LOVE
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STUDIO

DAYLIGHT AND SUNLIGHT STUDY

Tormead, 27 Dene Road
by Love Design Studio

June 2022
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CONTENTS

EXECUTIVE SUMMARY

Love Design Studio are appointed to prepare a daylight and sunlight assessment for the proposed development at Tormead, 27 Dene Road, Northwood. This is to assess the on-site daylight and sunlight access to rooms deemed habitable at Flat A, Flat B and Flat C based on relevant industry guidance. Although Flat C extends over two floors, rooms at ground floor were considered only.

To ensure that this assessment has correctly considered the daylight and sunlight access experienced of the site, it has been instigated in accordance with the Building Research Establishment's publication "Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice" (2011) (the "BRE Guidelines").

Daylight and sunlight access is typically desirable for occupants within residential 'habitable' rooms. This is acknowledged within the BRE guidelines, which place the most emphasis on these uses; mainly living rooms.

20 windows and 11 adjoining habitable rooms were identified in Flats A, B, and C as part of habitable spaces for the assessments. Two Living/kitchen/dining rooms (LKDs) and nine bedrooms were identified for the assessment at lower ground and ground floors.

This report sets out the daylight and sunlight assessment for Flats A, B, and C with and without factoring in the impact from surrounding trees.

Please see below a concise summary of the study.

PROPOSED SCHEME DAYLIGHT AND SUNLIGHT ACCESS

The recommended Average Daylight Factor (ADF) for LKDs is 2% and for bedrooms it is 1%.

The BRE guidelines states that it is usual to ignore the effect of existing trees and shrubs. Thus, the proposed scheme exceeds the recommended ADF levels for all assessed rooms without factoring in the effects of trees on daylight and sunlight.

The LKDs to Flats A and B still retain a high ADF level, even with the trees considered as an obstruction. The ADFs of four bedrooms fall short of the BRE recommendation of 1% across the four bedrooms.

Although four bedrooms fall short of the ADF targets, these bedrooms adjoin dwellings where at least one other bedroom in the flat achieves the ADF targets with tree shading considered.

It is important to point out that environmental factors, such as shade, also play an important role in building design and providing natural shade in the summer for mitigating overheating risk. Furthermore, natural lux levels are highest during the summer and therefore diffused daylight will be higher in summer meaning that average daylight expected in rooms will be higher.

It is therefore considered that the proposed development design is in line with the objectives of the National, Regional and Local policy context and the guidelines on daylight and sunlight set by BRE whilst simultaneously considering other environmental factors such as overheating mitigation.

INTRODUCTION

Love Design Studio are appointed to prepare a daylight and sunlight assessment for the proposed development at Tormead, 27 Dene Road, Northwood, HA6 2BX; this is to assess the on-site daylight and sunlight access to rooms deemed habitable at Flat A (lower ground floor), Flat B, and Flat C (ground floor only), based on relevant industry guidance. In a separate excercise we also tested the potential impact of the surrounding trees.

The proposal is for a 2.5-storey front, side, and rear extension to the main building (Tormead) to provide 5 self-contained flats with associated parking, cycle and bin storage, and landscape works.

Figure 1: Existing Site (Tormead, 27 Dene Road, Red)

METHODOLOGY

MODELLING METHODOLOGY

Using hand-drawn architectural drawings prepared by GNP Architects and google maps observations, 3D models were created in industry accepted daylight and sunlight software. These included the on-site existing structures within the site boundary and the proposed development.

The 3D model includes the window locations and internal configurations of Flat A (lower ground floor) and Flats B and C (ground floor only) of the proposed development.

Using a specialist computer programme, we have undertaken the analysis set out in the BRE Guidelines for the proposed scenario only.

Assessments were made of the Average Daylight Factor (ADF) to measure daylight access and Probable Sunlight Hours (APSH/WPSH) to measure annual sunlight and winter sunlight exposure, respectively.

The guidelines for modelling and testing the scheme's daylight and sunlight access were provided by the BRE's "Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice" by PJ Littlefair (2011); accepted as good practice by Planning Authorities when assessing the applications for new schemes. For further guidance on the methodology please see the BRE's document[1].

