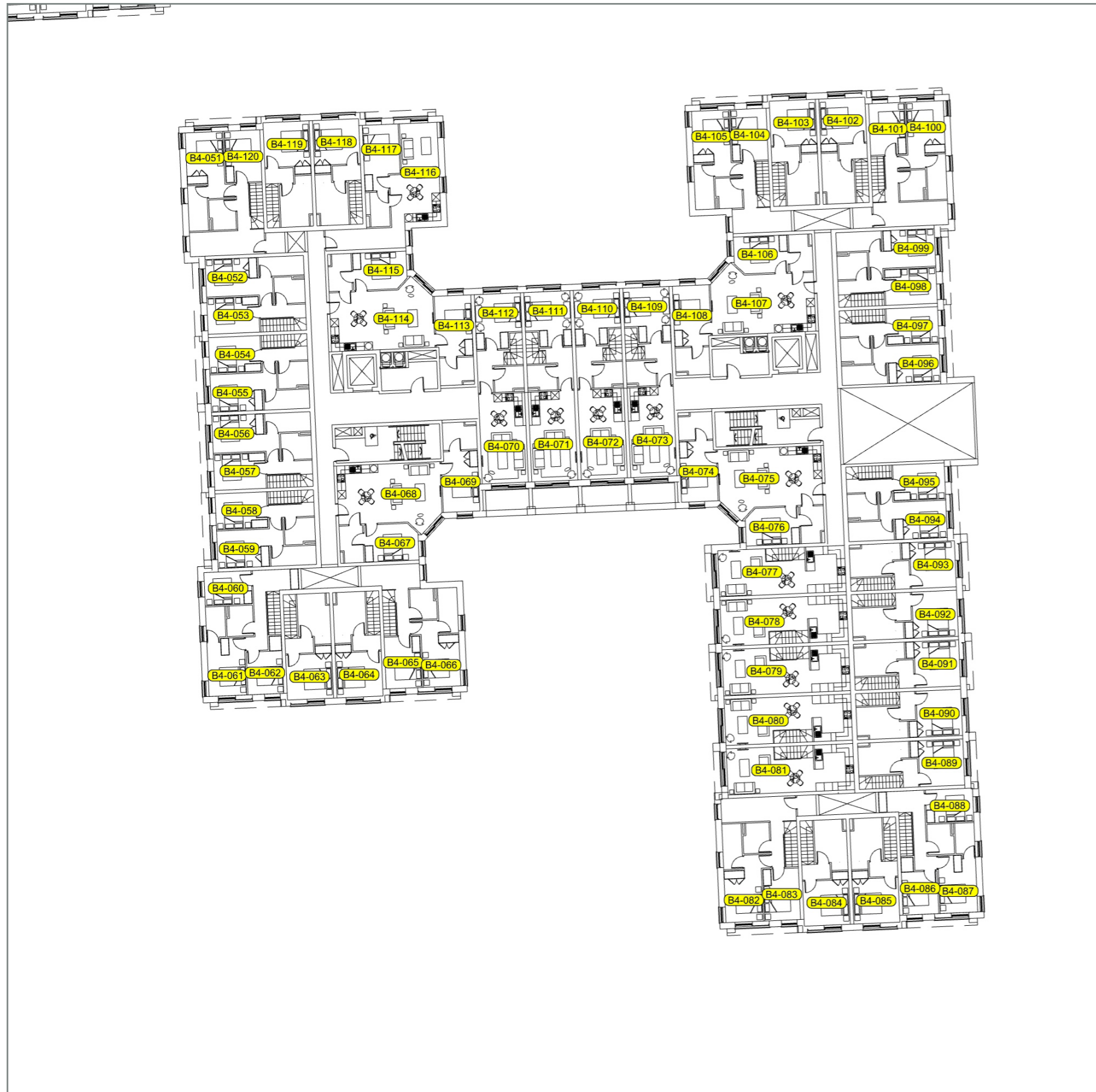


Fig. 10: Floor Plan

| Room ID | Room use | Daylight Quantum | | Sunlight Probability | | Room ID | Room use | Daylight Quantum | | Sunlight Probability | |
|---------------------|-------------|------------------|-----|----------------------|-------------|---------|-------------|------------------|-----|----------------------|-------------|
| | | ADF | ADF | APSH Total | APSH Winter | | | ADF | ADF | APSH Total | APSH Winter |
| D - Floor 1F | | | | | | | | | | | |
| B4-051 | Bedroom | 5.4 | | | | B4-099 | Bedroom | 1.1 | | | |
| B4-052 | Bedroom | 2.4 | | | | B4-100 | Bedroom | 5.3 | | | |
| B4-053 | Bedroom | 2.0 | | | | B4-101 | Bedroom | 2.0 | | | |
| B4-054 | Bedroom | 2.1 | | | | B4-102 | Bedroom | 3.0 | | | |
| B4-055 | Bedroom | 2.4 | | | | B4-103 | Bedroom | 3.0 | | | |
| B4-056 | Bedroom | 2.6 | | | | B4-104 | Bedroom | 1.8 | | | |
| B4-057 | Bedroom | 2.1 | | | | B4-105 | Bedroom | 4.6 | | | |
| B4-058 | Bedroom | 2.1 | | | | B4-106 | Bedroom | 1.2 | | | |
| B4-059 | Bedroom | 2.4 | | | | B4-107 | Living room | 1.2 | | | |
| B4-060 | Bedroom | 4.2 | | | | B4-108 | Bedroom | 1.6 | | | |
| B4-061 | Bedroom | 7.8 | | | | B4-109 | Bedroom | 2.4 | | | |
| B4-062 | Bedroom | 3.1 | | | | B4-110 | Bedroom | 2.6 | | | |
| B4-063 | Bedroom | 3.8 | | | | B4-111 | Bedroom | 2.6 | | | |
| B4-064 | Bedroom | 3.8 | | | | B4-112 | Bedroom | 2.4 | | | |
| B4-065 | Bedroom | 2.6 | | | | B4-113 | Bedroom | 1.7 | | | |
| B4-066 | Bedroom | 5.2 | | | | B4-114 | Living room | 1.2 | | | |
| B4-067 | Bedroom | 0.8 | | | | B4-115 | Bedroom | 1.1 | | | |