In relation to ADF, the BRE Guidelines set out numerical values for the internal daylight factor and seeks to ensure that habitable rooms receive ample daylight access. Depending on the room type there are different guidelines on the ADF target; with living rooms given greater weighting.

[1] https://www.bregroup.com/services/testing/indoor-environment-testing/natural-light/

A table of the scheme's target ADF values are set out below:

Table 1: The proposed scheme target ADF values

Item	Target ADF	Comment
Living, Kitchen & Dining Rooms	2%	As per the BRE Guidelines
Bedrooms	1%	As per the BRE Guidelines

*Usually, if a kitchen is less than 13sqm, it is a non-habitable room and the daylight tests need not be applied.

ADFs are reliant on a combination of the internal layout arrangement, window placement, window solar transmittance, and internal/external reflectance. It is often found at the planning stage that reflectance and maintenance factors are not quite specified and therefore assumptions are taken from the British Standards BS 8206-2:2008 document.

Assumptions of the reflectance and other modelling variables are set out below:

Table 2: The proposed scheme ADF variables.

Item	Value	Comment
Window light transmittance	0.68	Clear or translucent glass
Maintenance factor	96%	% loss of daylight based on:
		'suburban'[2]
		vertical glazing
		rain
Frame factor	80%	-
Room reflectance	0.63	-

The government wish to densify sites to maximise the delivery of housing for the UK and maximise the sustainability credentials by maximising the use on-site. The NPPF states at para.123 in relation to achieving appropriate densities that:

"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)."

[2] CIBSE Guide A Table 1.13, Calculation of maintenance factor for daylight factor

IMPACT OF SURROUNDING TREES METHODOLOGY

Using the Arboriculture Survey of the proposed site, 3 trees with the closest proximity to the rooms were assessed for their impact on internal daylight.

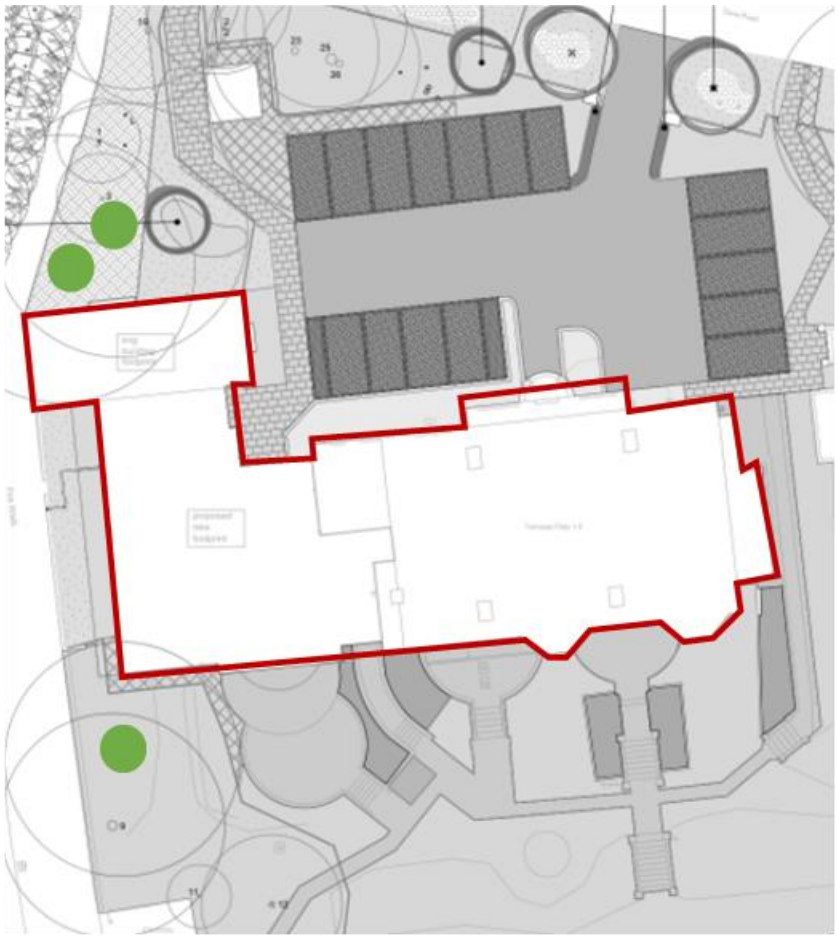

Figure 2: Outline of proposed site in Red; Trees closest to assessed rooms that were factored into daylight and sunlight calculations, Green (Sourced from Arboriculture Report with added annotations).