| B4-068 | Living room | 1.0 | | 9 | 3 | B4-116 | LKD | 3.2 | | | |
| B4-069 | Bedroom | 1.7 | | | | B4-117 | Bedroom | 1.6 | | | |
| B4-070 | Living room | 1.8 | | 12 | 12 | B4-118 | Bedroom | 2.5 | | | |
| B4-071 | Living room | 2.0 | | 14 | 14 | B4-119 | Bedroom | 2.5 | | | |
| B4-072 | Living room | 2.0 | | 12 | 12 | B4-120 | Bedroom | 1.5 | | | |
| B4-073 | Living room | 1.7 | | 11 | 11 | | | | | | |
| B4-074 | Bedroom | 1.9 | | | | | | | | | |
| B4-075 | Living room | 1.3 | | 18 | 4 | | | | | | |
| B4-076 | Bedroom | 1.1 | | | | | | | | | |
| B4-077 | Living room | 2.4 | | 24 | 10 | | | | | | |
| B4-078 | Living room | 3.0 | | 27 | 8 | | | | | | |
| B4-079 | Living room | 3.0 | | 31 | 12 | | | | | | |
| B4-080 | Living room | 3.6 | | 31 | 8 | | | | | | |
| B4-081 | Living room | 3.3 | | 33 | 10 | | | | | | |
| B4-082 | Bedroom | 7.0 | | | | | | | | | |
| B4-083 | Bedroom | 2.7 | | | | | | | | | |
| B4-084 | Bedroom | 3.9 | | | | | | | | | |
| B4-085 | Bedroom | 3.9 | | | | | | | | | |
| B4-086 | Bedroom | 3.0 | | | | | | | | | |
| B4-087 | Bedroom | 6.3 | | | | | | | | | |
| B4-088 | Bedroom | 2.7 | | | | | | | | | |
| B4-089 | Bedroom | 1.5 | | | | | | | | | |
| B4-090 | Bedroom | 1.9 | | | | | | | | | |
| B4-091 | Bedroom | 1.6 | | | | | | | | | |
| B4-092 | Bedroom | 1.8 | | | | | | | | | |
| B4-093 | Bedroom | 1.3 | | | | | | | | | |
| B4-094 | Bedroom | 0.6 | | | | | | | | | |
| B4-095 | Bedroom | 0.5 | | | | | | | | | |
| B4-096 | Bedroom | 1.1 | | | | | | | | | |
| B4-097 | Bedroom | 1.0 | | | | | | | | | |
| B4-098 | Bedroom | 1.1 | | | | | | | | | |

Table 8: Results

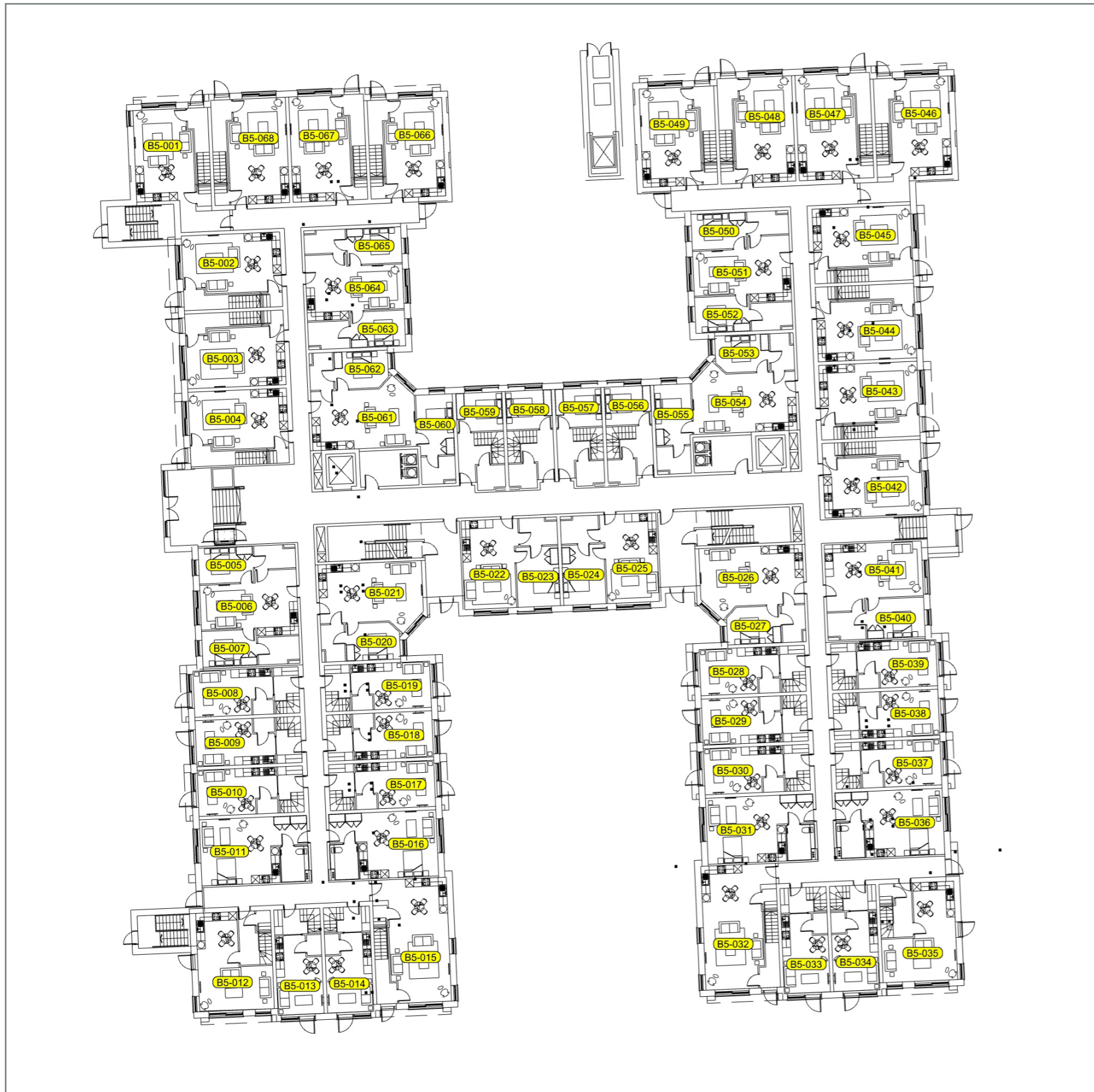


Fig. 11: Floor Plan

| Room ID | Room use | Daylight Quantum | | Sunlight Probability | | Room ID | Room use | Daylight Quantum | | Sunlight Probability | |
|---------------------|-------------|------------------|-----|----------------------|-------------|---------|-------------|------------------|-----|----------------------|-------------|
| | | ADF | ADF | APSH Total | APSH Winter | | | ADF | ADF | APSH Total | APSH Winter |
| E - Floor GF | | | | | | | | | | | |
| B5-001 | Living room | 5.6 | | 11 | 0 | B5-049 | Living room | 4.7 | | | |
| B5-002 | Living room | 2.2 | | 10 | 3 | B5-050 | Bedroom | 1.6 | | | |
| B5-003 | Living room | 2.2 | | 10 | 3 | B5-051 | Living room | 2.7 | 3 | | 0 |
| B5-004 | Living room | 2.0 | | 7 | 1 | B5-052 | Bedroom | 1.8 | | | |
| B5-005 | Bedroom | 1.6 | | | | B5-053 | Bedroom | 1.1 | | | |
| B5-006 | Living room | 2.7 | | 16 | 5 | B5-054 | Living room | 1.7 | | | |
| B5-007 | Bedroom | 1.5 | | | | B5-055 | Bedroom | 2.0 | | | |
| B5-008 | Living room | 3.8 | | 22 | 7 | B5-056 | Bedroom | 2.9 | | | |
| B5-009 | Living room | 4.1 | | 19 | 6 | B5-057 | Bedroom | 3.0 | | | |
| B5-010 | Living room | 4.4 | | 28 | 10 | B5-058 | Bedroom | 3.1 | | | |
| B5-011 | Studio | 3.6 | | 25 | 6 | B5-059 | Bedroom | 2.9 | | | |
| B5-012 | Living room | 11.3 | | 84 | 30 | B5-060 | Bedroom | 2.1 | | | |
| B5-013 | Living room | 8.1 | | 80 | 30 | B5-061 | Living room | 1.9 | | | |
| B5-014 | Living room | 8.1 | | 80 | 30 | B5-062 | Bedroom | 1.4 | | | |
| B5-015 | Living room | 7.7 | | 83 | 30 | B5-063 | Bedroom | 2.2 | | | |
| B5-016 | Studio | 3.7 | | | | B5-064 | Living room | 3.3 | | | |