As a 3D survey of the trees was unavailable we made best estimates utilising the methodologies found within Appendix H of the BRE guide. The BRE guide recommends calculating the ADF by creating a new θ value that factors in the impact of surrounding trees, where θ is the 'Clear Sky Angle'. The formula to calculate the new θ value is as follows:

$$\theta\ with\ trees\ =\ \theta\ with\ opaque\ trees\ +\ transparency\ /\ 100\%\ \times\ (\theta\ with\ no\ trees\ -\ \theta\ with\ opaque\ trees)$$

The calculation for θ can be found in Appendix C of the BRE guidelines which was used to calculate θ with opaque trees; this is summarised below.

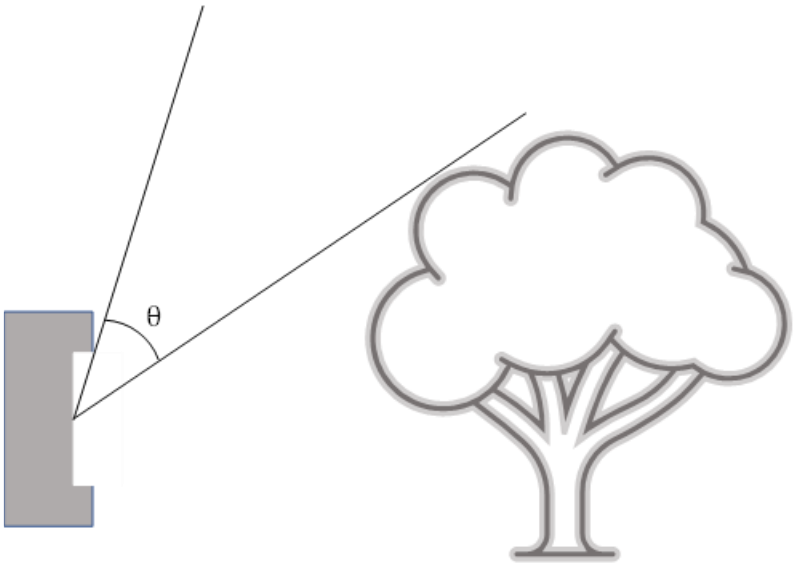

Figure 3: "θ is the angle subtended, in the vertical plane perpendicular to the window, by sky visible from the centre of the window" Appendix C of the BRE guidelines.

ASSUMPTIONS & LIMITATIONS

Drawings used to model the scheme are based on pdf files received from HGH Consulting. A 3D model file was produced from these 2D drawings; this file was used for placement of rooms and windows of Flats A, B, and C.

The BRE guide states that it is usual to ignore the effect of existing trees and shrubs; however, for the purpose of this study we have calculated the effects of trees on daylight and sunlight access.

The species and placement of the surrounding trees were taken from the Arboriculture report, prepared by Simon Pryce Arboriculture. Where limited access or information is available, assumptions have been made which may affect the conclusions reached in this report. For example, heights of the surrounding trees to calculate θ used the average height of each tree species from independent research.

The report provided is solely for the use of the client and no liability to anyone else is accepted and this report is based upon and subject to the scope of work set out in Love Design Studio's terms and conditions

SCHEME DRAWINGS USED FOR MODELLING

For reference, please see below images of the pdf drawings used to model the internal layouts.