| B5-017 | Living room | 4.5 | | | | B5-065 | Bedroom | 2.0 | | | |
| B5-018 | Living room | 3.9 | | | | B5-066 | Living room | 4.4 | | | |
| B5-019 | Living room | 3.8 | | | | B5-067 | Living room | 4.0 | | | |
| B5-020 | Bedroom | 1.2 | | | | B5-068 | Living room | 4.0 | | | |
| B5-021 | Living room | 1.3 | 10 | | 1 | | | | | | |
| B5-022 | Living room | 3.6 | 30 | | 11 | | | | | | |
| B5-023 | Bedroom | 2.5 | | | | | | | | | |
| B5-024 | Bedroom | 2.4 | | | | | | | | | |
| B5-025 | Living room | 3.5 | 28 | | 11 | | | | | | |
| B5-026 | Living room | 1.1 | 6 | | 0 | | | | | | |
| B5-027 | Bedroom | 1.0 | | | | | | | | | |
| B5-028 | Living room | 3.3 | 17 | | 6 | | | | | | |
| B5-029 | Living room | 3.4 | 12 | | 3 | | | | | | |
| B5-030 | Living room | 4.0 | 22 | | 8 | | | | | | |
| B5-031 | Studio | 3.3 | 28 | | 10 | | | | | | |
| B5-032 | Living room | 7.5 | 81 | | 30 | | | | | | |
| B5-033 | Living room | 8.2 | 80 | | 30 | | | | | | |
| B5-034 | Living room | 8.2 | 80 | | 30 | | | | | | |
| B5-035 | Living room | 12.5 | 88 | | 30 | | | | | | |
| B5-036 | Studio | 5.8 | | | | | | | | | |
| B5-037 | Living room | 7.6 | | | | | | | | | |
| B5-038 | Living room | 7.5 | | | | | | | | | |
| B5-039 | Living room | 7.6 | | | | | | | | | |
| B5-040 | Bedroom | 3.3 | | | | | | | | | |
| B5-041 | Living room | 4.4 | | | | | | | | | |
| B5-042 | Living room | 4.4 | | | | | | | | | |
| B5-043 | Living room | 5.2 | | | | | | | | | |
| B5-044 | Living room | 5.4 | | | | | | | | | |
| B5-045 | Living room | 5.0 | | | | | | | | | |
| B5-046 | Living room | 7.6 | | | | | | | | | |
| B5-047 | Living room | 4.8 | | | | | | | | | |
| B5-048 | Living room | 4.7 | | | | | | | | | |