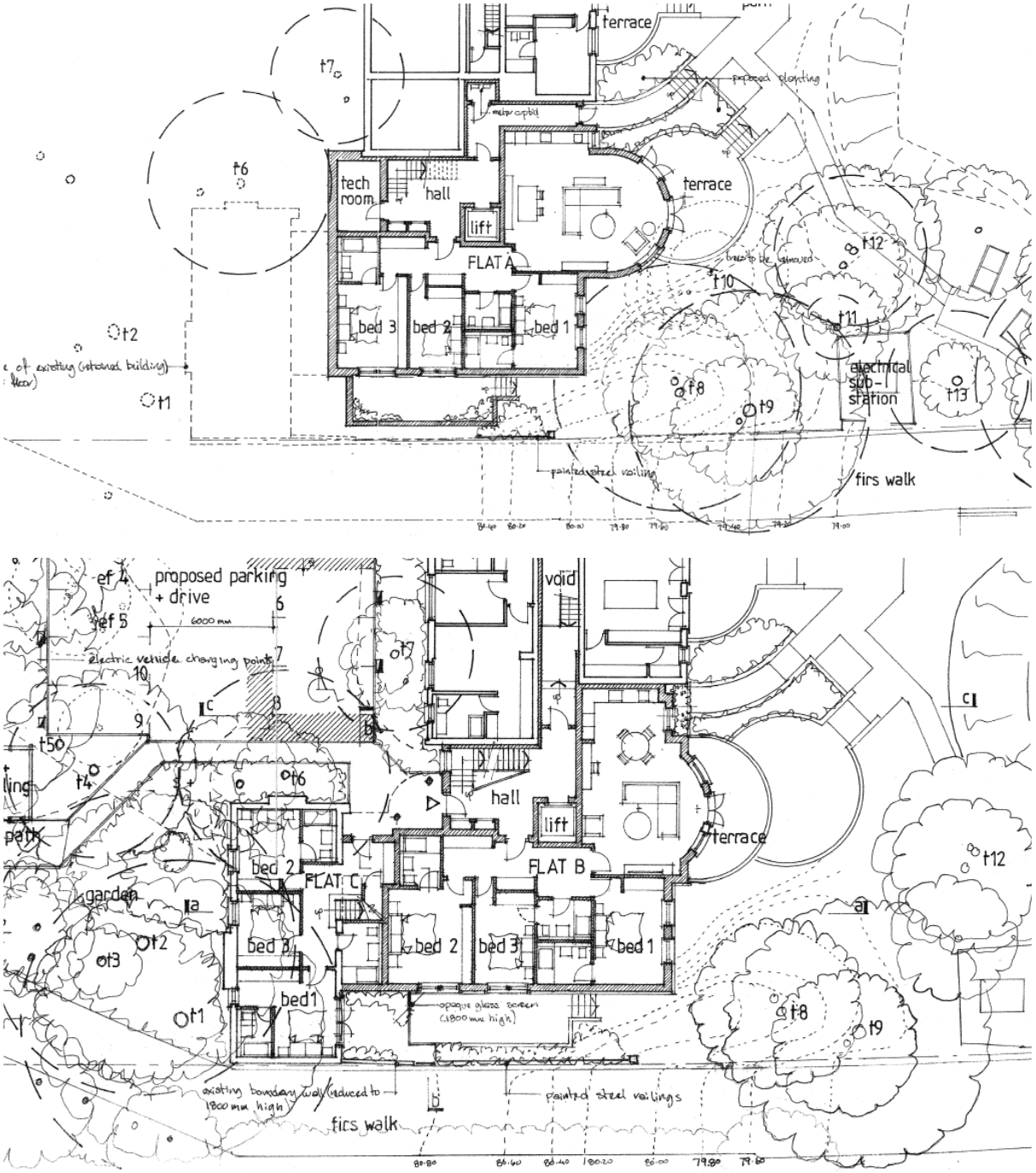

Figure 4: GNP Architects Lower Ground Floor rooms at Flat A (top) and Ground Floor rooms at Flats B and C (bottom).

PROPOSED SCHEME SUMMARY

Assessments were made of the Average Daylight Factor (ADF) and Vertical Sky Component (VSC) for measure of daylight; and probable sunlight hours (APSH/WPSH) for measure of sunlight, annually and in winter, respectively.

20 windows and 11 adjoining habitable rooms were identified in Flats A, B, and C as part of habitable spaces. Two Living/kitchen/dining (LKD) rooms and 9 bedrooms were identified for the assessment at ground floor and first floor.