Table 9: Results

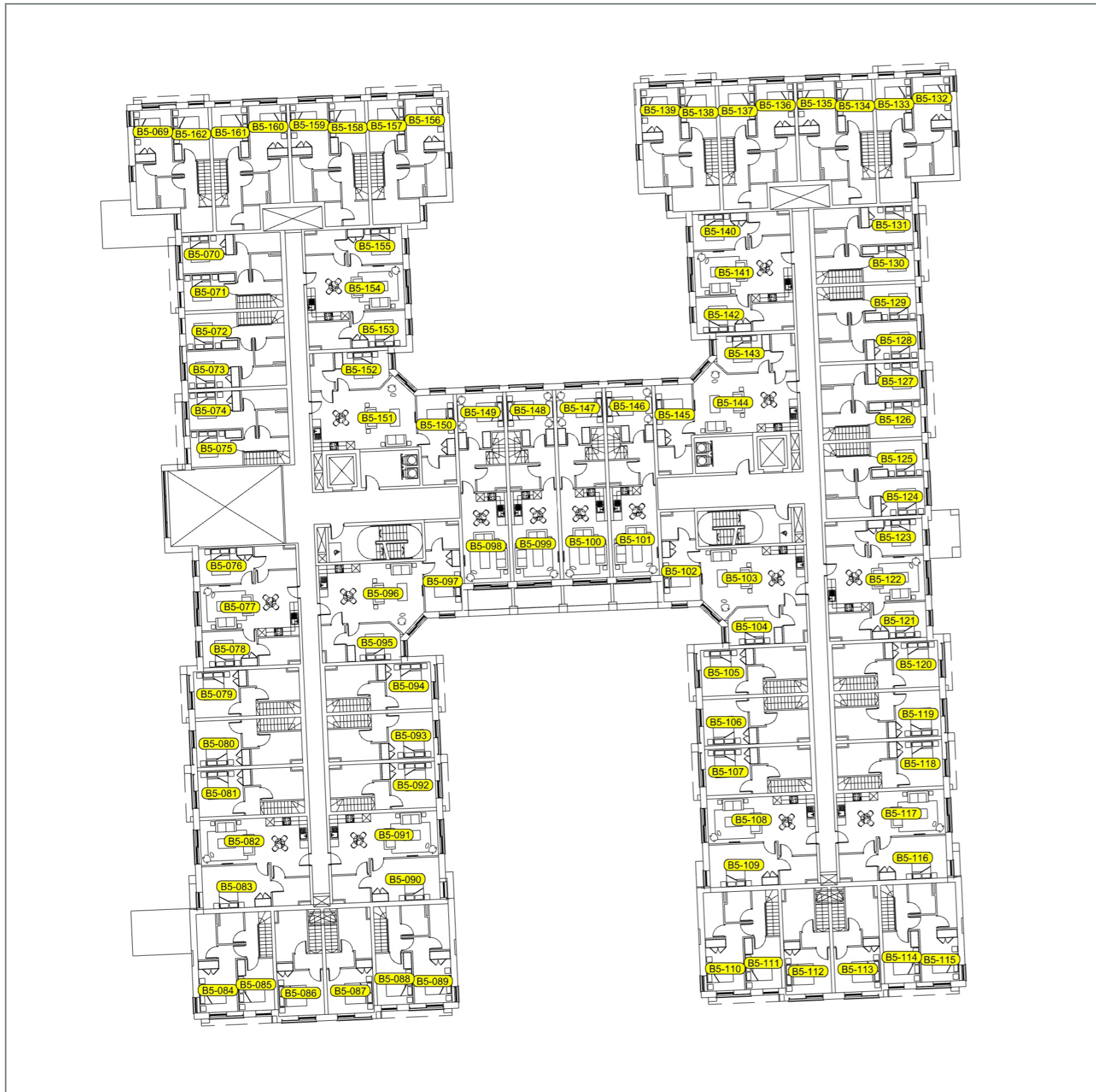


Fig. 12: Floor Plan

| Room ID | Room use | Daylight Quantum | | Sunlight Probability | | Room ID | Room use | Daylight Quantum | | Sunlight Probability | |
|---------------------|-------------|------------------|------------|----------------------|-----|---------|-------------|------------------|-------------|----------------------|--|
| | | ADF | APSH Total | APSH Winter | ADF | | | APSH Total | APSH Winter | | |
| E - Floor 1F | | | | | | | | | | | |
| B5-069 | Bedroom | 5.7 | | | | B5-117 | Living room | 4.5 | | | |
| B5-070 | Bedroom | 1.2 | | | | B5-118 | Bedroom | 3.8 | | | |
| B5-071 | Bedroom | 0.9 | | | | B5-119 | Bedroom | 3.8 | | | |
| B5-072 | Bedroom | 0.8 | | | | B5-120 | Bedroom | 3.4 | | | |
| B5-073 | Bedroom | 0.9 | | | | B5-121 | Bedroom | 3.1 | | | |
| B5-074 | Bedroom | 0.6 | | | | B5-122 | Living room | 4.2 | | | |
| B5-075 | Bedroom | 0.6 | | | | B5-123 | Bedroom | 1.7 | | | |
| B5-076 | Bedroom | 1.3 | | | | B5-124 | Bedroom | 2.3 | | | |
| B5-077 | Living room | 1.3 | 9 | 7 | | B5-125 | Bedroom | 2.6 | | | |
| B5-078 | Bedroom | 1.3 | | | | B5-126 | Bedroom | 2.7 | | | |
| B5-079 | Bedroom | 1.6 | | | | B5-127 | Bedroom | 3.2 | | | |
| B5-080 | Bedroom | 2.1 | | | | B5-128 | Bedroom | 3.5 | | | |
| B5-081 | Bedroom | 2.0 | | | | B5-129 | Bedroom | 2.8 | | | |
| B5-082 | Living room | 2.9 | 31 | 10 | | B5-130 | Bedroom | 2.6 | | | |
| B5-083 | Bedroom | 1.3 | | | | B5-131 | Bedroom | 3.2 | | | |
| B5-084 | Bedroom | 7.1 | | | | B5-132 | Bedroom | 7.8 | | | |
| B5-085 | Bedroom | 2.9 | | | | B5-133 | Bedroom | 2.8 | | | |
| B5-086 | Bedroom | 3.9 | | | | B5-134 | Bedroom | 3.0 | | | |
| B5-087 | Bedroom | 3.9 | | | | B5-135 | Bedroom | 3.9 | | | |
| B5-088 | Bedroom | 2.9 | | | | B5-136 | Bedroom | 3.9 | | | |
| B5-089 | Bedroom | 7.1 | | | | B5-137 | Bedroom | 3.0 | | | |
| B5-090 | Bedroom | 1.6 | | | | B5-138 | Bedroom | 2.7 | | | |
| B5-091 | Living room | 3.0 | | | | B5-139 | Bedroom | 3.6 | | | |
| B5-092 | Bedroom | 2.1 | | | | B5-140 | Bedroom | 1.4 | | | |
| B5-093 | Bedroom | 2.2 | | | | B5-141 | Living room | 2.3 | 7 | 0 | |
| B5-094 | Bedroom | 1.7 | | | | B5-142 | Bedroom | 1.5 | | | |
| B5-095 | Bedroom | 1.1 | | | | B5-143 | Bedroom | 0.8 | | | |
| B5-096 | Living room | 1.1 | 15 | 1 | | B5-144 | Living room | 1.4 | | | |
| B5-097 | Bedroom | 1.8 | | | | B5-145 | Bedroom | 1.7 | | | |
| B5-098 | Living room | 1.7 | 10 | 10 | | B5-146 | Bedroom | 2.4 | | | |
| B5-099 | Living room | 1.8 | 11 | 11 | | B5-147 | Bedroom | 2.6 | | | |
| B5-100 | Living room | 1.8 | 10 | 10 | | B5-148 | Bedroom | 2.6 | | | |
| B5-101 | Living room | 1.7 | 11 | 11 | | B5-149 | Bedroom | 2.5 | | | |
| B5-102 | Bedroom | 1.8 | | | | B5-150 | Bedroom | 1.8 | | | |
| B5-103 | Living room | 1.0 | 9 | 0 | | B5-151 | Living room | 1.6 | | | |
| B5-104 | Bedroom | 0.9 | | | | B5-152 | Bedroom | 1.1 | | | |
| B5-105 | Bedroom | 1.7 | | | | B5-153 | Bedroom | 1.9 | | | |
| B5-106 | Bedroom | 1.8 | | | | B5-154 | Living room | 2.9 | | | |
| B5-107 | Bedroom | 1.7 | | | | B5-155 | Bedroom | 1.8 | | | |
| B5-108 | Bedroom | 2.6 | 30 | 12 | | B5-156 | Bedroom | 3.4 | | | |
| B5-109 | Bedroom | 1.3 | | | | B5-157 | Bedroom | 2.6 | | | |
| B5-110 | Bedroom | 6.9 | | | | B5-158 | Bedroom | 2.7 | | | |
| B5-111 | Bedroom | 2.9 | | | | B5-159 | Bedroom | 3.6 | | | |
| B5-112 | Bedroom | 3.9 | | | | B5-160 | Bedroom | 3.5 | | | |
| B5-113 | Bedroom | 3.9 | | | | B5-161 | Bedroom | 2.7 | | | |
| B5-114 | Bedroom | 2.9 | | | | B5-162 | Bedroom | 2.5 | | | |
| B5-115 | Bedroom | 8.0 | | | | | | | | | |
| B5-116 | Bedroom | 2.2 | | | | | | | | | |