All assessed habitable rooms exceed target ADF, VSC, APSH, and WPSH levels based on BRE guidelines, without factoring in the impact from surrounding trees. A full set of calculations of the daylight and sunlight access are set out in the table below.

Table 3: Full Daylight and Sunlight Test results for the proposed development

Reference*	VSC %	APSH %	WPSH %	ADF %	ADF Target %
Flat A/LGF/Bed/R1/W1	37.10	78	27	1.33	1.0
Flat A /LGF/Bed/R1/W10	32.82	69	24		
Flat A /LGF/Bed/R2/W2	24.79	-	-	1.42	1.0
Flat A /LGF/Bed/R2/W3	26.84	-	-		
Flat A/LGF/Bed/R3/W4	26.66	-	-	1.2	1.0
Flat A/LGF/Bed/R3/W5	25.38	-	-		
Flat A/LGF/LKD/R4/W6	28.35	54	20	2.11	2.0
Flat A/LGF/LKD/R4/W7	36.58	71	26		
Flat A/LGF/LKD/R4/W8	39.62	88	30		
Flat A/LGF/LKD/R4/W9	39.12	73	26		
Flat B/GF/Bed/R1/W1	37.98	79	30	2.05	1.0
Flat B/GF/Bed/R1/W14	36.75	75	28		
Flat B/GF/Bed/R2/W2	38.65	48	15	2.25	1.0
Flat B/GF/Bed/R2/W3	38.37	-	-		
Flat B/GF/Bed/R3/W4	37.22	48	15	1.76	1.0
Flat B/GF/Bed/R3/W5	36.20	-	-		
Flat B/GF/LKD/R7/W10	33.00	60	26	2.35	2.0
Flat B/GF/LKD/R7/W11	37.09	77	28		

Reference*	VSC %	APSH %	WPSH %	ADF %	ADF Target %
Flat B/GF/LKD/R7/W12	39.52	88	30		
Flat B/GF/LKD/R7/W13	37.83	77	28		
Flat C/GF/Bed/R4/W6	22.61	45	16	1.99	1.0
Flat C/GF/Bed/R4/W7	35.72	-	-		
Flat C/GF/Bed/R5/W8	38.58	-	-	1.57	1.0
Flat C/GF/Bed/R6/W9	39.57	-	-	1.48	1.0

*X/XX(X)/XX/XX – Flat No./Floor/Room Use/Room Ref/Window Ref

BRE guidelines states that it is usual to ignore the effect of existing trees and shrubs; however, for the purpose of this study we also calculated the effects of trees on daylight and sunlight access.

The LKDs to Flats A and B (Flat C LKD not assessed as it is situated at first floor) still retains a high ADF value even with the trees considered as an obstruction. The ADFs of four bedrooms fall short of the BRE recommended ADF of 1% averaging 0.37% ADF across the four bedrooms. When considering trees as an obstruction, Flats A and B only contain one bedroom that falls short of the 1% ADF and Flat C contains 2 secondary bedrooms that fall short of the criteria (see Appendix A) and so other bedrooms within the same flats achieve the 1% ADF criteria.

It is important to point out that environmental factors, such as shade, also play an important role in building design and providing natural shade in summer for mitigating overheating risk. Furthermore, natural lux levels are highest during the summer and therefore diffused daylight will be higher in summer meaning that daylight expected in rooms will be higher if unshaded.

As per BRE guidelines, trees are not typically assessed for their impact of internal sunlight:

"IN ASSESSING THE IMPACT OF BUILDINGS ON SUNLIGHT IN GARDENS (SEE SECTION 3.3), TREES AND SHRUBS ARE NOT NORMALLY INCLUDED IN THE CALCULATION UNLESS A DENSE BELT OR GROUP OF EVERGREENS IS SPECIFICALLY PLANNED AS A WINDBREAK OR FOR PRIVACY PURPOSES. THIS IS PARTLY BECAUSE THE DAPPLED SHADE OF A TREE IS MORE PLEASANT THAN THE DEEP SHADOW OF A BUILDING (THIS APPLIES ESPECIALLY TO DECIDUOUS TREES)."