Table 10: Results



Appendix 2

Detailed drawings and results of the Sunlight Amenity assessment

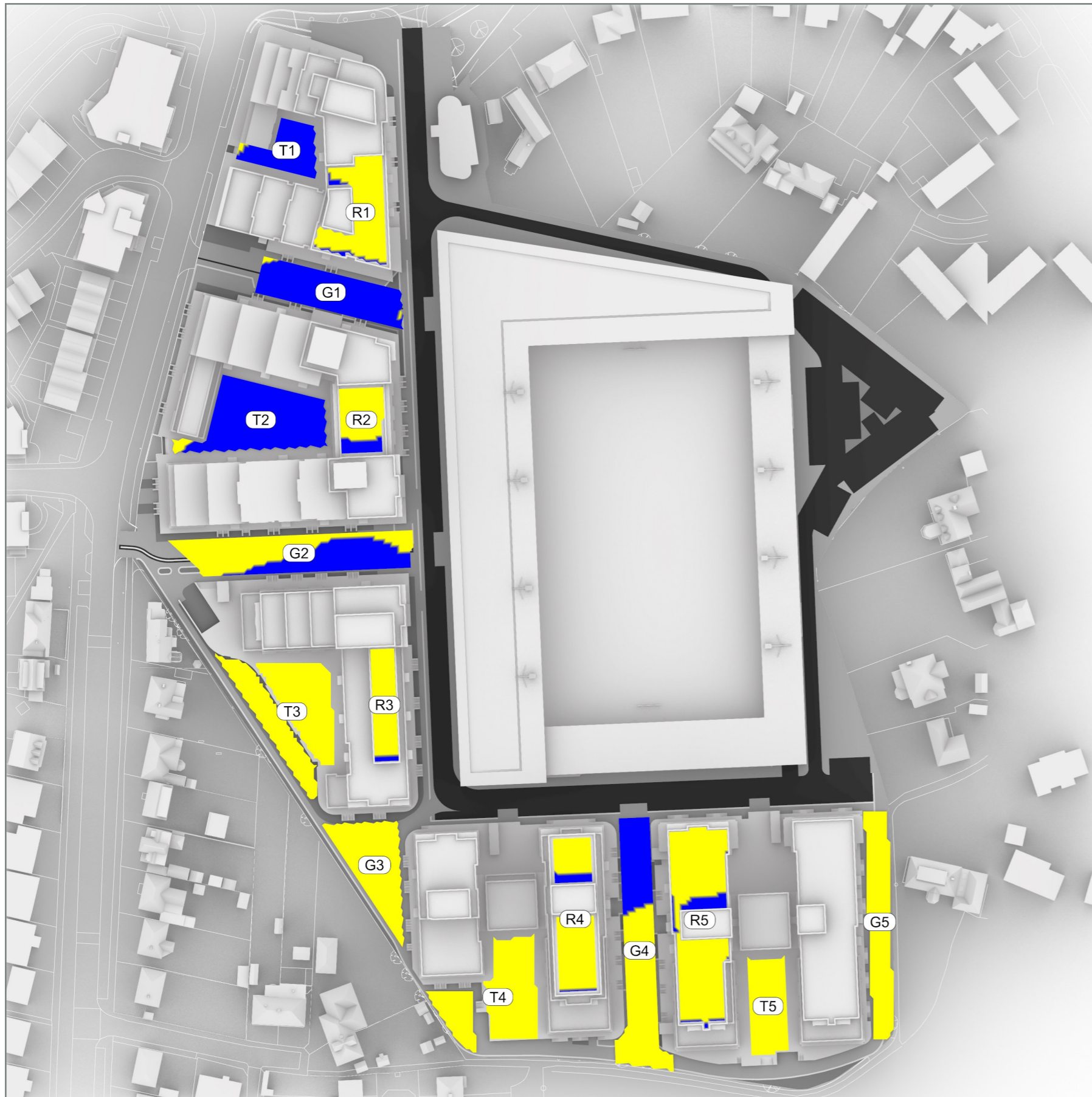


Fig. 1: Proposed Scenario

| Zone Name | Area (m2) | Sunlit Area * Proposed [%] |
|-----------|-----------|----------------------------|
| G1 | 491.2 | 2.3 |
| G2 | 793.3 | 57.2 |
| G3 | 497.7 | 100.0 |
| G4 | 842.1 | 66.0 |
| G5 | 511.4 | 100.0 |
| R1 | 443.1 | 92.3 |
| R2 | 273.1 | 78.9 |
| R3 | 238.9 | 94.1 |
| R4 | 494.0 | 89.0 |
| R5 | 770.0 | 89.7 |
| T1 | 258.2 | 3.0 |
| T2 | 704.2 | 3.2 |
| T3 | 793.4 | 100.0 |
| T4 | 623.2 | 100.0 |
| T5 | 340.1 | 100.0 |

*Sunlit Area = Area receiving at least 2hrs. of sunlight on 21st March



YES BRE's Sun On Ground
Area seeing at least two hours of sunlight

NO

Day: 21st March
Latitude: 51.4°N
Effective day length: 10 hours
*Min solar angle 10°
(BR209 3.3.8)

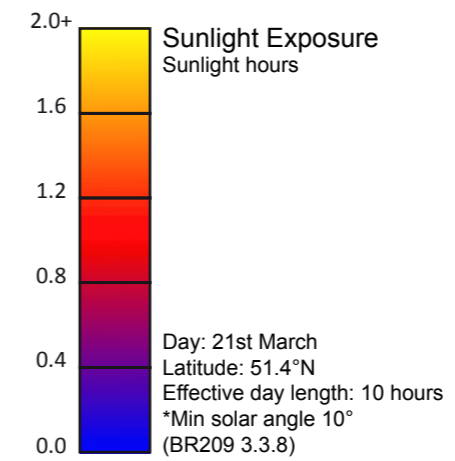
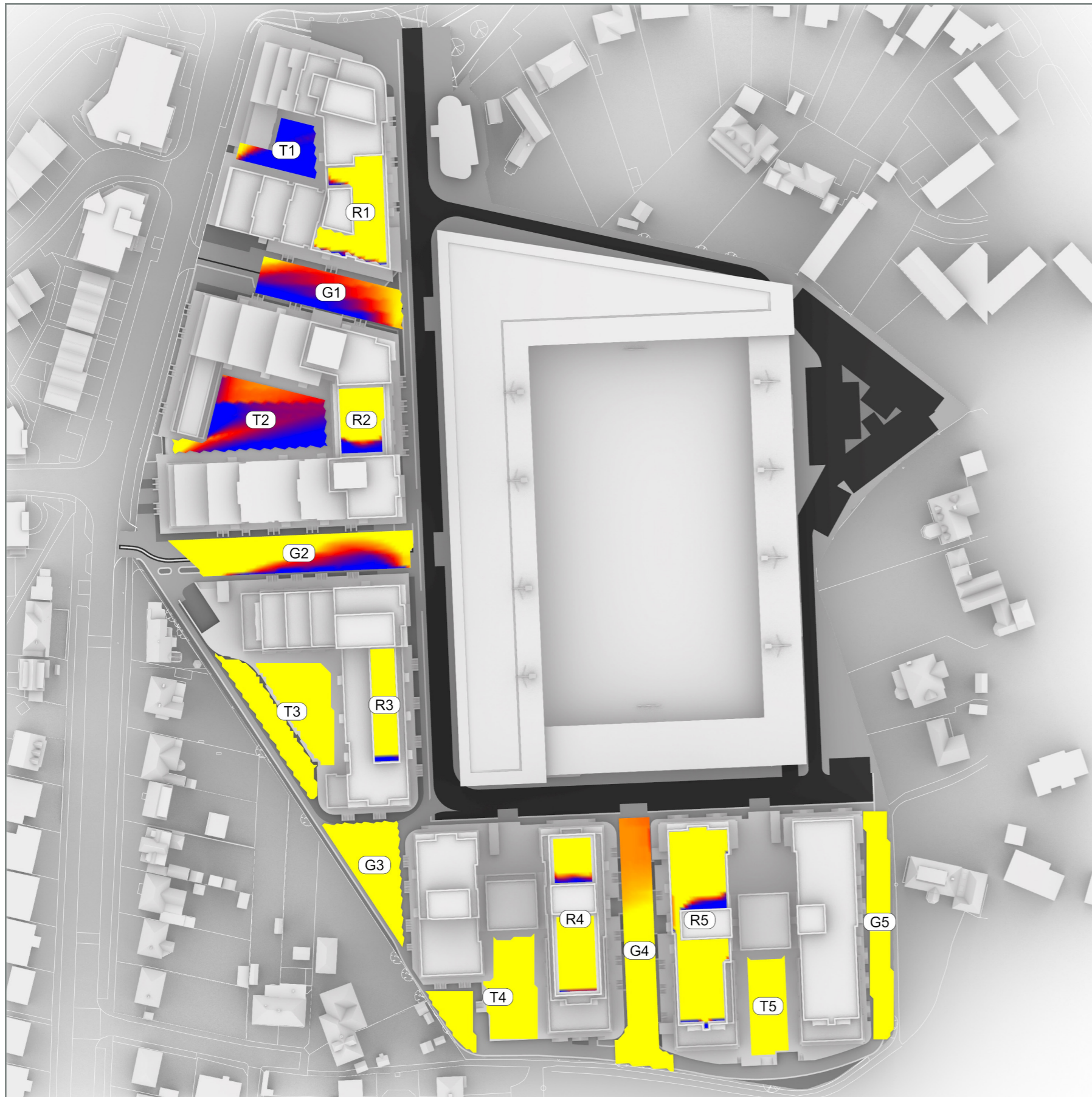


Fig. 2: Proposed Scenario