CONCLUSION

Love Design Studio are appointed to prepare a daylight and sunlight assessment for the proposed development at Tormead, 27 Dene Road, Northwood. This is to assess the on-site daylight and sunlight access to rooms deemed habitable at Flat A, Flat B and Flat C based on relevant industry guidance. Although Flat C extends over two floors, rooms at ground floor were considered only.

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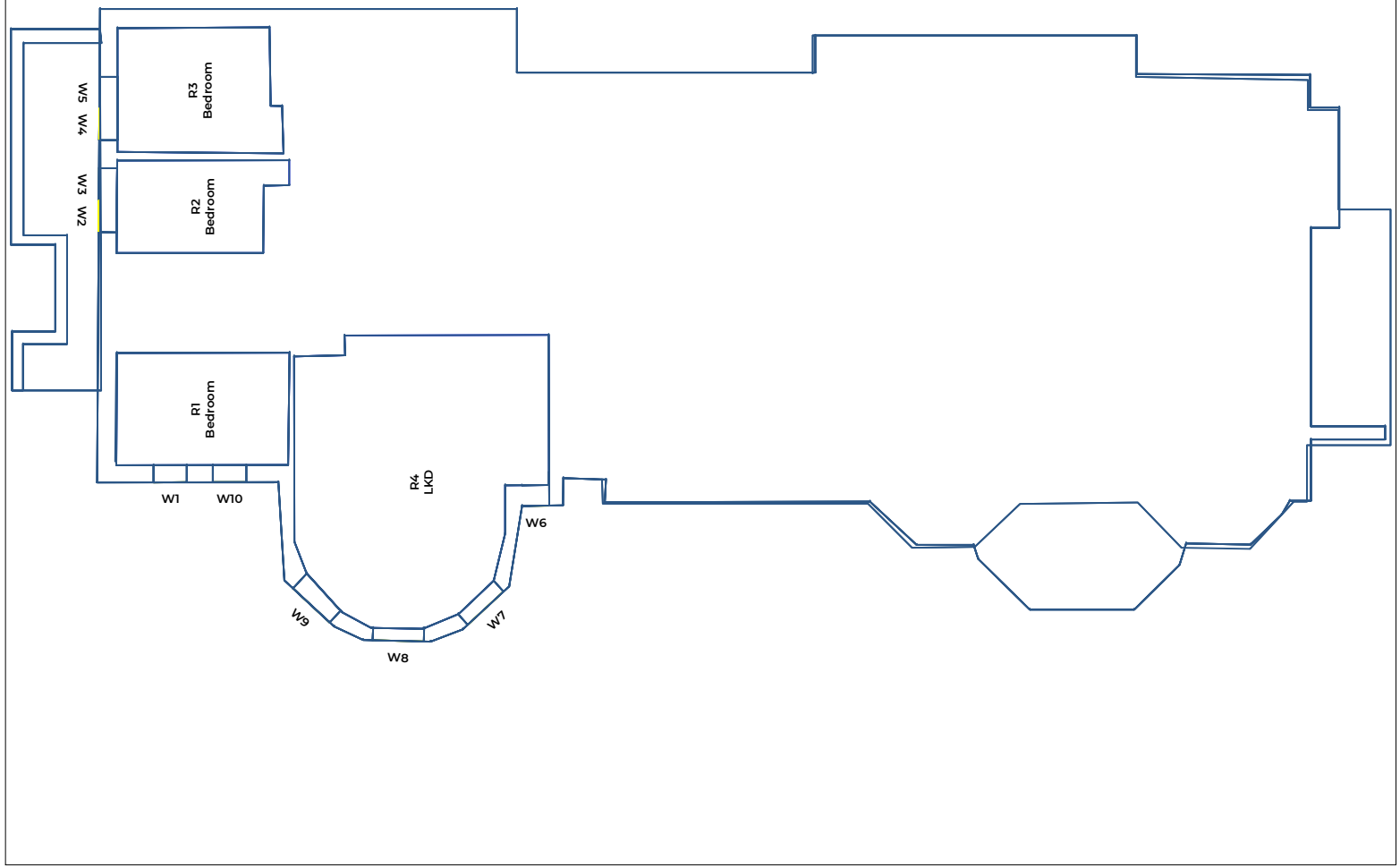
APPENDIX A – WINDOW AND ROOM LOCATIONS

The following images reference the window and room locations as per the results tables from earlier sections.

LOVE DESIGN STUD/O

Tormead, 27 Dene Rod
Lower Ground Floor
Window Ref
Room Ref



NOT TO SCALE
ILLUSTRATIVE ONLY

Date: 01/06/2022
Drawing: 442-27DR-WR/RR-LGF
Issue: 00A

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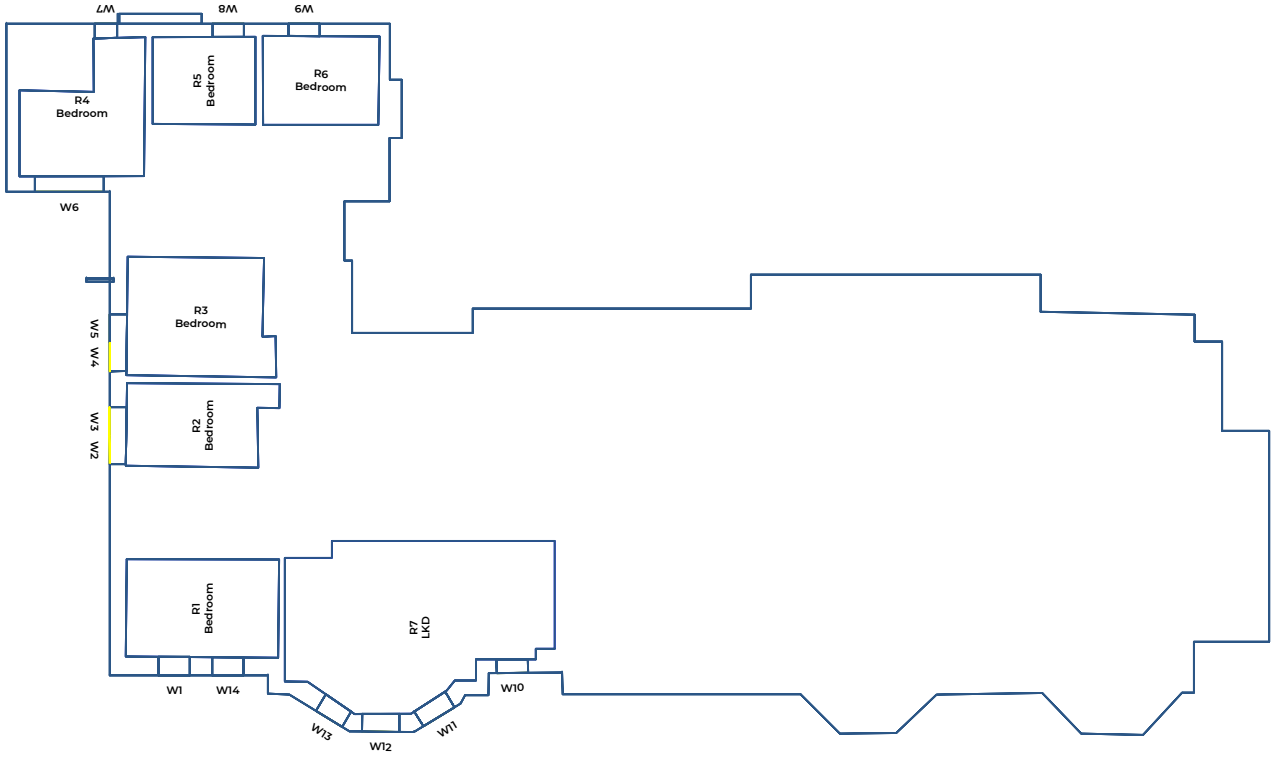
LOVE DESIGN STUD/O

Tormead, 27 Dene Rod
Ground Floor
Window Ref
Room Ref



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Drawing: 442-27DR-WR/RR-GF
Issue: 00A

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